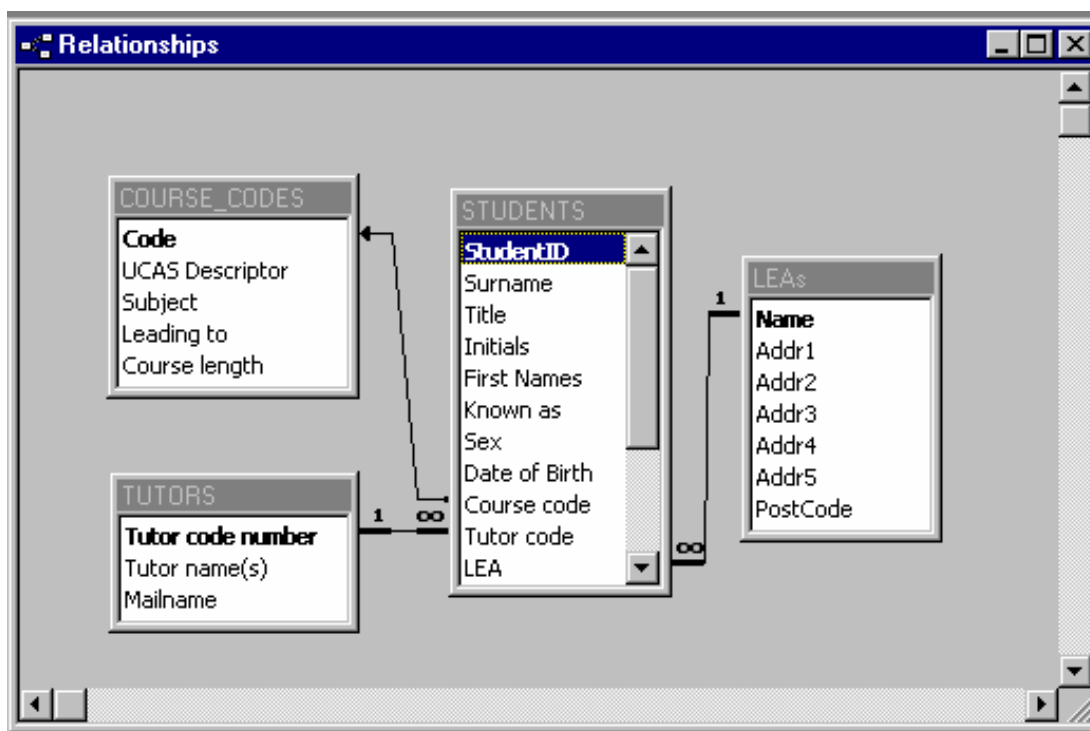


An introduction to databases using Microsoft Access 2003

This document introduces the basic concepts of working with a relational database using Microsoft Access 2003, which is accessible from the ITS Networked PC service.

The notes make use of an example database called stucol.mdb. This is available on the Networked PC service. If you do not use the Networked PC service then you can obtain a copy of the database from the ITS WWW pages.



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Conventions:

In this document, the following conventions are used:

- A typewriter font is used for what you see on the screen.
- A **bold typewriter font** is used to represent the actual characters you type at the keyboard.
- A ***slanted typewriter font*** is used for items such as filenames which you should replace with particular instances.
- A **bold font** is used to indicate named keys on the keyboard, for example, **Esc** and **Enter**, represent the keys marked Esc and Enter, respectively.
- A **bold font** is also used where a technical term or command name is used in the text.
- Where two keys are separated by a forward slash (as in **Ctrl/B**, for example), press and hold down the first key (**Ctrl**), tap the second (**B**), and then release the first key.

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1 Introduction

1.1 About Microsoft Access

Microsoft Access is the recommended PC database application at the University of Durham. These notes provide an introduction to the use of some of the facilities Access has to offer.

1.2 What you should know already

It is assumed that you are familiar with using Microsoft Windows and therefore know how to perform tasks such as accessing commands from menus on the Menu bar, selecting objects, entering information into dialog boxes and moving, closing, opening and re-sizing windows.

1.3 Giving commands

There are usually at least three different ways of giving commands when using Access — selecting from the menu bar, using toolbar buttons and right-clicking an object to open a shortcut menu of commands. Often there is a keyboard option too! These notes concentrate on the quickest methods, which are usually using the toolbar buttons or right-clicking to open a shortcut menu.

2 Database concepts

A database is used for storing data that has a certain structure to it and then maintaining and retrieving that data. It could replace manual systems such as files or card indexes.

Data are held in **tables**, with each row in a table being known as a **record**. Each record is divided up into columns known as **fields**, with each field containing certain data about that record. So, for example, a table of data for a club membership list would have one record per member of the club and each record would be split into fields such as surname, forenames, telephone number, address, town, postcode, membership fee and so on. A table maintained by a library might contain one record per book with each record split up into fields such as author, title, publisher, cost, shelf code and so on.

A database system that can perform operations on a single table is known as a **flat file** system. However, data does not always fit happily into just one table. It is often much better to hold data in a number of different tables, which can be linked together by common fields. A database that can support this type of structure is known as a **relational** database system. Access is a relational database system.

The following example demonstrates the problems of holding data in a single table and the advantages of using the relational approach.

Suppose you wished to collect data on books along with biographical details of the authors. Using the single table approach, two flawed solutions might occur:

Solution A:

Title	Author	Shelfcode	Birthdate	Birthplace
My First Book	Evans, H	389.023	8/10/38	London
My Next Book	Evans, H	389.777	8/10/38	London
A Good Novel	Wise, P	254.003	17/11/49	Manchester
Bedtime Stories	Jones, R	124.000	19/10/69/	Leeds
Another Book	Evans, H	330.127	8/10/38	London
Now Read This	Wise, P	220.034	17/11/49	Manchester

This solution suffers from repetition of data — biographical details are repeated for every book written by an author and if any detail, for example a date of birth, was found to be incorrect, it would have to be modified in many locations. This situation could lead to possible data inconsistency.

Solution B:

Author	Birthdate	Birthplace	Book 1	Book 2	Book 3
Evans, H	8/10/38	London	My First Book	My Next Book	Another Book
Wise, P	17/11/49	Manchester	A Good Novel	Now Read This	
Jones, R	19/10/69	Leeds	Bedtime Stories		

The second solution avoids the duplication of the authors' biographical details by holding only one record per author. However, authors tend to write more than one book. The more prolific authors would need many fields to contain their book titles and so the records of authors who write few books would contain a number of empty fields. Also, the book titles are no longer in just one field called Title and so the job of searching for a specific book is made more difficult.

You can see that the first solution makes it very difficult to maintain data accurately and the second solution wastes space and causes problems with data retrieval.

The correct solution is to have two tables, one called **AUTHORS** and one called **BOOKS**, which have a different number of fields and records, but have a common field through which they can be linked:

AUTHORS

Name	Birthdate	Birthplace
Evans, H	8/10/38	London
Wise, P	17/11/49	Manchester
Jones, R	19/10/69	Leeds

BOOKS

Title	Author	Shelfcode
My First Book	Evans, H	389.023
My Next Book	Evans, H	389.777
A Good Novel	Wise, P	254.033
Bedtime Stories	Jones, R	124.000
Another Book	Evans, H	330.127
Now Read This	Wise, P	220.034

Now there are two separate tables but with one field (the author's name) common to both — note the field names are not the same, but this is not important as long as the fields contain the same type of data.

The common field establishes the relationship between the two tables. That is, an author will only appear once in the **AUTHORS** table but may appear many times in the **BOOKS** table because an author may write many books. This is known as a **one-to-many** relationship. There are other degrees of relationship that can be modelled in a database but one-to-many is the most common. It is important to appreciate these relational capabilities of Access when designing a database.

3 Starting up Access

- 1 Start up Windows in the usual way.
- 2 Click on the **Start** button on the Windows taskbar.
- 3 Select **Microsoft Access**. (If you are using a stand-alone PC, you may need to select **Programs** first.)

Access opens and a task pane dialog box is displayed that gives you the option to create a new database or open an existing one.

4 A first look at the Access environment

4.1 The Access screen

When Access has opened you will see a typical Windows application screen with a menu bar, toolbar and status bar.



- 1 If necessary, maximise the Access window to full screen by clicking on the **Maximise Window** button in the top right-hand corner of the window.

You can find out what each button on the toolbar does by pausing (but not clicking) the mouse pointer over the buttons in turn. You will notice that a ToolTip appears displaying the name of the buttons.

2 Try this now.

Notice that most of the buttons are greyed out at this stage indicating that their functions are inappropriate, although you can still find out what they do.

5 A first look at an Access database

5.1 Obtaining a copy of the sample database

In order to work through the tutorial that follows you need a copy of the file **stucol.mdb** (.mdb is the extension automatically given to Access database files — **mdb** stands for Microsoft database).

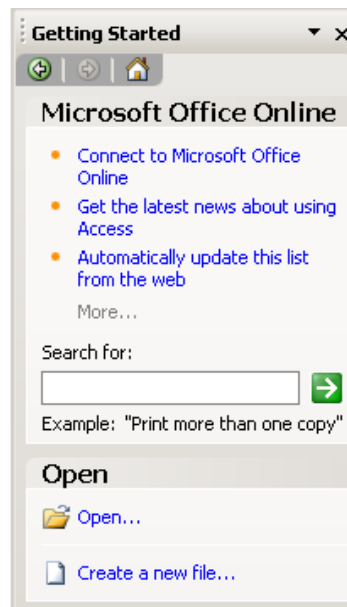
If you are working on the Networked PC service then you will need to copy this file (**stucol.mdb**) from the **its\Access** directory of **workfile on 'dudley' (T:)** to your **j:** drive.

If you are not using the Networked PC service then you will need to obtain a copy of this file (**stucol.mdb**) from the ITS WWW pages. It can be found in the **Information | Guides | Sample files** section — the URL is **<http://www.dur.ac.uk/its/info/guides/files/access/>**

There is information about how to copy files in [Guide 57: Using Windows 95/98/NT](#) and [Guide 142: Using Windows 2000](#)— **both of which** are available from the I T Service Desk.

5.2 Opening an existing database

If you worked through Section 4 above, you will have seen that each time Access is first started up, the following task pane box appears:



The lower half of the dialog box gives you the opportunity to open an existing database or create a new database.



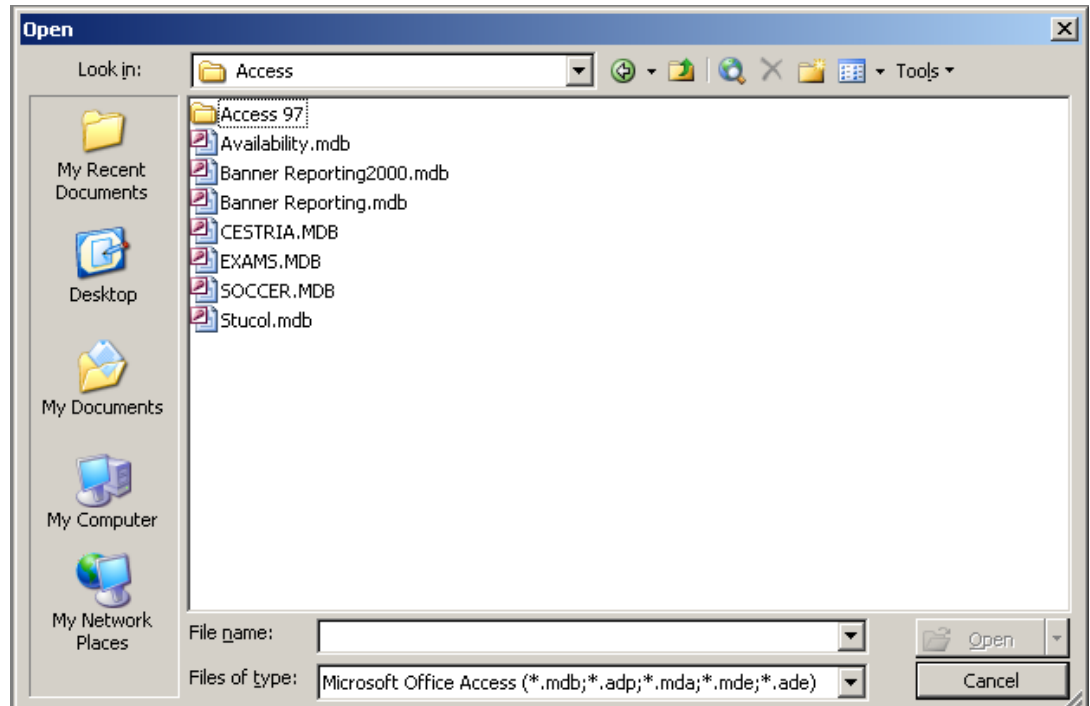
When this dialog box is not displayed, to open an existing database *either*

- 1 Click on the **Open Database** button on the toolbar.

or

Select **File | Open ...** from the menu.

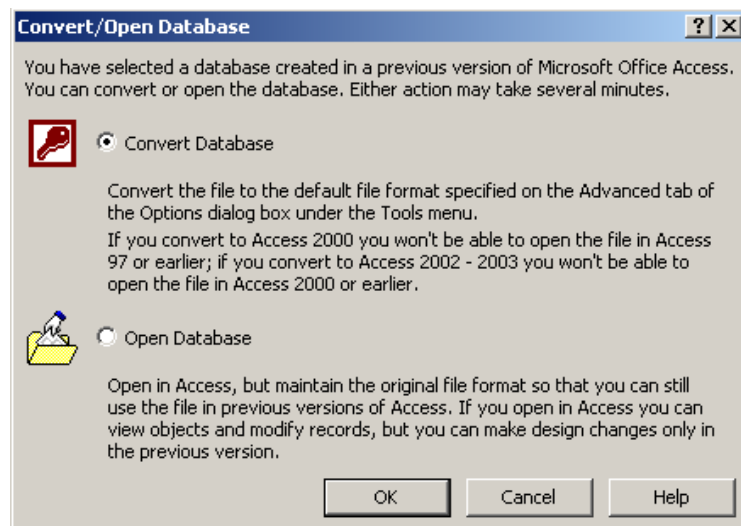
- 2 In the **Open** dialog box, move to the drive and folder where you have stored the file **stucol.mdb**.



- 3 Highlight **stucol.mdb** and click **Open**.

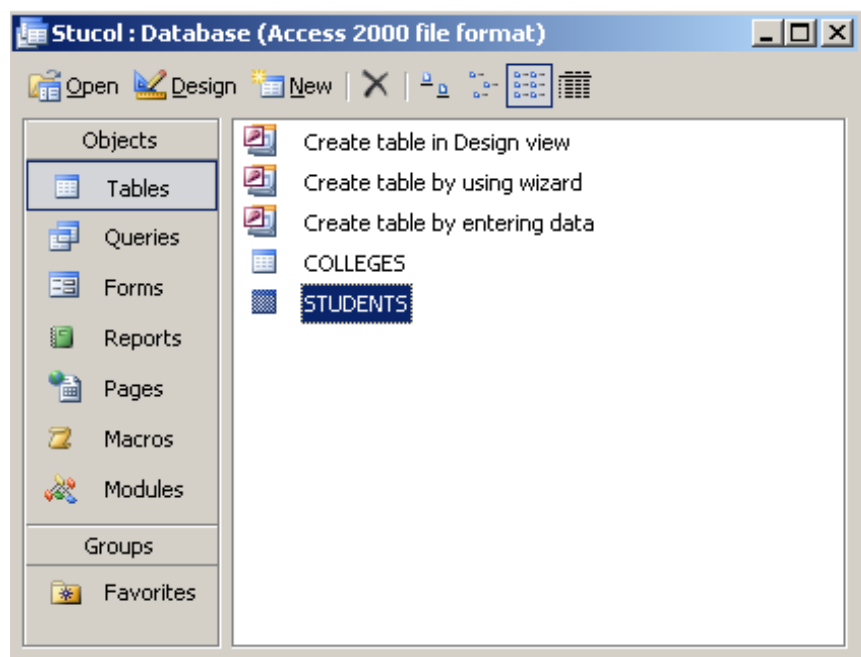
If your database was created in a previous version of Access you will be asked if you wish to convert it to an Access 2000 database or if you wish to open it.

- 4 Select the appropriate option and click **OK**.



A new window, known as the **Database window** appears. An Access database consists of a single file containing all the objects that make up the database - tables, queries, forms, reports, pages, macros and modules. You can navigate between these objects by clicking the buttons to the left of the window.

When the **Tables** button is selected you can see that this database contains just two tables, **COLLEGES** and **STUDENTS**.



5.3 The Default Database Folder

This is a good time to see where Access files are stored by default, to do this you must first have a database open.

- 1 Select **Tools | Options...** and click on the **General** tab.

The folder name is shown in the **Default Database Folder:** text box.

On the ITS Networked PC service the default folder is set to j:

On a stand-alone PC Access files are stored in **C:\My Documents** by default. You might like to change this to a more appropriate location.

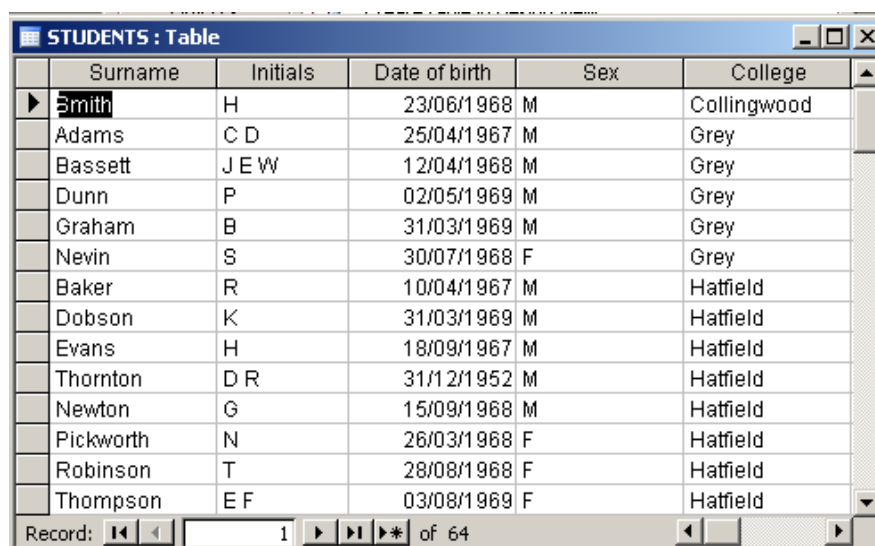
- 2 Click **OK** when you have finished looking at this dialog box.

5.4 Looking at the data tables

We will now look at the existing tables of data.

- 1 With the **Tables** button in the **Database Window** selected, click on **STUDENTS** to highlight it and then click the **Open** button.

The **STUDENTS** table opens in **Datasheet View**, so called because in this view you can see all the records that hold the student data. Notice how each student record is broken down into fields such as **Surname**, **Initials**, **Date of birth** and so on. Each record in the table occupies one line and each field a column.



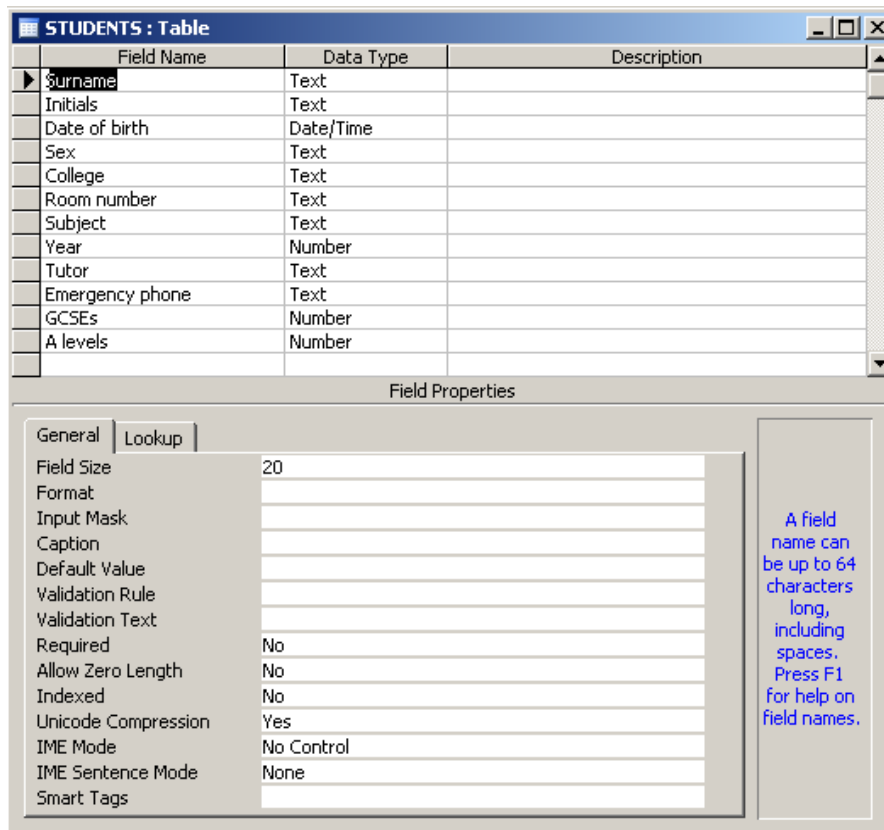
	Surname	Initials	Date of birth	Sex	College
▶	Smith	H	23/06/1968	M	Collingwood
	Adams	C D	25/04/1967	M	Grey
	Bassett	J E W	12/04/1968	M	Grey
	Dunn	P	02/05/1969	M	Grey
	Graham	B	31/03/1969	M	Grey
	Nevin	S	30/07/1968	F	Grey
	Baker	R	10/04/1967	M	Hatfield
	Dobson	K	31/03/1969	M	Hatfield
	Evans	H	18/09/1967	M	Hatfield
	Thornton	D R	31/12/1952	M	Hatfield
	Newton	G	15/09/1968	M	Hatfield
	Pickworth	N	26/03/1968	F	Hatfield
	Robinson	T	28/08/1968	F	Hatfield
	Thompson	E F	03/08/1969	F	Hatfield

To find out about the structure of the table:



- 2 Click the **Design View** button on the toolbar (the first on the left).

The window changes to display information about the table structure. You can see which fields have been defined, together with other details (which will be returned to later in the section on constructing tables).



Field Name	Data Type	Description
Surname	Text	
Initials	Text	
Date of birth	Date/Time	
Sex	Text	
College	Text	
Room number	Text	
Subject	Text	
Year	Number	
Tutor	Text	
Emergency phone	Text	
GCSEs	Number	
A levels	Number	

Field Properties

General | Lookup

Field Size: 20

Format:

Input Mask:

Caption:

Default Value:

Validation Rule:

Validation Text:

Required: No

Allow Zero Length: No

Indexed: No

Unicode Compression: Yes

IME Mode: No Control

IME Sentence Mode: None

Smart Tags:

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

To revert to Datasheet View:

- 3 Click the **Datasheet View** button on the toolbar (notice how this has now replaced the Design View button on the left-hand side).



From this exercise you can see how it is possible to toggle between the data and the design of the table.

5.5 Moving around in a table

In the open **STUDENTS** table you will notice the cursor highlighting the first field in the first record. There is also a row selector on the left-hand side pointing to the first record. There are a number of ways of moving the cursor around the table, which you should experiment with:

- 1 Use the left and right **arrow** keys, the **Tab** key or the **Enter** key to move from field to field.

Notice that when you reach the right-hand side of a table and press the right arrow, Tab or Enter key, the cursor moves to the first field in the next record.

- 2 Use the **mouse** to point and click at any field or record in the table.
- 3 Use the horizontal and vertical **scroll bars** to move around the table.
- 4 Press the **Page Down** and **Page Up** keys to move a screen at a time.

- 5 Use the **Record navigation buttons** at the bottom left-hand side of the window.



These are labelled with arrows, which enable movement to (from left to right) first record, previous record, next record and last record. The button marked with the asterisk moves to a new, blank record.

You can move directly to a particular record number by changing the number in the box between the navigation buttons and then pressing **Enter**.

5.6 Sorting records

It is possible to sort the records of a table in Datasheet view, in ascending or descending order). For this example we will sort the records by surname.

- 1 Right-click anywhere in the **Surname** field.
- 2 Select **Sort Ascending** from the shortcut menu.



Now the records are arranged in alphabetical order according to surname. To remove the sort and revert to the original table:

- 1 Right-click anywhere in the table.
- 2 Select **Remove Filter/Sort** from the shortcut menu.

It is possible to select two or more adjacent fields of a table to sort on. The records would be sorted first by the left-most column selected, then, within that, by the next column to the right, and so on.

For example, you might want to sort the records first by College, then within College by Room number.

- 1 Select the **College** and **Room number** fields by dragging the mouse through the two column headings. The two columns should then be highlighted.
- 2 Click the **Sort Ascending** button.

If you wanted to sort by **College** and within College by **Surname**, you could re-arrange the columns (to put the Surname immediately to the right of the College) and use the procedure just described. However, you can do it without re-arranging the columns using the **Advanced Filter/Sort** which is described later in this document.

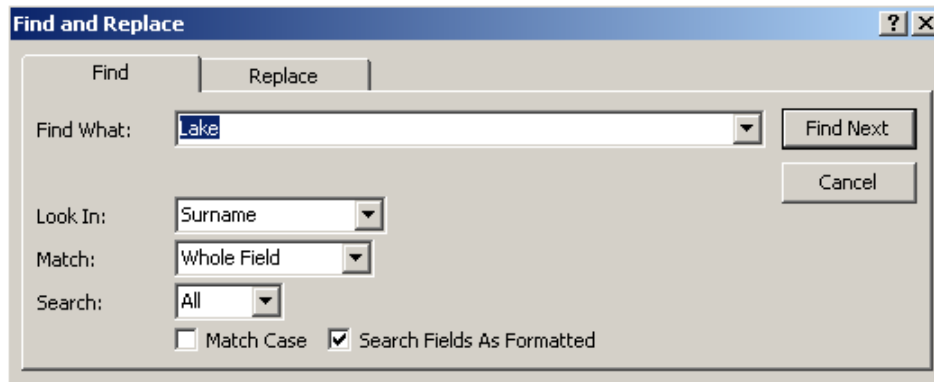
5.7 Locating specific records

The methods described above enable you to browse through a table, but it is more likely that you would want to locate a specific record (or records) according to the data contained in it. In Access you can move to a particular record by specifying the data held in one of the fields.

For example, to look for someone called **LAKE**.



- 1 Move the cursor to any cell in the **Surname** field and click on the **Find** button on the toolbar (or select **Edit | Find...** on the menu bar).
- 2 The **Find and Replace** dialog box will open.
- 3 Check that the **Look In:** option is set to **Surname**.
- 4 In the **Find What:** box, type
lake



The **Match:** drop-down list is usually set to **Whole Field** i.e. the surname must match Lake in this example. It is also possible to set it to **Any Part of Field**, which would then find people with names such as Lake, Blake or Lakerton, or to **Start of Field**, which would locate Lake or Lakerton.

Additional options are available. If you check the **Match Case** box by clicking in it with the mouse, then the value you type will have to match exactly with what is in the found record's field, including upper or lower case letters. If you leave this box unchecked it does not matter if you type **LAKE**, **Lake** or **lake**. Checking the **Search Fields As Formatted:** box would search the data according to how it is displayed rather than how it is stored by Access.

There is also a drop-down list labelled **Search:** which specifies whether to search all records (the default) or whether just to search up or down.

- 5 Click **Find Next**.

The arrow jumps to the first record with Lake in the **Surname** field. This is the only student with this name so close the dialog box.

- 6 Click **C**lose or **C**ancel.

Here are a few more searches for you to try.

- 1 Use the same technique as above to find a student called **Prior**.
- 2 Locate the record of the student in room **J69**.
- 3 What happens when you look for someone called **Bowery**?

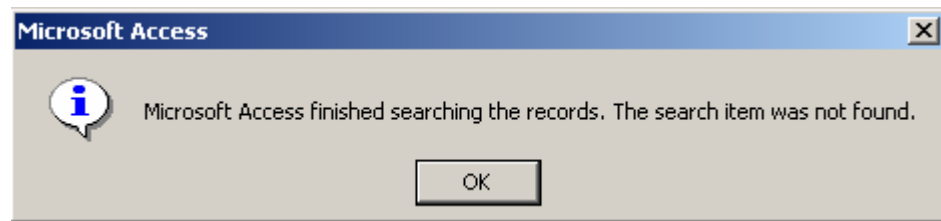
There will often be more than one record that meets your search criterion. For example:

- 1 Find the first student from **Trevelyan** college.
- 2 Having found this record, click on the **Find Next** button.

The next record meeting the search criterion is found.

- 3 Continue clicking the **Find Next** button until you have found all the records with **Trevelyan** in the College field and the end of the table is reached.

A window will appear informing you that the search is complete.



Don't be put off by this rather misleading message. As you saw, Access *did* find a number of search items — this just means that it can't find any more!

- 4 Click **OK** to close the dialog box.

If you are unsure of the exact spelling of the data item you want to find, you can include special characters called **wildcards** in your search criterion. Wildcards can also be used to restrict a search to prevent locating unwanted records, or to widen the search by looking for records that are similar but not identical. The wildcard characters include:

- ? which represents any single character
- * which represents any number of characters (including zero)
- # which represents any single numerical digit.

So, if searching for a surname, typing **R*** as the search criterion would locate all students whose surnames begin with **R**.

Typing ***john*** would match any record with the string **john** anywhere in the specified field. This might be a useful way to locate students in St John's College if you are not sure exactly how the college name has been entered into the database (perhaps as St. John's or St Johns).

Searching on **E?** on the Room number field would find students who occupy rooms in block **E** but with only a single digit (or letter) after the **E** (it will find **E1** to **E9** but not **E17** or **E123** for example).

Entering **E#** on the other hand, would match **E1**, **E2** and so on, but not **EG** or **EV**.

Note that if you want to search for a value that actually includes one of the wildcard characters, you need to enclose the wildcard in square brackets when using Find. For example, to find a record where a field value is **A*** you need to search for **A[*]**.

Try these searches using wildcards:

- 1 Find the students from **St Chad's College**.
- 2 Find all the students who live in block **T**.
- 3 Which students have two forenames?

6 Using filters

The **Find** command is used to locate a particular record or records according to field values but sometimes it may be useful to view a whole subset of records in a table (e.g. all the males or only the students from Trevelyan college). A **filter** can be used to achieve this. Filters are not as powerful as **queries**, which will be covered later in this document. However, they can be saved with a table, form or query and applied as needed when any of these objects is re-opened.

There are four methods of filtering records: **Filter By Selection**, **Filter By Form**, **Filter For Input** and **Advanced Filter/Sort**. We will now look at an example of each one.

6.1 Using Filter By Selection

If you can easily find and select an example of the value you want the filtered records to contain, use **Filter By Selection**.

Let us assume that you would like to work on a list of male students only.



- 1 Open the **STUDENTS** table if it is not already open.
- 2 In the **Sex** field, highlight an example of **M**.
- 3 Click the **Filter By Selection** button on the toolbar.



The view of the **STUDENTS** table changes to show only records for male students. Notice that the **Apply Filter** button is now 'on' and that its name has changed to **Remove Filter**. The **FLTR** indicator is also visible on the Status Bar.

- 4 Click the **Remove Filter** button.

It is also possible to filter records *excluding* selection. To do this, with the appropriate field value selected, right-click in that field and select **Filter Excluding Selection** from the shortcut menu. For example, highlighting **M** in the **Sex** field then choosing **Filter Excluding Selection** would display all the *female* students.

You can repeat the method in steps 2 and 3 above to further refine the filter. Suppose now you want to look at male students from **Trevelyan** college.

- 1 If you experimented with **Filter Excluding Selection**, make sure that you are again looking at a list of *male* students.
- 2 In the **College** field, highlight an example of **Trevelyan**.
- 3 Click the **Filter By Selection** button.



Now you are looking at male students from Trevelyan only.

- 4 Now further refine the filter to find male students at Trevelyan who study **French**.



To remove the filter:

- 5 Click the **Remove Filter** button.

6.2 Using Filter By Form



If you want to choose from a list rather than search in the records for values to filter on, or if you want to specify multiple criteria all at once, use **Filter By Form**. We will use a similar example as the section above so that you can compare the two methods.

Suppose that you want to view all **female** students at **Van Mildert**.

- 1 Click the **Filter By Form** button on the toolbar.



The **Filter By Form** window is displayed. Notice that the criteria from the last example are still displayed.

- 2 Clear these by clicking **Edit** and the **Clear Grid** button.

- 3 Click in the **Sex** field then on the down arrow that appears.



The list of the values in this field is displayed, i.e. **"M"** and **"F"**.

- 4 Select **F**.

- 5 Click in the **College** field and then on the down arrow to display the choice of colleges.

- 6 Find and select **Van Mildert**.

- 7 Click the **Apply Filter** button.



You should now be viewing a list of the four female students from Van Mildert.

- 1 Remove the last filter then repeat the method in steps 1 to 7 above to view the two **male** students from **Grey** who are studying **History**.



- 2 Click the **Remove Filter** button again when you have finished.

All the above examples have located records by applying criteria that are joined by **AND** e.g. male students from Trevelyan College. Students were only selected if they were both male AND came from Trevelyan.

It is also possible to join the criteria with an **OR**. You could for example, select all those students who are studying English or French.

- 1 Click the **Filter By Form** button.



- 2 Click **Edit** and then the **Clear Grid** button.

- 3 In the **Subject** field, select **English**.

- 4 Click on the **Or** tab at the bottom of the Filter By Form window.

- 5 In the **Subject** field, select **French**.

- 6 Click the **Apply Filter** button.

This time the students that are displayed are either studying English, or they are studying French. There should be 18 of them.



- 7 Click the **Remove Filter** button.

6.3 Using Filter For Input

If you want to type in your search criteria and are focussing on just one field, use **Filter For Input**.

- 1 Right-click in the **Sex** field to display a shortcut menu.
- 2 Click in the **Filter For:** text box and type **M** (case doesn't matter).
- 3 Press the **Enter** key.

The filter is applied to the table so that now only male students are displayed.

You can now repeat this method to further refine the filter.

- 1 Right-click in the **College** field of the filtered table.
- 2 In the **Filter For:** text box, type
Trevelyan
- 3 Press the **Enter** key.

As before, you are now viewing the male students from Trevelyan College.

- 4 Before you remove this filter, repeat steps 1 to 3 above to narrow the selection still further, to those studying **French**, so as to display just the 3 male students from Trevelyan who are studying French.

The main disadvantage of this method is that it is easy to make typing mistakes and thus unwittingly apply an incorrect filter.

6.4 Sorting filtered records

Using the three filtering methods described so far, it is not possible to sort records as part of the filtering operation. However, it *is* possible to apply a sort to the filtered table. You do this by right-clicking in the field you wish to sort on, then selecting **Sort Ascending** or **Sort Descending** from the shortcut menu. Sorting records in a table was described more fully in Section 5.6.

6.5 Advanced Filter/Sort

There are several advantages of using **Advanced Filter/Sort**. Unlike the other filtering methods, it is possible to search for records that meet multiple criteria, and sort the records, all in one operation. Criteria can be combined using AND and OR, and records can be sorted on more than one field, in a mixture of ascending and descending order.

The following example produces the records of **male** students studying **French** or **German**, sorted in ascending order by **Surname**.

- 1 Select **Records | Filter | Advanced Filter/Sort...** from the menu bar.

A dialog box called **StudentsFilter1 : Filter** opens. There is a list of all the fields in the table at the top, and a design grid at the bottom. You need to drag any fields that you want to filter or sort on, from the list onto the design grid.



- 2 First, click **Edit** and the **Clear Grid** button to remove the last filter from the design grid.
- 3 Click on **Subject** in the field list at the top of the window and drag it into the first column of the design grid.

A double click will quickly place field automatically in the next available column.

The fieldname **Subject** will appear in the row labelled **Field**:

- 4 Click in the **Criteria:** row of that column and type **French**.
- 5 In the **or:** row of that column type **German**.
- 6 Place **Sex** into the second column of the design grid.
- 7 In the **Criteria:** row of that column type **M**.
- 8 In the **or:** row of that column type **M**.
- 9 Drag **Surname** into the third column of the design grid.
- 10 Click in the **Sort:** row of that column, click the down arrow and select **Ascending**.

The design grid should now look as follows:

	Subject	Sex	Surname	
Field:	Subject	Sex	Surname	
Sort:			Ascending	
Criteria:	"French"	"m"		
or:	"German"	"m"		

- 11 Click the **Apply Filter** button.

You should see a list of seven students. Records were selected only if they satisfied *both* criteria in the **Criteria:** row **OR** *both* criteria in the **or:** row. This method could be extended over many **or:** rows if necessary.

6.6 Saving a filter

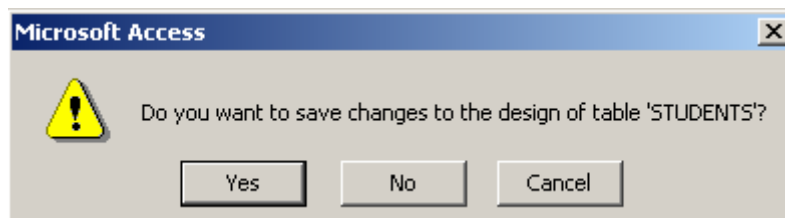
A filter can be saved with the object in which it is created – a table, form or query. It is then automatically loaded when the object is re-opened but it is not automatically applied. It is also possible to save a filter as a query.

6.6.1 Saving a filter as a query

Note that you can save a filter as a query by selecting **File | Save As Query** when either the **Filter By Form** or **Advanced Filter/Sort** window is open. If you do this you should type a meaningful name for the query into the dialog box that appears, so that you can remember what it does later, and press **OK**.

6.6.2 Saving a filter with a table, form or query

When you close a table (or form, or query) to which you have just applied a new filter, the following window is displayed:



Clicking **Yes** will save the filter along with any other changes you may have made. Next time you open the table, all records will again be displayed but you can apply the filter you saved by clicking on the **Apply Filter** button. Alternatively if you click on **No**, you will close the table without saving the latest changes.

- 1 Close the **STUDENTS** table now without saving the changes to the design.

7 Defining and using queries

Queries are similar to filters but are more powerful. Using queries it is possible to:

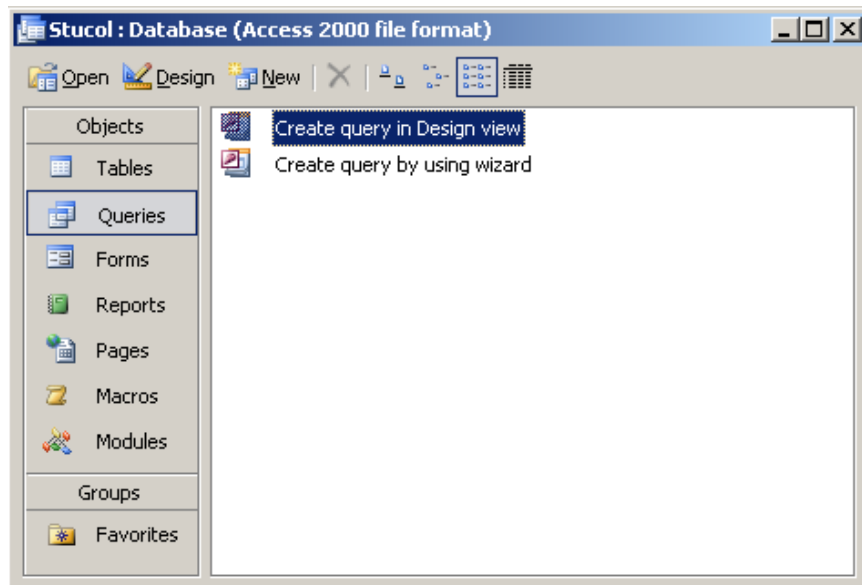
- extract the records that satisfy the search criteria into a **recordset**
- select which fields are to be displayed
- perform more complicated searches using logical operators
- carry out searches on more than one table linked together
- produce summary statistics
- calculate new values based on existing fields.

7.1 Creating a simple query

It is not necessary to have any tables open when you create a query so:

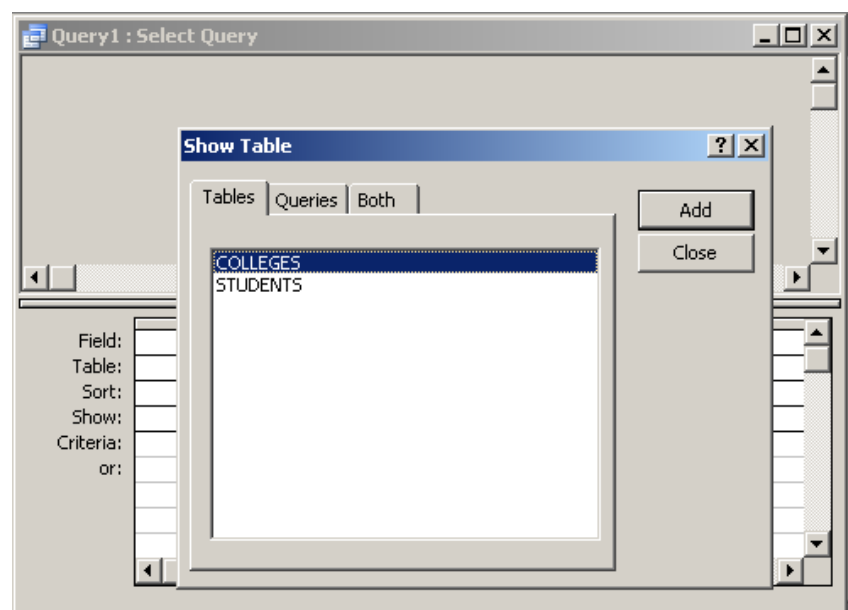
- 1 Close all windows apart from the Database window.
- 2 In the Database window, click the **Queries** button.

If there are any queries already defined in the database, they are listed here. Unless you experimented with saving a filter as a query in the last section, the Queries window will be empty.



- 3 Click **New**.
- 4 The option you need is already highlighted in the **New Query** dialog box, so click **OK**.

The **Query1 : Select Query** dialog box now opens, along with the **Show Table** dialog box, which displays the names of the tables in the database.



We are to perform a query on the **STUDENTS** table so:

- 5 In the **Show Table** dialog box click on the table name **STUDENTS** to highlight it, then click the **Add** button.
- 6 As this is the only table we need for now, click the **Close** button.

The **Select Query** dialog box is very similar to the window used for the **Advanced Filter/Sort** operation (see Section 6.5). The top half displays all the fields in the **STUDENTS** table and the bottom half contains a design grid, called the **Query By Example (QBE)** grid. One difference however, is that when a filter is applied, all fields in the table are automatically displayed, when running a query you can specify which fields are to be displayed. This is done by dragging fields from the upper half of the window to the QBE grid below.

To display all the fields in the table:

- 7 Drag the asterisk that appears in the field list in the top half of the window to the first column of the QBE grid. The asterisk is shorthand for all the fields in the table.

- 8 Run the query by clicking the **Run** button on the toolbar.

The query is processed and apart from the window title, which is now **Query1 : Select Query**, a table is displayed that looks the same as if you had simply opened the **Students** table. This table, the result of the query, is called a **recordset**, which is a viewed subset of the original table. Unlike a real table, a recordset doesn't actually exist in the database. It is created by Access from the source tables at the time a query is run. In most cases you can work with a recordset in the same way that you can work with a table. You can browse through it, select information from it, print it and even update the data in it. Any changes made to the contents of the recordset are then implemented in the underlying table(s).

- 9 When you have looked at the query result, return to the **Design view** of the query by clicking the **View** button on the toolbar.

Notice that it is possible to toggle between Design view and Datasheet view of the query in the same way as you did when looking at the **STUDENTS** table in Section 5.

7.2 Running a query on selected fields

When it is in Design view, the query we have just run can be modified to control which fields are displayed.

- 1 Clear the left-hand column in the QBE grid (which currently requests that all fields be displayed) by clicking on the grey line at the head of the column to highlight it, then pressing the **Delete** key (or select **Edit | Clear Grid** on the menu bar).

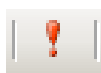
The **Students** field name, asterisk and check mark should disappear from the QBE grid.

You will now modify the query so that only the **Surname**, **Initials**, **College** and **Subject** fields are displayed in the query result:

- 1 Select the **Surname**, **Initials**, **College** and **Subject** fields from the field list in the top half of the window by clicking on **Surname**, then holding down the **Ctrl** key and clicking on each of the others with the mouse.
- 2 Drag the fields to the first column of the QBE grid and release the mouse button.

The field names will be entered into the first four columns of the grid with check marks in the row entitled **Show**:

Field:	Surname	Initials	College	Subject
Table:	STUDENTS	STUDENTS	STUDENTS	STUDENTS
Sort:				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:				
or:				



- 3 Run the query.

This demonstrates how you can select which fields are to be displayed in the query result.

7.3 Searching for particular records

Suppose now that you wish to display the four fields named above, but you only want to see the records of the female students.



- 1 Return to the query design window by clicking the **View** button.
- 2 Drag the **Sex** field into the QBE grid.

This field is needed to search for the female students, but it is not necessary to display it in the query result.

- 3 Move to the **Sex** column, click in the **Criteria:** row and type **F** (case is not important).

This type of query is known as a **query by example** (QBE) because you fill in an example of the type of record you are searching for (that is, in this case, those with the value **F** in the **Sex** field).



- 4 Run the query.

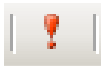
Query1 : Select Query					
	Surname	Initials	College	Subject	Sex
▶	Baxter	R	University	Art	F
	Bayles	T	St Johns	Geography	F
	Button	D S	St Chads	Comp Sci	F
	Card	V	St Marys	Maths	F
	Gaunt	A	St Aidans	Physics	F
	Hodges	A	Van Mildert	Geography	F
	Hodgson	A R	St Chads	Maths	F
	Johnson	N	St Aidans	History	F
	Lake	N F	St Chads	Art	F
	Maughan	J P	Van Mildert	Geography	F
	Nevin	S	Grey	Comp Sci	F
	Newton	D	St Cuthberts	English	F
	Parkin	V	University	Geography	F
	Peters	M	University	Comp Sci	F

Record: 1 of 28

Now that you have run the query and can see that all the records in the recordset are indeed for female students, you may wish to remove the Sex field from the resulting query result.



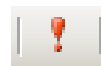
- 1 Return to the query design window.
- 2 Click in the check box in the **Sex** column.
- 3 Re-run the query.



Suppose we now wish to see a list of all the subjects studied by students at Durham University.

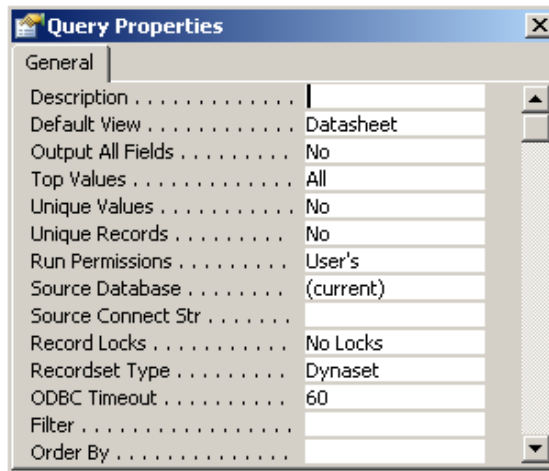


- 1 Return to the query design window.
- 2 Delete all but the **Subject** field from the QBE grid.
- 3 Click in the **Sort:** row of the **Subject** column, click the down arrow that appears and select **Ascending**, to sort the subjects in alphabetical order.
- 4 Run the query.



A list of subjects appears, but many of the subjects appear a number of times in the list, as by default, an Access query returns all records that match the criteria you specify. If you wish, you can modify the query in Design view so that only unique values are displayed in the result. Try this now.

- 1 Return to the query design window, then right-click anywhere in the background of the query design window — i.e. not on the QBE grid.
- 2 Select **Properties...** from the shortcut menu.
- 3 In the **Query Properties** dialog box set **Unique Values** to **Yes**.



- 4 Run the query again.

You should now see a list of just ten subject names.

- 5 Set the **Unique Values** property of the query back to the default value (**No**) when you have finished experimenting.

7.4 Searching for non-equalities

Using the * and ? wildcard characters it is possible to search for records that do not exactly match the specified field contents. Work through this example:

- 1 Clear the QBE grid (select **Edit | Clear Grid** from the menu bar).
- 2 Copy the **Surname**, **Initials** and **College** fields into the QBE grid.
- 3 On the **Criteria:** row of the **College** column, type
john

- 4 Run the query.

This should produce a list of all St John's College students.

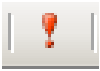
It is also possible to use non-equality operators such as <(less than) and >(greater than) in a query.

So, now you could find all the students in years **2** and **3** by dragging the **Year** field into the QBE grid and creating a query with **>1** as the search criterion.

- 1 Delete the current search criteria from the QBE grid.

A quick way to do this is to select the whole Criteria: row by clicking on the row selector at the left hand side to highlight the row, then pressing the **Delete** key.

- 2 Construct the query following the suggestion given above for the **Year** field.
- 3 Place check marks in any other fields you feel to be appropriate.



- 4 Run the query.

These operators can be used with non-numeric data.

- 1 Delete all entries currently in the **Criteria:** row.
- 2 On the **Criteria:** row of the **Surname** field type
>s

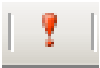


- 3 Run the query.

The result should be a list of students with surnames that begin with **S** and later letters of the alphabet.

All the queries up to now have contained search criteria based on one field only, but you will almost certainly wish to construct queries based on more than one field. For example, the following query will locate all male students in their third year:

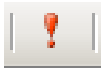
- 1 Delete current search criteria.
- 2 Type in **m** in the **Criteria:** row of the **Sex** field and **3** in the **Year** field.
- 3 Check the **Surname, Initials, Sex, College** fields.
- 4 Run the query.



When search criteria are inserted in more than one field on the same row of the QBE grid, they are joined together by **AND**. This means that the query you have just run will find only those students who are *both* male *and* in year 3.

However, it is possible to construct queries based on criteria joined by the word **OR**. For example, you may wish to find all the students in Hatfield or Trevelyan who are studying English. To achieve this:

- 1 Return to the query design window.
- 2 Delete the current search criteria.
- 3 Enter **Hatfield** as the College and **English** as the Subject on the **Criteria:** row.
- 4 Enter **Trevelyan** as the College and **English** as the Subject on the **Or:** row.
- 5 Run the query.



When search criteria are filled in on separate lines of a query they are, by implication, joined by **OR**. To put another way, records are selected if they satisfy **all** the criteria on the **Criteria:** row, **OR all** the criteria on the **Or:** row. This can be extended over many **Or:** rows.

7.5 Calculated fields

Fields can be created whose values depend on the values in other fields in the record. To demonstrate this, the total number of examination passes for

each student will be calculated. This is done by adding together their GCSE and A level passes.

- 1 Return to the query design window, delete all but the **Surname** and **Initials** fields from the QBE grid then add the **GCSEs** and **A levels** fields to the query. Ensure that all the **Show:** check boxes are checked.
- 2 In the **Field:** cell of the first empty column, type
Total Exam Passes: [GCSEs]+[A levels]

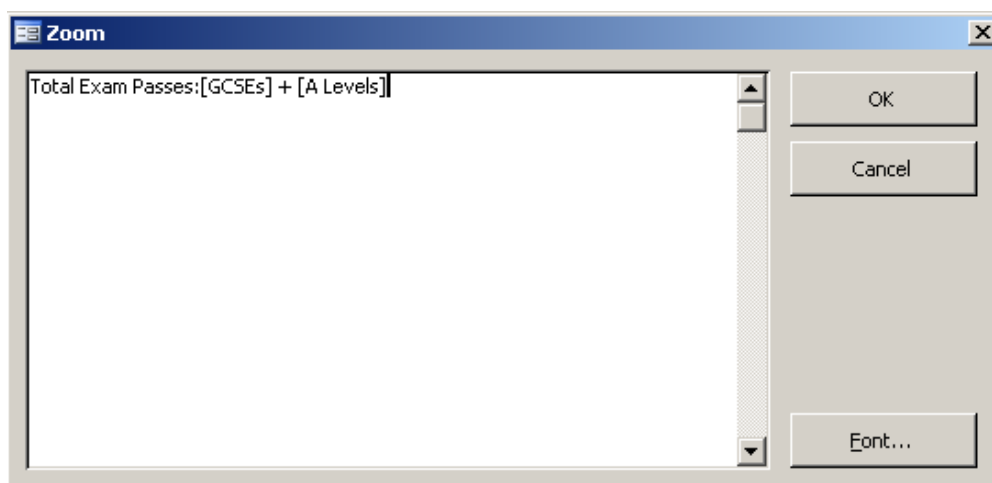
This tells Access to add the contents of the **GCSEs** and **A levels** fields and assign the total to a field called **Total Exam Passes**.

Take care to ensure that you have typed the field name *exactly* as it appears above, including the colon and spaces.

The column width of the QBE grid is too narrow to display the whole of the above expression. In order to see what you have typed, you could resize the columns in the grid by dragging their boundaries, or you could use the **Zoom** facility.

- 3 Make sure the text insertion point is within the cell holding the expression you wish to zoom in on, then press **Shift/F2**, or right click and select **Zoom....**

The **Zoom** dialog box appears. In this box you can view and edit the contents of the expression you have just typed.



- 4 Click **OK** to close the **Zoom** box.
- 5 Make sure the **Show:** box is checked.
- 6 Run the query.



You should see a table displaying the exam passes for each student together with a new field displaying their total number of passes.

Note that the new field has been named **Total Exam Passes** as you specified in the expression.

7.6 Summary statistics

As a variation on the theme of calculated fields, it is also possible to use functions to provide summary calculations *through* records, rather than *across* fields in a record. As an example of this, suppose we want to calculate the total number of GCSE and A level passes in the whole student population.



- 1 First remove the **Surname**, **Initials** and **Total Exam Passes** fields from the query.
- 2 Click on the **Totals** button on the toolbar. This opens a **Total:** row in the query window.
- 3 Move to the **GCSEs** field, click in the **Total:** cell and then click on the down arrow to reveal a list of available functions.
- 4 Select **SUM**.
- 5 Repeat steps 3 and 4 for the **A levels** field.

Field:	GCSEs	A levels
Table:	STUDENTS	STUDENTS
Total:	Sum	Sum
Sort:		
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:		
or:		



- 6 Ensure that both fields are checked, then run the query.

You should get an answer table that displays two figures – one giving the total number of GCSE passes in the student population and the other the total number of A level passes. Access displays field headings that reflect the type of calculation carried out. In this case the fields are headed **SumofGCSEs** and **SumOfAlevels**.

- 1 Now add the **College** field to the query. The **Total:** row contains **Group By** by default.
- 2 Re-run the query.



This time you will get an answer table containing the total number of GCSE and A level passes for all students, broken down by college.

The **SUM** function is only one of many available in Access. Others that you will probably find useful are **AVG** (Average) and **COUNT**.

- 1 Use these functions to calculate the average number of GCSE passes and number of students, broken down by college.

7.7 Summary of operators available in queries

Arithmetic Operators:

+	Adds two operands. e.g. [GCSEs]+[A levels]
-	Subtracts two operands. e.g. [Value]-30
-(unary)	Changes sign of operand. e.g. -6789
*	Multiplies two operands. e.g. [Units]*[Unit Price]
/	Divides one operand by another. e.g. [Total] / 2
\	Divides one integer operand by another. e.g. [Units] \ 4
Mod	Returns remainder of division by an integer. e.g. [Units] Mod 5
^	Raises an operand to a power (exponent). e.g. [Value] ^ [Exponent]

Comparison Operators:

=	Equal to. e.g. =69
>	Greater than. e.g. >69
<	Less than. e.g. <69
>=	Greater than or equal to. e.g. >=69
<=	Less than or equal to: e.g. <=69
<>	Not equal to. e.g. 69<>96

Logical Operators:

Return the logical values **True**, **False** or **Null**.

And	Logical and.
Or	Logical or.
Not	Logical not.

Other Operators:

Is	Used with Null to determine if a value is Null or Not Null. e.g. Is Not Null
Like	Determines whether a string value matches a "pattern". Used in conjunction with wildcards (see Section 5.6). e.g. Like "JOHN"
In	Determines whether a string value is equal to any of a list of values. e.g. In("Collingwood", "Grey", "Hatfield")

Between Determines whether a numeric value lies within a range of values.
e.g. Between 30 and 50

8 Properties of objects

Sometimes the results in a **recordset** (table resulting from a query) may not be presented to your liking. For example, the average number of GCSE passes is displayed as a figure with 10 or more figures after the decimal point, when two figures after the decimal point, or even just a whole number, would suffice.

8.1 What are objects?

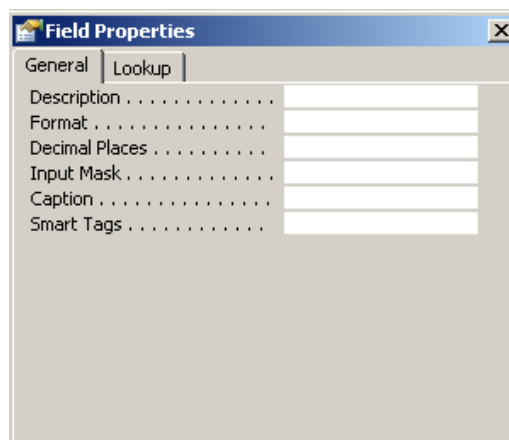
Access is an **object oriented application** — that is, it is made up of different components called **objects**. Tables, fields, forms, reports and queries are a few examples of objects in an Access database system. An object has certain characteristics associated with it, known as **properties** e.g. its name, size, colour etc. The properties of an object can usually be inspected and altered.


Right-clicking an object with the mouse generates a shortcut menu to its list of properties, along with a list of the operations that may be carried out on it.

8.2 Changing object properties

We will now alter the GCSE field property in the query you have just run so that running the query results in a more sensible number format for the average number of passes.

- 1 Return to the query design window.
- 2 Right-click in the **GCSEs** field of the QBE grid.
- 3 Select **Properties...** from the shortcut menu to display the **Field Properties** dialog box.



- 

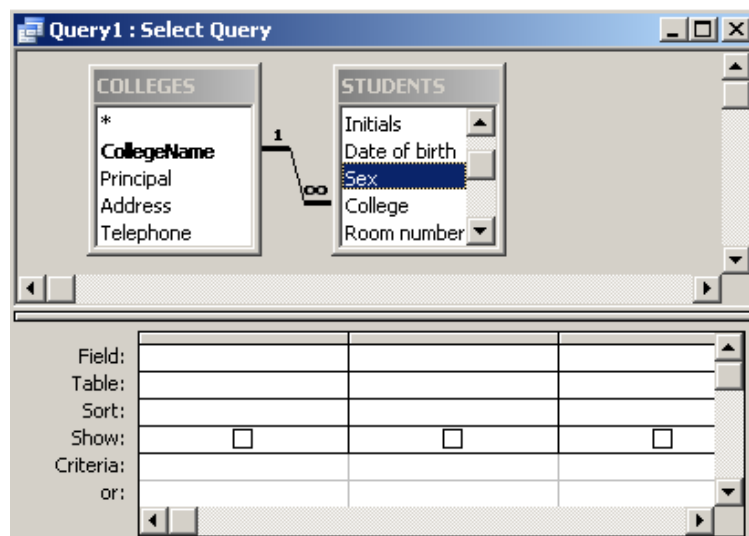
This could be carried out on any table, not just a recordset.

maths and then communicate with their college principal. The data about the college principal is in a different table from the student data. The task *could* be achieved by a two-stage query: first find the maths students and then, knowing the college, look up the relevant principal. A much more efficient method is to use the relational capabilities of Access to run a query on more than one related table.

The **COLLEGES** and **STUDENTS** tables have a **one-to-many** relationship between them. Each college has many students but a student is a member of only one college. Each college name will only appear once in the **COLLEGES** table (the 'one' side of the relationship), but may appear many times in the **STUDENTS** table (the 'many' side). The common field that establishes this relationship and joins the two tables is the one containing the college name. (Remember that it does not matter whether the fields have different names, just that they contain the same type of data.)

- 1 Close the **COLLEGES** table.
- 2 Click on the **Queries** button in the database window, double-click **Create query in Design view** to open a new query in Design view.
- 3 In the **Show Table** dialog box, add both tables to the query by highlighting each one in turn and then clicking the **Add** button.
- 4 Close the **Show Table** dialog box.

You should now see a query design window with the fields from the two tables available.



Notice that there is a line linking the two tables by the College name fields. Access displays a "1" above the line to show which table is on the "one" side of the relationship and an infinity sign "∞" to show which table is on the "many" side. The join line exists because when the database was set up, the designer defined the relationship between the two tables. Defining relationships between tables is covered in Section 13.

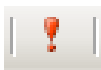
- 5 Drag the fields needed for the query into the QBE grid.

These should be **Surname**, **Initials**, **Subject** and **College** from the **STUDENTS** table, and **Principal** and **Telephone** from the **COLLEGES**

table. (It is usually better to take the linking field from the “many” end of a one-to-many relationship.) Do not drag the field from both tables or this information will be displayed twice in the query result.

- 6 Now fill in the criterion on which you are searching by typing **Maths** in the **Criteria:** row of the **Subject** field.

Field:	Surname	Initials	Subject	College	Principal	Telephone
Table:	STUDENTS	STUDENTS	STUDENTS	STUDENTS	COLLEGES	COLLEGES
Sort:						
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:			"maths"			
or:						



- 7 Run the query.

You will be provided with a list of all maths students and in each record the relevant principal and telephone number appears, even though this information occurs only once in the **COLLEGES** table.

9.2 Sorting the recordset

It may be helpful to sort a recordset in some specific manner. For example, you could sort the list by college, so that all students from the same college appear together. Data in a recordset can be sorted by one or more fields. Access uses the order of the fields in the query window to determine which will be sorted first. The specified fields are sorted from left to right.

Later in these notes, **keys** and **indexes** will be discussed. These provide an alternative and more efficient way of displaying tables in different orders.



- 1 Return to query **Design view**.
- 2 Click in the **Sort:** cell of the **Surname** field and then on the down arrow that appears to reveal a list of sort options.
- 3 Click on **Ascending**.
- 4 Do the same with the **College** field.
- 5 Run the query.



The recordset is sorted by **Surname** as first, which is not as intended. This is because the **Surname** field is to the left of the **College** field in the query QBE grid of the query design window (if you added the fields to the query in the order described earlier), and fields are sorted from the left.

- 1 Return to the **Design view** of the query.
- 2 Click the grey bar at the top of the **College** field to select it, then click on it again and hold the left mouse button down. Drag the column to the **Surname** field. When the mouse button is released, the **Surname** field will move to the right and the **College** field will be inserted to its left.



- 3 Re-run the query.

You should now find the recordset sorted and displayed as intended.

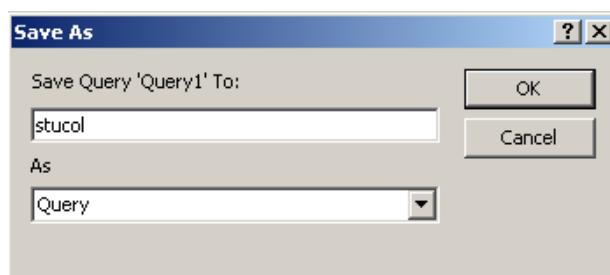
9.3 Saving queries

You could now save this query, along with its recordset properties, so it can be run again at a later date or used as a starting point for future queries.

- 1 Select **File | Save As...** from the menu bar.

The **Save As...** dialog box will appear.

- 2 Enter a suitable name for the query, such as **StuCol**.



- 3 Click on **OK**.

The query will be saved in the **stucol.mdb** database file in the queries section.

- 4 Close the query window to return to the Database window.

The query can be retrieved by selecting the **Queries** button, highlighting its name and clicking on **Open**.

- 1 Retrieve the **StuCol** query now. The query will be run automatically if you choose **Open**.
- 2 Use this same query as a proforma for a query to find all the **Physics** students.

9.4 Saving and printing a recordset

Every time a query is run, the resulting recordset contains the very latest data from the table(s) upon which the query is based. When a query is closed, the recordset no longer exists but the data that it contained is still stored in the underlying table(s). This type of query is known as a select query, as all it does when it is run is select and display data. Therefore, if you always want the contents of a recordset to be up to date, it is not usual to save them in a permanent form.

However, there could be times when it is helpful to save a recordset as a separate, permanent table in Access (perhaps to create a subset of data to transfer to another database or user). Access does this by creating a special sort of query — a **make-table query**. If you do this, it is important to remember that the created table will only contain a snapshot of the data as it existed at that particular point in time — it will not be modified if you later

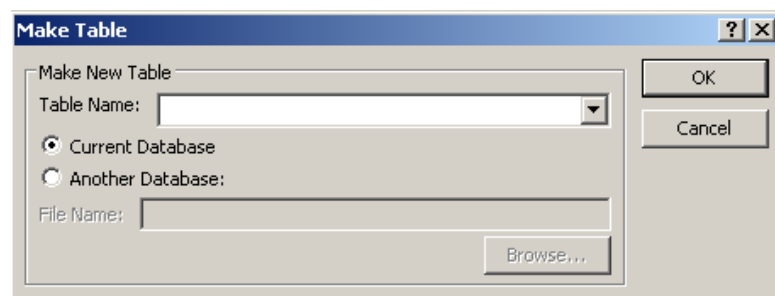
modify data in the underlying table(s). This is known as an action query, as it is performing an action (i.e. making a table) when it is run.

To save the recordset produced by running **StuCol** as a table:



- 1 Open the **StuCol** query and notice the number of students retrieved.
- 2 Change the query to **Design view**.
- 3 Click on the down arrow next to the **Query Type** button on the toolbar and select **Make-Table Query...**
- 4 Enter the name of the new table into the **Make Table** dialog box.

Choose a name that indicates what records will be in the new table. The name must be different from all the tables and queries that you already have in this database.

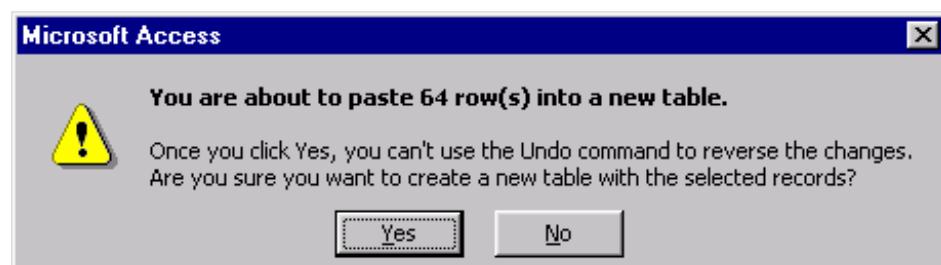


- 5 Click **OK**.

The title of the query design window changes to **StuCol: Make Table Query**. You can modify the contents of this window like any other query. For example, if you were extracting the data to pass on to someone else, they may want the students' room numbers to be included.

- 6 Click the **Run** button to run the query and create the table.

A window will appear to inform you of the number of records to be pasted to the new table.



- 7 If the number of records to be pasted is the same as the number you noted when the original query was run, click **Yes**.
- 8 Close the query without saving it.
- 9 Now click the **Tables** button in the Database window and you should find the new table there containing the records you are expecting.

It is also possible to save a recordset in a variety of other file formats, for example a plain text file, an RTF file (for use in a word processor), or an Excel spreadsheet.

With the original query in Design view select the **File | Export...** command from the menu bar. Type a name in the **File name** dialog box, choose a file type from the **Save as type** ... drop down menu and click **Export**.

You may wish to print a recordset to produce a permanent hard copy. Printing is covered in the following section.

9.5 Parameter queries

The queries described so far have included specific criteria, which have to be edited when different search criteria are needed. For example, the **StuCol** query extracts **Maths** students but would need editing if you wanted to find **Chemistry** students. A **parameter query** is useful when you want to produce a general query that will prompt you for the search criteria each time it is run. As an example, we will create a modified version of the **StuCol** query.

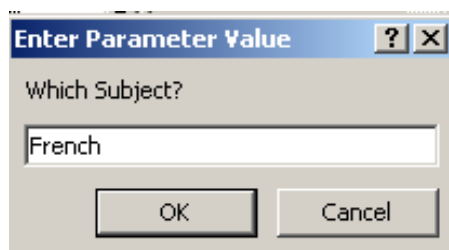
- 1 Open the **StuCol** query in **Design** view.
- 2 The **Criteria:** row of the **Subject** field currently displays a specific subject (probably "Maths"). Delete this and type
[Which subject?]

This is a parameter, which must be enclosed in square brackets. The text within the brackets will be displayed when the query is run.

Note: the text cannot be exactly the same as a field name (i.e. **subject** will not work, **subject?** will work).



- 3 Run the query.
- 4 Type **French** into the **Enter Parameter Value** dialog box.



- 5 Click **OK**.

A list of the students studying French should appear.



- 6 Return to **Design** view and re-run the query, this time typing **Comp Sci** as the subject criterion.

A list of Computer Science students is generated.

- 7 Return to **Design** view again and select **File | Save As...** to save this version of the query with a different name, say **StuCol-parameter**.

You have now saved a generalised parameter query, which can be used to find students studying any subject.

- 1 As an exercise, create a parameter query to extract all students from a particular college, which you specify when the query is run.
- 2 Now adapt this to extract all students from a particular college and of a certain sex.

Note that you can use a parameter for any of the criteria anywhere on the QBE grid and so combine them using AND or OR as required.

9.6 Query wizards

As you have been creating new queries you may have noticed options in the New Query dialog box to use various types of **wizard**. **Query wizards** are designed to help you create queries quickly and easily by walking you through the stages of query creation and then displaying the query on the screen when you click **Finish**.

The **Simple Query wizard** helps you to build a very simple query design by prompting you for the basic components (tables, fields etc.) you want in your query. If you try using this wizard, you will see that it is still necessary to enter search criteria, sort orders and so on, as you were doing earlier in this section.

The remaining three wizards help to build less straightforward queries - crosstab queries and queries to find duplicated or unmatched rows. These types of queries are not frequently used and are outside the scope of this introductory document.

10 Printing datasheets

It is possible to print all or part of a datasheet (whether from a table, query or form) directly from Access. It is important to ensure that the correct printer has been selected (particularly if you are working on the ITS Networked PC service) and that the page setup attributes are appropriate.

- 1 Choose a table or a query and open it so that its records are displayed as a datasheet.
- 2 Select **File | Page Setup...** from the menu bar.
- 3 In the **Page Setup** dialog box, click on the **Margins** tab to specify the margin sizes and on the **Page** tab to check the paper size and orientation. Remember that all ITS laser printers use true A4 cut sheets.
- 4 Close the **Page Setup** dialog box — click on **OK** to save any changes you have made, or **Cancel** if you have made none.

Clicking the **Print** button on the toolbar would send the output directly to the default printer without further prompting, but it is usually best to use the **File | Print...** command from the menu bar so that you can check that the remaining print settings are as you would wish.

- 5 Select **File | Print...** from the menu bar.
- 6 In the **Print** dialog box, check that the printer in the **Name:** box is the one to which you want to direct the output.

If you are using an ITS computer classroom, you can either print to the self-service laser printer serving the room you are in, or to a laser printer in the main Computer Room in the Computer Centre. Notice that the **Print** dialog box also gives you the opportunity to print multiple copies or to print selected pages or records.

- 7 When you are satisfied that all the settings are correct, click **OK**.

If you are using the Networked PC service your print job will now be queued.

11 Exiting Access

- 1 Close all windows by clicking the **Close** button at the top right-hand corner of the Access window.

If there is anything that you have forgotten to save, you will be prompted to do so as the application closes down.

This concludes the first part of this Access tutorial.

Reminder: If you are using the Networked PC service, you must remember to logout before you leave the computer.

12 Creating tables, entering and editing data

When designing and setting up any database, it is good practise to spend some time at the beginning thinking carefully about which tables you want in the database and the relationships between them. Time invested in getting the structure of the database right before data are entered can save a lot of time later on.

When looking at the design of your database, think about what data goes into which table, and consider the following points:

- what data do you have — or might you have
- what do you want to do with it
- avoid duplication of information
- avoid redundancy
- can you identify each record uniquely?
- avoid dangling references

As an example of how to create an Access table, we will add a new table to the existing **stucol.mdb** database.

- 1 Start up Access as described in Section 3 of this document.
- 2 Choose **stucol** from the list of database files in the task pane and click **OK**.

If **stucol** is not in the list, click **More Files...** to locate it, then click **Open**.
- 3 In the Database window, check that the **Tables** button is selected and click on **New**.
- 4 In the **New Table** dialog box, select **Design View** then click **OK**.

12.1 Defining fields

You now need to enter the names of the fields you want into the table design window, together with their data type and where necessary, size.

Field names can be a maximum of 64 characters long and may contain embedded spaces if required.

Access supports ten data types, each with a specific purpose. The most common data types are:

Text — For alphanumeric data, up to 255 characters in length.

Number — Numeric data, except money, on which you may wish to perform numerical calculations.

Currency — Used for monetary data, usually displayed to two decimal places.

Date/Time — These can be displayed in a range of available formats, or it is possible to create your own.

Memo — Fields that contain lengthy pieces of text, usually comments or explanations too long for text fields. A memo field may contain up to 65,535 characters.

Autonumber — A unique value generated and incremented by Access for each new record entered in a table.

Yes/No — Fields that can only take the value **Yes** or **No**, sometimes also referred to as Boolean values (true/false).

We will now set up a simple table to store data about the departments in the university.

- 1 In the **Field Name** column type
Department
- 2 Press the **Tab** key to move on to the **Data Type** column.
- 3 The default data type, **Text**, is entered automatically. Click on the down arrow to see the other data types that are available, then click away from the drop down list to accept this default.

- 4 Moving into the **Data Type** column caused the **Field Properties** box to open in the lower part of the window. The default field size of 50 characters is rather long for departmental names, so highlight it in the first row and type in **12**.

Field Name	Data Type	Description
Department	Text	

Field Properties

General | Lookup

Field Size: 12

Format:

Input Mask:

Caption:

Default Value:

Validation Rule:

Validation Text:

Required: No

Allow Zero Length: Yes

Indexed: No

Unicode Compression: Yes

IME Mode: No Control

IME Sentence Mode: None

Smart Tags:

The maximum number of characters you can enter in the field. The largest maximum you can set is 255. Press F1 for help on field size.

- 5 It is not necessary to set any more field properties for the moment, so click in the second row of the Field Name column ready to enter a second field.
- 6 Complete the table definition by entering the fields shown below:

Field Name	Data Type	Size
Head	T	30
Location	T	25
Budget	C	
Student Places	N	

Note that you can type the first letter of a data type and Access will fill in the data type automatically. Alternatively, click the down arrow and choose the data type from the drop down list. Also note that it is not necessary to specify a size for numeric or currency fields.

Field Name	Data Type	Description
Department	Text	
Head	Text	
Location	Text	
Budget	Currency	
Student Places	Number	

Field Properties

General | Lookup

Field Size: 12

Format:

Input Mask:

Caption:

Default Value:

Validation Rule:

Validation Text:

Required: No

Allow Zero Length: Yes

Indexed: No

Unicode Compression: Yes

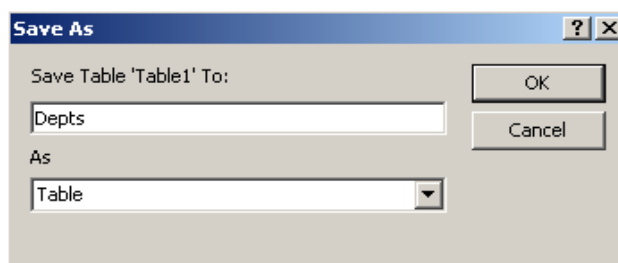
IME Mode: No Control

IME Sentence Mode: None

Smart Tags:

Having now completed the table design, you must save it before you can change to Datasheet view.

- 1 Select **F**ile | **S**ave **A**s
- 2 In the **Save As** dialog box, overtype the suggested table name with the name **DEPTS** and click on **OK**.



- 3 Click on **N**o when asked if you want to create a primary key. (Keys are covered in the next section.)
- 4 Click on the **V**iew button on the toolbar to see the new empty table in **D**atasheet view.



12.2 Checking and modifying table structure

Once a table has been created, its design can be checked at any time by clicking on the **V**iew button to return to Design view. It should, of course, be open and be the currently selected table.

Sometimes, it will be necessary to correct a mistake in a table design or to carry out a modification to its structure. If there is no data in the table or any other database objects such as queries, forms or reports based upon it, then changes to fields do not present any problems. Otherwise, care must be taken. For example, if you change the data type of a field in a populated table this may cause loss of data if the new data type is not compatible with the existing type and format. It therefore makes good sense to take time to get the design of tables right before any data are entered, to avoid difficulties later.

You will now add a field to the **DEPTS** table. Since this table is empty of data, this operation presents none of the problems described above.

- 1 Click the **V**iew button to return to the table design window.
- 2 Add a sixth field, called **Comment**, of data type **Memo**. Notice that you do not need to enter a field size.
- 3 Click the **V**iew button again to return to **D**atasheet view.

A message appears to warn you that you must first save the table.

- 4 Click **Y**es to save the modified table and return to Datasheet view.



12.3 Entering and editing data in a table

When the table is returned to Datasheet view, the insertion point is ready in the first field of the first record. A table must be in Datasheet view for data to be entered directly into it.

- 1 Type in some appropriate data for the departments of **Maths**, **Geography**, **French** and **Comp Sci**.
- 2 Make up your own data for the other fields.

When entering figures in the **Budget** field it is necessary only to type in the value — there is no need to type £ signs or commas for example, and the amounts are automatically shown with two decimal places.

- 3 Make changes to existing entries simply by clicking in a cell and changing its contents.

It is important to realise that any changes you make to the data are saved into the database file as you go along. Although you are required to provide confirmation of changes to a table's design, you are not normally prompted to confirm individual changes to the data. Neither do you have the option when you close Access to discard the changes you have made (in the way that you can with applications like Word and Excel for example).

12.4 Inserting and deleting records

12.4.1 Inserting new records

You can add a new record to a table without needing to see the other records, by using the **Data Entry** command. This takes you straight to a new, blank record.

- 1 Select **Records | Data Entry**.

A blank record is visible with the insertion point positioned in the first field.

- 2 Type data for the mythical **Astrology** department into the blank row.

When you have finished, just close the table. The changes will be saved automatically.

- 3 Open the **DEPTS** table again. The new record has been added.

You can also add data to a table while the other records are visible. If a table is updatable, this is indicated by the existence of a single blank record in the last row of the table, with an asterisk in the row selector on the left-hand side. If a table is Read Only this record does not appear.

As soon as the insertion point is placed in this row, the asterisk changes to the row selector arrow.

- 4 Click in the first field of the blank row and enter data for the mythical **Meteorology** department.

A new blank row appears under the row you have just entered.

12.4.2 Deleting records

To delete a complete record (or records), first select the record(s) and then use the **Delete** command.

- 1 Select the Astrology and Meteorology records you have just entered by clicking in the row selector on the left-hand side of the **Astrology** record and dragging to the **Meteorology** record below.
- 2 Right-click anywhere in the selected records and select **Delete Record** from the shortcut menu (or simply press the **Delete** key.)
- 3 Click **Yes** to confirm deletion of the records.

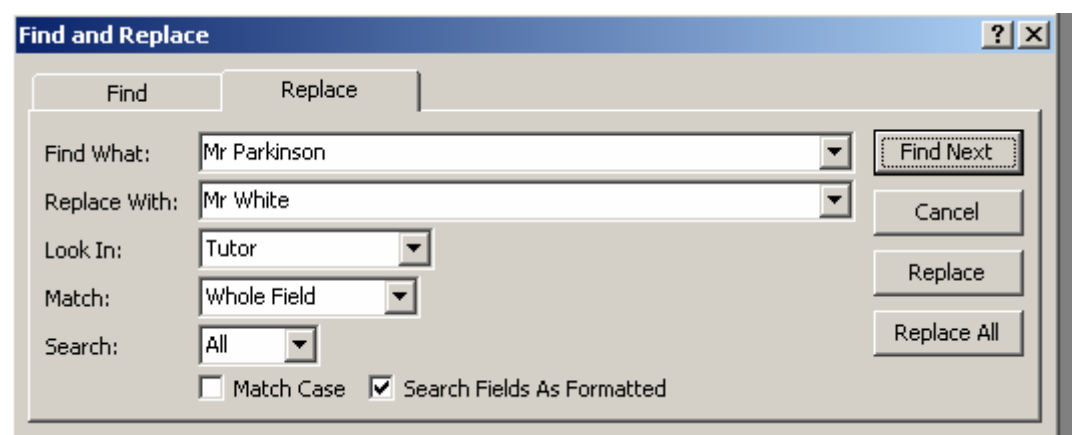
12.5 Making global changes to data

Rather than making changes one at a time as described above, Access provides ways of changing multiple records in one operation.

12.5.1 Using **Edit | Replace**

If you need to make the same change to several records in a table, for example implementing a name change, then the **Edit | Replace** facility is a quick and easy way to do this. For this exercise, assume that the tutor **Mr Parkinson** leaves, and we wish to allocate all his students to **Mr White**.

- 1 Close the **DEPTS** table.
- 2 Open the **STUDENTS** in **Datasheet view**.
- 3 Click in any cell in the **Tutor** field (it doesn't matter which one).
- 4 Select **Edit | Replace...** from the menu bar (or press **Ctrl/H**).
- 5 In the **Find What:** text box of the dialog box, type **Mr Parkinson**.
- 6 In the **Replace With:** text box, type **Mr White**.



- 7 Click the **Find Next** button.

The cursor jumps to the next cell containing Mr Parkinson. This establishes that there is actually a tutor with this name.

- 8 Click **Replace All**.
- 9 Click **Yes** to confirm that you really want to do this.

The **STUDENTS** table will have been updated as required (you could check this if you like).

- 10 Click **Close** to close the dialog box.

12.5.2 Action queries

If records need to be updated based on specific criteria, or it is necessary to perform calculations on a field to carry out the update, then a special type of query, called an **action query**, can be used. There are four types of action query: **update**, **delete**, **append** and **make-table**. The **make-table** query has already been mentioned in Section 9. We will now look at examples of the **update** and **append** queries.

Suppose the departmental budget for all departments is to be increased by 5%. This can be implemented using an **update query** on the **DEPTS** table.

- 1 Close the **STUDENTS** table.
- 2 Click the **Queries** button in the Database window and open a new query in **Design view**.
- 3 Add the **DEPTS** table to the query, then close the **Show Table** dialog box.
- 4 Click the drop down arrow by the **Query Type** button on the toolbar and select **Update Query** from the drop-down list. The Query title and QBE grid are changed to reflect the fact that this is now an update query.
- 5 Drag the **Budget** field into the QBE grid.
- 6 In the **Update To:** row type
[Budget]*1.05

Take care that you type this exactly as shown here, including the square brackets.

- 7 Run the query.
- 8 Click on **Yes** when prompted with the number of rows to be updated and all departmental budgets in the table will be increased.

All the records in the **DEPTS** table will have been updated (you may like to check this by opening the **DEPTS** table).

- 9 Close the query without saving it.

Whole groups of records can be deleted in a similar manner if they can be identified by a search criterion. A **delete query** is used to do this.

Suppose you wish to delete all students taking **Economics**, from the **STUDENTS** table:





- 1 Open a new query on the **STUDENTS** table.
- 2 Click the **Query Type** button on the toolbar and select **Delete Query** from the drop-down list. The Query title and QBE grid are changed to reflect the fact that this is now a delete query.
- 3 Drag the **Subject** field to the QBE grid.
- 4 In the **Criteria:** row type **Economics**.
- 5 Change to **Datasheet view** to check the resulting recordset. There should be five rows containing **Economics**. These are the records that will be deleted when you run the query.
- 6 Return to the **Design view** of the query, and run the query.
- 7 Click on **Yes** when prompted to confirm that this is what you want to do.
- 8 Close the query without saving it.



Append and make-table queries work in a similar way. An append query adds a group of records to the end of a table. A make-table query creates a new table from data selected from one or more tables. If you wish, you can find out more about these by selecting **Help | Microsoft Access Help** clicking the **Index** tab and searching for **create an action query**.

12.6 Validity checks

It is important to have data entered as accurately as possible into a database and to this end, in table Design view, it is possible to place certain **validity checks** on the data so that only valid entries are accepted.

As an example, we will look at the design of the **DEPTS** table.

- 1 Open the **DEPTS** table in **Design view**.

Under **Field Properties** there are a number of items concerned with the validity of data entered into the table. These checks are specific to the currently highlighted field.

Input Mask — These are character strings that determine how data are displayed during data entry and editing, and what sort of values are acceptable.

It is a type of code to represent a pattern of acceptable values. A question mark (?) represents any optional alphabetic character whilst a hash (#) represents any optional digit. The letter **C** represents any optional character.

There are equivalent characters for required entries.

A greater than sign (>) means that any character to the right of it is converted to uppercase and a less than sign (<) means that any character to the right is converted to lowercase. A back slash (\) precedes a literal character in a string.

The following are some examples of useful validity checks:

?###	A letter and three digits (optional)
##.##	A numeric value with two figures before and after a decimal point.
\C	Displays the letter C.
CCCC	Any sequence of 0 to 4 characters.

Default Value — This enables a value to be set as an initial value for a field. It may be changed to a different value during data entry or editing.

Validation Rule/Validation Text — The Validation Rule property is used in conjunction with Validation Text to specify requirements for entered data. The rule sets the conditions and the text specifies the warning message that will be issued if the conditions are breached. For example, you could specify that numbers entered into a field must be in the range 1-500 and set up a message such as “The value entered must be between 1 and 500”, which will be displayed when a value outside this range is entered.

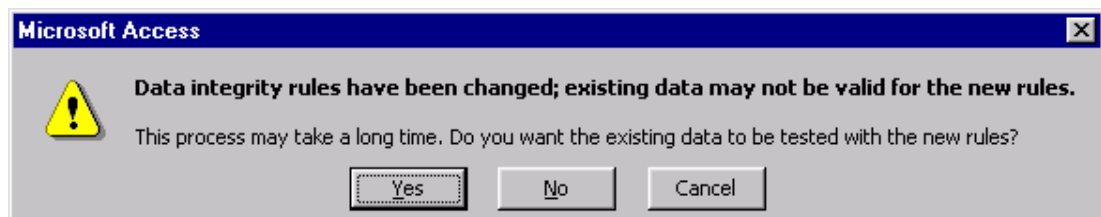
Required — If Yes is entered in this row, the field cannot be left blank.

Allow Zero Length — If Yes is entered in this row, zero length strings ("") are valid field entries.

Indexed — Yes is entered into this row if the field is to be indexed. Indexes will be discussed later.

- 1 In the **DEPTS** table select the **Department** and **Head** fields and enter **Yes** for the **Required** property.
- 2 Select the **Location** field and type in **Science Site** as **Default Value**.
- 3 Select the **Budget** and **Student Places** fields and enter minimum budget and student number figures for the **Validation Rule** property (use the > operator). Don't forget to compose suitable **Validation Text** for each one.
- 4 Save the new table design.

You will, at this point, see a warning message to say that data integrity rules have been changed and asking you if you would like to check existing data to see if it is still valid.



- 5 Click **Yes**.

If any records do violate the checks, you will be asked whether you want to keep the new rules and continue testing, revert to the old rule and continue, or to stop. Whichever you choose, Access allows the records to remain in the table – it is up to you to remove them as necessary. The rules you have set apply only to *new* data entered into the table – another reason for refining your table design before any data are entered.

- 6 Open the **DEPTS** table in **Datasheet view** and try entering some data to test out the validity checks you have imposed.

If during editing you want to abandon the changes you are making to a particular cell, or a particular record, press the Escape (**Esc**) key.

- 7 Close the table when you have finished.

12.7 Keys and indexes

12.7.1 What is a key?

In Section 5.6 you saw that it is possible to sort records in a table by right-clicking in a field and selecting a sort command from the shortcut menu.

- 1 Refresh your memory by trying to sort the **DEPTS** table by **Annual Budget**.

Sorting like this is an intensive process, which is possible for the small sample tables being dealt with here. But for a large table with many records, a sort operation can take a very long time.

It is strongly recommended that a primary index, known as a **primary key**, is allocated to every table. A primary key is made up of one or more fields in the database that yield a unique value for each record in the table. When choosing a primary key for a table you should choose the simplest data that naturally provides unique values.

In addition to preventing duplicate records being entered into the database, a primary key maintains an order for the table. Whenever new records are added to a table they are ordered by the primary key field(s).

Primary keys are also necessary for relationships to be defined between tables in the database in order to run queries on more than one table at a time and to update two or more tables in one operation.

Only the **COLLEGES** table has a primary key defined so far.

- 2 Open the **COLLEGES** table in **Design view**.

The key symbol to the left of the **CollegeName** field indicates that this field is the primary key of the table. Since no two colleges have the same name, it is possible to allocate this single field as the primary key. Similarly, no two departments have the same name and so **Department** is a suitable primary key field for the **DEPTS** table.

The **STUDENTS** table is more complicated as it is quite possible for a number of students to have the same name. As the data stand at the moment, a **composite** primary key of the **Surname**, **Initials** and **Date of birth** fields would be sufficient to uniquely identify each student. However,


this would not be sufficient if **John** and **Jack Kennedy** both became students and they were twins. In cases like these, it is often best to introduce a new field such as **Student Number** to uniquely identify records, rather than have a complicated composite primary key.

12.7.2 Defining a primary key

The defining of primary keys is a simple operation performed from the table Design view.

- 1 Close the **COLLEGES** table and open the **DEPTS** table in **Design view**.
- 2 Select the **Department** field.
- 3 Click the **Primary Key** button on the toolbar.

The key indicator is inserted in the selection button beside the field.



	Field Name	Data Type	Description
►	Department	Text	
	Head	Text	
	Location	Text	
	Budget	Currency	
	Student Places	Number	

- 4 Return to **Datasheet view**, clicking **Yes** when prompted to save the table.
- 5 Now add some more records to the table.

Notice where in the table they are inserted. As you enter data the records will be added to the end of the table. As soon as you close the table or change from Datasheet view and then back again, the table will be ordered on the key field(s).

- 6 Use the same technique as above to set **Surname**, **Initials** and **Date of Birth** as the composite primary key of the **STUDENTS** table. (Remember, to select more than one field, hold down the **Ctrl** key while you click on them.)

12.7.3 Defining indexes

The primary key of a table is always indexed and by default the table is always shown sorted on the key field(s), but it is also possible to index other fields. In general, indexes speed up sorts, searches and queries but can slow down data updates. This is because any indexes on a table must be updated each time a record is added or changed, in addition to the table itself. Setting up an index will not noticeably improve performance unless there is a very large number of records in the table.

The tables you are currently working with are very small, so what follows is only for demonstration purposes. An index differs from the primary key in

that records in the table can have duplicate values in the indexed field(s). Like primary keys, indexes are set up from the table Design view. Assuming that we wish to view the **STUDENTS** table sorted by college on a fairly regular basis, it may be helpful to index the **College** field. To do this:

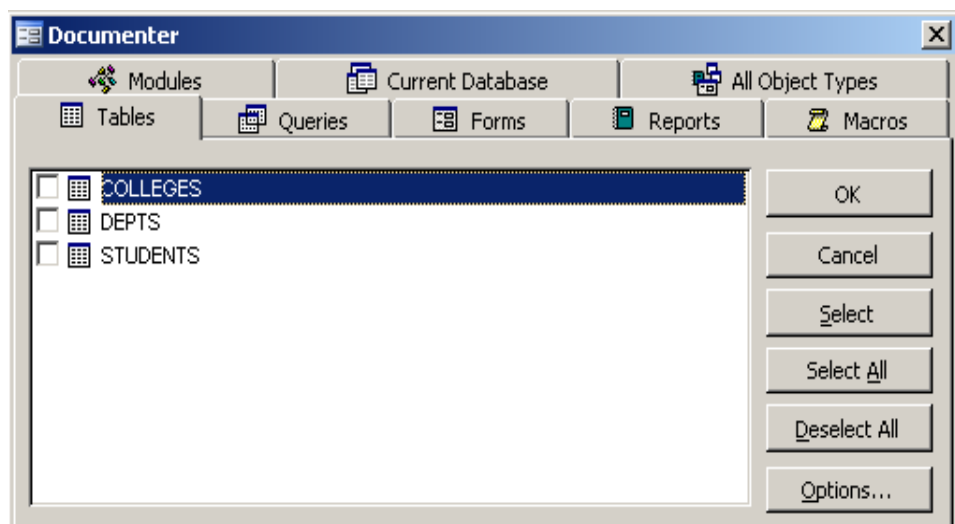
- 1 Display the **STUDENTS** table in **Design view**.
- 2 Select the **College** field and under **Field Properties**, set the **Indexed** property to **Yes (Duplicates OK)**.
- 3 Save the new table design and close the table.

12.8 Printing a table design

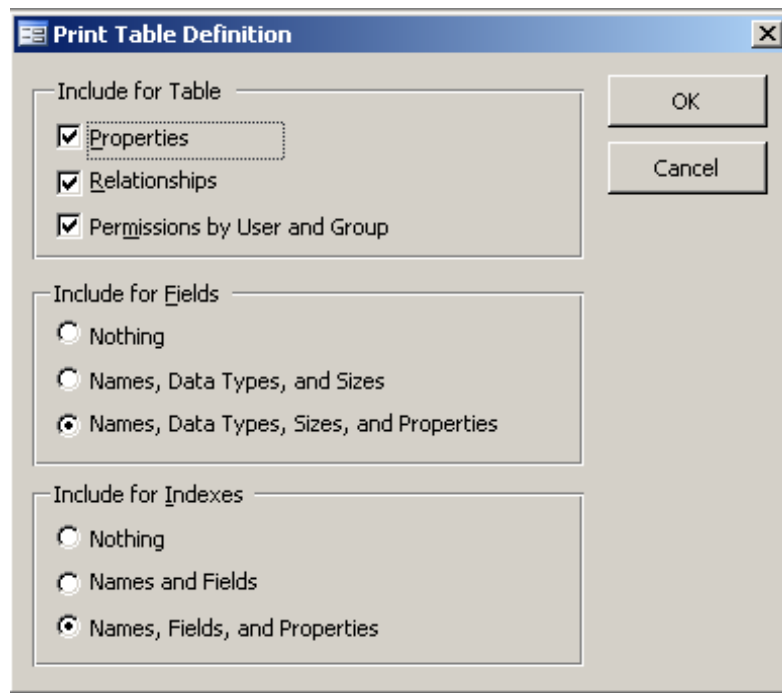
It is not possible to print directly from a table design window, but it is possible to print a list of the design characteristics of database objects. These are known as **definitions**. For example, you can print a table's field names, properties, relationships and permissions. You just need the Database window open to do this.

- 1 Select **Tools | Analyse | Documenter**.

The **Documenter** window opens.



- 2 Making sure that the **Tables** button is selected, click on **COLLEGES** then click the **Select** button.
- 3 Click **Options...** to specify which features of the object you want to print.



- 4 Accept the default settings by clicking **OK**.
- 5 Click **OK** to close the **Documenter** window.

In a little while the definitions you have asked for will appear as a **Print Preview** of a report. It is a good idea to examine this report before printing to check the length of the resulting definitions, because some can be very long.

- 6 If you want to print the report, select **File | Print...** from the menu bar and then click on **OK**.

13 Linking tables and referential integrity

As we have seen, the **STUDENTS** and **COLLEGES** tables are related via the field containing the college names, which is present in both tables. This relationship is a **one-to-many** relationship, which means that each College appears only once in the **COLLEGES** table, but may appear many times in the **STUDENTS** table — or not at all.

When this relationship was created, the database designer specified that referential integrity was to be enforced. What this means is that every reference to a College in the **STUDENTS** table must have a matching record in the **COLLEGES** table. If you attempt any data entry or modification that would violate this rule, then Access will not allow you to do it. To put this another way, referential integrity ensures that there can be no *dangling references*.

So if you want to add a new College to your database you must enter it first in the **COLLEGES** table. Not until you have done that will you be able to enter any new students for that college in the **STUDENTS** table.

If you want to change the name of a college, you must change it in the **COLLEGES** table. Access will automatically update the College field in all the related records in the **STUDENTS** table provided the **Cascade Update Related Fields** property of the relationship is set to **Yes**. If this property has not been set, then you will not be able to change the name of the College in the **COLLEGES** table (unless of course there were no related records in the **STUDENTS** table).

Similarly, if you want to delete a college, you must delete it from the **COLLEGES** table. Access will automatically delete all the related records in the **STUDENTS** table provided the **Cascade Delete Related Records** property of the relationship is set to **Yes**. If this property has not been set, then you will not be able to delete the College from the **COLLEGES** table (unless of course there were no related records in the **STUDENTS** table).

Referential integrity is a property of a relationship that enables Access to ensure the integrity of the relationship at all times. The properties **Cascade Update Related Fields** and **Cascade Delete Related Records** offer the facility of updating the data in both tables at the same time.

13.1 Creating a link between two tables

Before referential integrity can be enforced between tables, the relationship that exists between them has to be formally defined. In Section 9.1 you saw that the relationship between the **COLLEGES** and **STUDENTS** tables has already been defined in the database. We will now set up a relationship and enforce referential integrity between the **STUDENTS** table and the **DEPTS** table.

- 1 First, open the **DEPTS** table in **Datasheet view**.
- 2 Ensure that there is a record for every subject used in the **STUDENTS** table.

You could find out what subjects are present in the **STUDENTS** table by a simple query, but we know from the originally supplied data that the subjects are **Art, Comp Sci, Economics, English, French, Geography, German, History, Maths** and **Physics**.

- 3 Enter data for those subjects not already present in the table.

Remember that this data is going to be used to link this table with the **STUDENTS** table, so you must make sure that you enter the department names here exactly as they appear in the **STUDENTS** table.



- 4 Close all windows except the Database window then click the **Relationships** button to display the **Relationships** window.

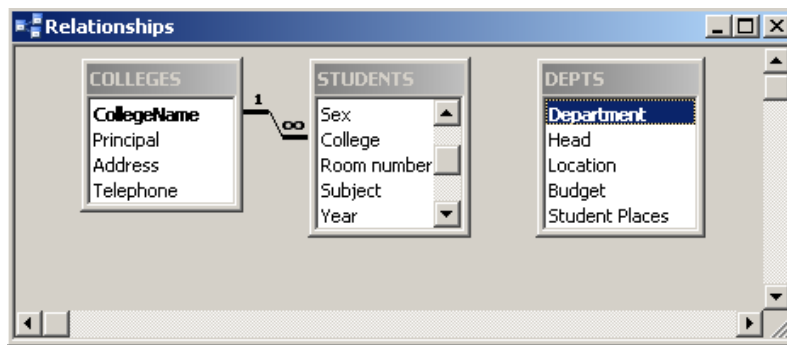
Notice that the tables **COLLEGES** and **STUDENTS** and the relationship between them are already illustrated in the **Relationships** window. It is possible to print the window by selecting **File | Print Relationships**.

Now add the table **DEPTS** to the display.



- 5 Click the **Show Table** button, select **DEPTS** from the list of tables and click **Add**.

- 6 Click **C**lose to close the **Show Table** dialog box.



Notice that for each table the names of the fields involved in primary keys are shown in bold. Two tables are formally related by linking the primary key in one table with the matching field (or fields) in the related table. As we have seen earlier, the matching fields do not have to have the same name (although they often do) but must be of the same data type and contain the same value for related records. Inspection of the **DEPTS** and **STUDENTS** tables reveals that the **Department** and **Subject** fields respectively, fit these criteria.

The relationship between **DEPTS** and **STUDENTS** is another example of one-to-many. **DEPTS** is on the 'one' side of the relationship because a department name may appear only once in the **DEPTS** table, but may exist many times in the **STUDENTS** table (the 'many' side) because departments normally have many students. When a relationship is defined between two tables with a one-to-many relationship between them, the primary key field must come from the table on the 'one' side of the relationship. This is indeed the case with the **DEPTS** and **STUDENTS** tables, so these two tables satisfy all criteria for formally defining the relationship between them.

The table containing the primary key (**DEPTS**) is known as the **primary table**. The corresponding field in the **related table** (**STUDENTS**) is called a **foreign key**.

It is now possible to set up the relationship between **DEPTS** and **STUDENTS** by joining the **Department** primary key field from **DEPTS** to the **Subject** foreign key field in **STUDENTS**.

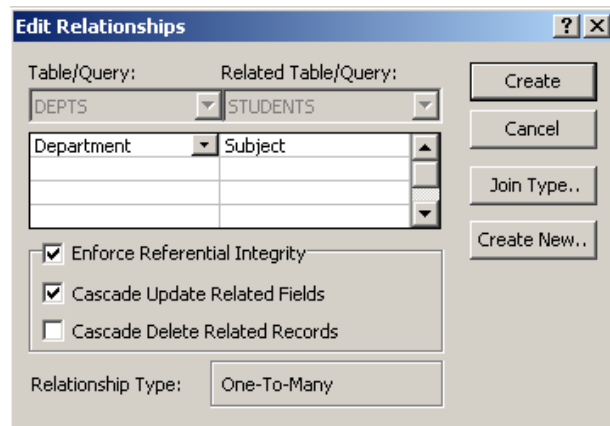
- 7 In the **Relationships** window, click on the **Department** field in the **DEPTS** table and drag it to the **Subject** field of the **STUDENTS** table.

Note that you may first have to scroll down the list of field names in the **STUDENTS** table, or click and drag the bottom of the **STUDENTS** table, in order to reveal the **Subject** field.

The **Relationships** dialog box opens. Notice that the relationship between the two tables has correctly been identified as one-to-many.

13.2 Referential integrity

You now have the option to enforce referential integrity between the two tables.



- 1 Click in the **Enforce Referential Integrity** box to insert a check mark. This prevents a value for **Subject** being inserted in the **STUDENTS** table that does not exist in the **DEPTS** table.

Options in the lower part of the box now become available. Checking **Cascade Update Related Fields** would mean that any change to a **Department** field of the **DEPTS** table would automatically cause the **Subject** field in all related records in the **STUDENTS** table to be updated at the same time. So, for example, if a department changed its name, the correction would appear in the **Subject** field. This would be useful, so:

- 2 Put a check mark beside **Cascade Update Related Fields**.

Checking **Cascade Delete Related Records** would mean that when an entry in the **Department** field was deleted, all corresponding records in the **STUDENTS** table would also be deleted. In our example this would be inappropriate, for if you wanted to delete a department because it had closed down, you would not want to delete all the students in that department. You would expect the students to remain and to transfer to other departments.

- 3 Click on **Create**.

If the data presently in the two tables violates the referential integrity of the relationship that you are trying to create, you will not be able to create the relationship with the Enforce Referential Integrity property set. You will first have to remove any dangling references in the **STUDENTS** table either by adding to or correcting the appropriate records in the **DEPTS** table, or correcting or deleting records in the **STUDENTS** table.

When the relationship is created you will see a line joining the two tables, representing the one-to-many relationship between them.

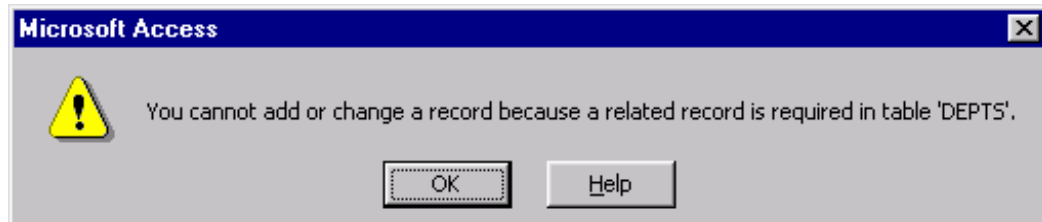
- 4 Close the **Relationships** dialog box, choosing **Yes** to save the layout.

Now make some data changes in the two tables to demonstrate the effect of the referential integrity rules that have been set up.

- 5 Open the **STUDENTS** table in Datasheet view.

- 6 Add a new student to the table, entering an invalid subject in the **Subject** field i.e. a subject that does not appear in the **DEPTS** table.

Access will allow you to complete the data entry for the new record, but as soon as you attempt to move to the next record, or close the table, a warning message appears to tell you that the new record cannot be accepted.



- 7 Click **OK**, enter a valid subject instead (or press the Escape key to discard the change) and move to the next field to enter the record into the database.
- 8 Open the **DEPTS** table in **Datasheet view**.

Let us assume that the **Art** department is now to be known as the **Design** department.

- 9 Make this modification.

Make sure that you complete this step by moving the text insertion point to another record when you are finished.

- 10 Return to the **STUDENTS** table.

You should find that all students who were previously recorded as studying **Art** have had their subject changed to **Design**.

If you do not want to be able to change the name of a department in this way, then remove the **Cascade Update Related Fields** property of the relationship.

This concludes the second part of this tutorial.

14 Creating data entry forms

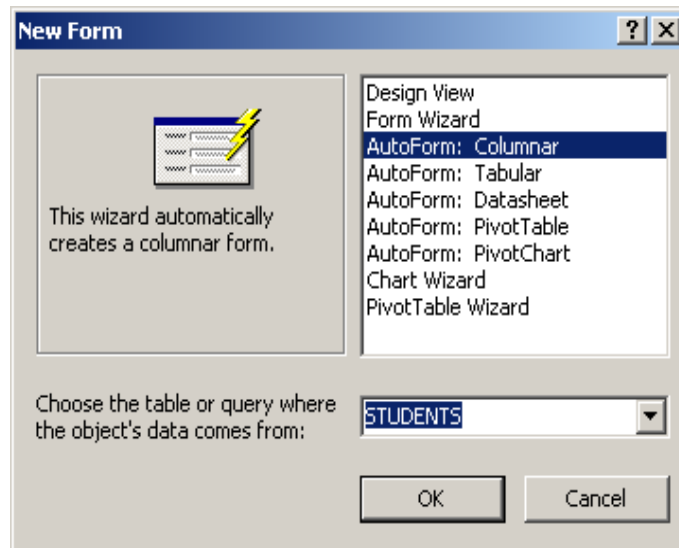
These notes have so far concentrated on working with tables, with more than one record being viewed on the screen at the same time. However, it is often convenient, especially for data entry purposes, to view just one record at a time using **forms**.

14.1 Using the AutoForm Wizard

The simplest way to generate a **data entry form** is by using a **form wizard**. A wizard prompts you for essential information and then generates a form automatically. You can then modify the design of the form and add to it as required.

- 1 Close all windows apart from the Database window.

- 2 Select the **Forms** button and click the **New** button.
- 3 In the **New Form** dialog box, select **AutoForm: Columnar** from the list of options.
- 4 Choose **STUDENTS** from the drop down list below to base the form on the **STUDENTS** table.



- 5 Click **OK**.

A form in columnar style is generated and opened, displaying the first record in the **STUDENTS** table. The navigation buttons at the bottom enable movement around the table. You could also use the arrow keys or locate records according to field value using the **Edit | Find...** command.

You can also filter the records as you would the records in a table.

Notice that by default, this wizard includes *all* the fields from the table in the form. This is fine in this case, as the form is intended as a data entry form. If you want to be more selective about the fields on the form or to choose from a variety of styles, selecting the **Form Wizard** option from the **New Form** dialog box gives you greater flexibility about how the finished form will look.

14.2 Adding new records using the data entry form



- 1 Click the **blank record** button at the bottom of the form.
- 2 Enter some new data into the blank record.

As you press the **Enter** or **Tab** key to leave the last field of the record, the next blank record becomes available to you so that you could continue data entry if you wish. As soon as you leave the new record, it is entered into the table in key order.

14.3 Editing records using the data entry form

Forms can also be used to edit data in existing records. The relevant record can be located using the arrow keys as described in Section 5.5, or by searching according to field value as in Section 5.7.

For example, to record the fact that **Mr R. Dennison** has changed his subject from **Maths** to **Economics**:



- 1 Click in the **Surname** field.
- 2 Click the **Find** button on the toolbar.
- 3 In the **Find What:** box, type **Dennison**.
- 4 Click on **Find Next**.
- 5 Close the Find and Replace window by clicking cancel.

The record you have been looking for should be displayed in the form.

- 6 Move to the **Subject** field.
- 7 Change **Maths** to **Economics**.

As you leave this record, the change will be made to the **STUDENTS** table.

14.4 Deleting a record using the data entry form

To delete a complete record via the data entry form, again first find the record to be deleted using the arrow keys as described in Section 5.5, or by searching according to field value as in Section 5.7.

- 1 Select the record by clicking in the record selector (the column with the right pointing arrow, to the left of the field names).
- 2 Click the **Delete Record** button or press the **Delete** key.
- 3 Answer **Yes** to the warning message.



14.5 Simple modifications to the data entry form

The form generated by the form wizard is the default columnar style. You may wish to modify parts of it.

To make any modifications to a form:



- 1 Click the **View** button on the toolbar to display the form in **Design view**.

Form view is replaced by a schematic representation of the form along with a Toolbox.

Forms are made up of a collection of individual design elements called **control objects**, or just **controls**. These controls are arranged in one or more **Sections**. The **Form Header** contains those controls that will appear only once at the top of the form. The **Detail** section contains those controls that are repeated for each record in the data on which the form is based. Like other objects in the database, these sections, and the controls on them can have their properties changed.

There are many properties that you may wish to change in order to modify the appearance of your form. The following are a few examples of the sorts of things you might want to change. After making each change, switch to Form view to check the effect of your change.

To alter the properties of any control it must be selected first.

For instance you might like to left justify the numbers in the **Year**, **GCSEs**, **A levels** and **Date of Birth** fields.



- 1 Select a field (for example **Date of birth**) to be modified.

Make sure that you select the field itself (the box on the right) and not its label (the box on the left). Handles will appear on the control when it is selected.

- 2 Click on the **Align left** button on the formatting toolbar.

You could repeat this for the other three fields to be modified, one at a time. However, it is quicker to select the three fields together and then change their properties.

- 3 Select the **Year** field, then hold down the **Shift** key and click on the **GCSEs** and **A levels** fields in turn.

All three fields should be selected.

- 4 Click on the **Align left** button on the formatting toolbar.
- 5 Click anywhere away from the controls to deselect them.

Some of the text boxes are unnecessarily wide. You may wish to resize them.

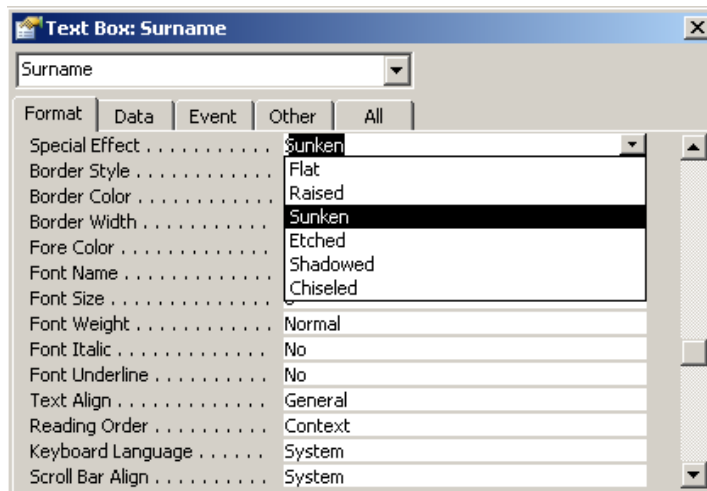
- 6 Select the **Year** field, then position the mouse over the middle handle of the right hand border of the box to obtain a double headed arrow, and drag the border to the left until the box is the required size.

You may wish to make the **GCSEs** and **A levels** fields the same size as the **Year** field that you have just resized.

- 7 Select the three fields **Year**, **GCSEs** and **A levels** as described in step 3 above.
- 8 From the **Format** menu, select **Size | To Narrowest**.

You may like to experiment with different effects (e.g. raised, sunken) for some of the fields.

- 9 Select the **Surname** field.
- 10 Right click on it to display a shortcut menu, and select **Properties**.
- 11 Check that the **Format** tab is selected then use the scroll bar to locate the **Special Effect** property.
- 12 Click in the **Special Effect** property and on the down arrow that appears.
- 13 Select **Raised** from the list, and close the **Properties** window.



You can if you wish apply this to several fields at once:

- 14 Drag a rectangle across the Detail section of the form to capture at least part of each of the fields you want to modify. All fields that lie within the rectangle will be selected.
- 15 Right-click on any one of the fields and select **Properties** as before. You can now change the properties of all selected fields at once. The only difference you will notice is that the window will be called **Multiple Selection**.

14.6 Further modifications

There are many ways in which you can modify the appearance of a form, and you should experiment.

14.6.1 Moving fields

Fields can be moved around the form by using normal Windows drag and drop techniques. That is, you can highlight a field or label, move the mouse pointer over it until it changes into a hand symbol, then drag the item to a new position.

- 1 Make sure that the form is open in **Design view**.
- 2 Move some fields to produce a more balanced layout.

Notice that the field's text box and label move together. If you wish you can move them independently.

- 3 Select a field, then move the mouse over its top left hand handle until the mouse pointer changes to a pointing finger. You can now drag the field without moving the label.

You can move a label independently of its text box in the same way.

You can also move several fields at the same time.

- 4 Select several fields using one of the methods described earlier, then move the mouse pointer over one of the fields until it changes into a hand symbol, and drag all the selected item to a new position.

14.6.2 Removing a field

There may be controls on your form that you don't want, and you may wish to delete them. You could for example remove the Emergency phone number field.

- 1 Select the **Emergency phone** field, and press the **Delete** key.

Note that the text box and its label are both removed.

You can also remove a label without removing its text box.

- 2 Select the **Label** control for the **Surname** field, and press the **Delete** key.

14.6.3 Adding fields

You may find you have deleted a field and want to put it back on your form. Put the Emergency phone field back onto the form.



- 1 Click on the **Field List** button on the toolbar.
- 2 Drag the **Emergency phone** field from the **Field List** onto the form.

Notice that you get both a text box and a label for the field.

- 3 You may need to re-position the new controls to line them up with the other controls already on the form.
- 4 Format the text box and its label to match the other controls.

14.6.4 Resizing the form

If the form window is an inappropriate size and shape for your preferred layout you can resize the window using the normal Windows technique of dragging the borders.

Alternatively, with the form in **Form** view, select **Window | Size to Fit Form** from the menu bar (note that this command is not available if the window is maximised).

14.6.5 Adding text to a form

You may wish to add a title to the form. You do this with the form in **Design view**.

So far, all the data in the form is displayed in the **Detail** area of the form. You can add a header to the **Header** area at the top of the form (or a footer at the bottom) to display information or controls that don't need to change with each different record. You can choose to add Form or Page headers and footers.

By default, the **Form Header** title should be displayed at the top of the form. If it is not, you can view it by selecting **View | Form Header/Footer** from the menu bar. In the form you are currently looking at, the header area will probably be 'closed up'. To open up an area into which you can insert the header text:

- 1 Move the mouse pointer over the boundary between the **Form Header** and **Detail** titles until the pointer becomes a double pointing arrow.



- 2 Click and drag the boundary down to open up a header area.

Look for the floating Toolbox, which normally appears when the form is in Design view. If this is not displayed, then click on the toolbox button on the toolbar.



- 3 Click on the **Label** button in the toolbox.

This is the label tool, which can be used to add a title or any other text to a form.

- 4 Move the mouse back into the form and the pointer will change to a crosswires, with a letter A.
- 5 Move to the place in the header area where you wish to insert the title, left click with the mouse and drag the pointer to create a rectangle of the required size.
- 6 Type a title for your form, perhaps

University of Durham

or whatever else you wish.

- 7 Click away from the label to finish.

If the title text does not fit inside the label, drag the handles on the label to resize it or choose the **Format | Size | To Fit** command. To enter text on more than one line, press **Ctrl/Enter** to insert a carriage return.

You can now treat the text you have entered as any other control. You can move it to different positions on the form or modify its properties. For example, it might be a good idea to change the font to something more appropriate for a header.

14.6.6 Adding special controls

The most common control used on a form is a simple text box, but there are other types of controls that can be added to a form to perform specific functions or to assist data input.

For example, whenever the data you are displaying can have only two or three valid values, it may be helpful to use **option buttons**, **check boxes** or **toggle buttons** to view or set the value in a field.

List boxes or **combo boxes** are very useful controls, which can display a list of possible data values for a field. This can speed up data entry and

help to minimise errors. The main difference between a list box and a combo box is that a list box only displays a list of data values, but a combo box has both a text box and a drop-down list.

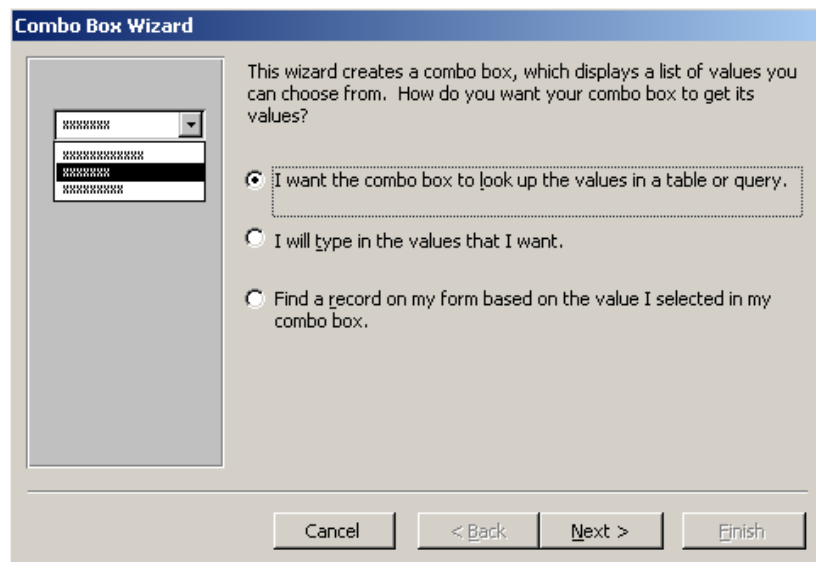
If you want to divide your form into different pages (like the Database window) you can insert **tab controls** into the form to achieve this.

Command buttons are controls that when clicked carry out one or more operations on the database, such as opening and closing tables automatically.

As an example of adding a special control to a form, we will replace the simple **College** field with a combo box. This will make it easier to enter the college field for any new students that we wish to add to the database.

- 1 With the form in **Design view**, select the existing **College** text box and press the **Delete** key to remove the text box control (this also removes the label).
- 2 Check that the **Control Wizards** button is selected in the toolbox.
- 3 Click the **Combo Box** button in the toolbox.
- 4 Click on the **Field List** button on the toolbar to open up the list of fields available to the form.
- 5 Click on the **College** field and drag it to the space on the form left by deleting the field earlier.

The **Combo Box Wizard** appears.



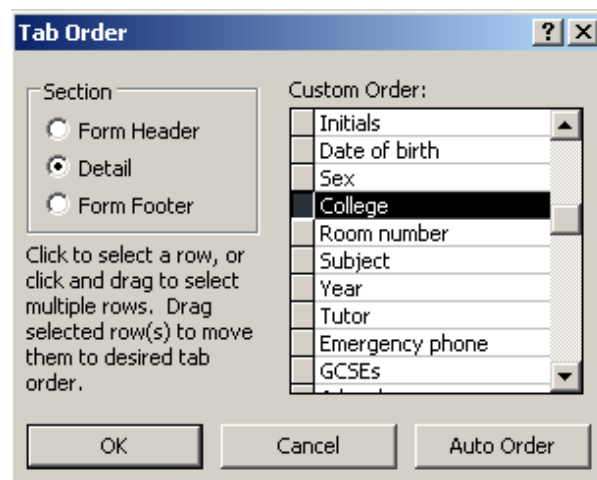
- 6 All the possible values for the **College** field are stored in the **COLLEGES** table so click **Next>** to accept this setting.
- 7 In the next window, click **Next>** to accept **COLLEGES** as the table to take the data values from.

- 8 In the next window, click the single right pointing arrow to select **CollegeName** as the field to take the data values from, then click **Next>**.
- 9 Follow the instructions that now appear for adjusting the column width of the list, then click **Next>**.
- 10 The following window asks if you want to store the value in the control in the database or have Access remember it for future tasks. The values in this control are intended to be used to update the **STUDENTS** table, so click **Next>** to accept the settings in this window.
- 11 Finally, type in **College** as the label name and click **Finish**.
- 12 Close the field list.
- 13 If necessary, re-position and align the new label and text box.

The tab order for moving from field to field in the form will now need adjusting.

- 14 Right-click the **College** text box and select **Tab Order...** from the shortcut menu.

The **Tab Order** dialog box appears. Follow the instructions to re-position the **College** field in the original tab order i.e. after **Sex** and before **Room number** if you didn't change the field order earlier.



- 15 Click **OK**.
- 16 Switch to **Form view**.



You will now see a down arrow on the right-hand side of the **College** text box. Clicking on it reveals the list of college names stored in the **COLLEGES** table. Clicking on a name enters it into the text box above.

- 17 Try this now.

Selecting from a short list, like this one, is quick and easy. However, if there is a very long list of values to choose from, it can take a while to scroll

through the list to find an entry. The **Auto Expand** facility helps to speed up this process.

Suppose that the first student in the table, Mr C. Adams, is changing college from **Grey** to **St Cuthberts**. Instead of selecting the new college from the list, this time you will type the new name directly into the text box.

- 1 Highlight **Grey** in the **College** field (if it is not already highlighted) and start to overwrite it with the new name, **St Cuthberts**. Watch what happens as you do this.

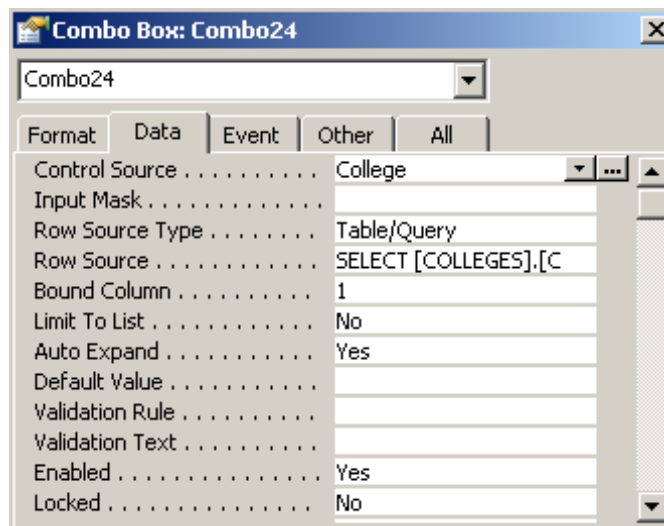
As you type the first letter **S**, the first college in the list beginning with that letter appears in the text box — St Aidans. As there are four colleges beginning with **St**, typing the **t** and the **space** makes no difference, but as soon as you type **C**, the entry moves to St Chads. Finally, as the **u** is entered, the required name **St Cuthberts** appears in the text box. You do not need to type any more of the name.

- 2 Press the **Tab** or **Enter** key to accept the entry and move to the next field.

The **Auto Expand** property is set in the text box property list. To see it:

- 1 Switch to **Design view**.
- 2 Right-click the **College** text box and select **Properties** from the shortcut menu.

Auto Expand is found under Data properties.



- 3 Close the **Combo Box:** window

14.7 Saving a form

If you wish you can save the design of your form.

- 1 Choose **File | Save As** and type a suitable name for your form.

You will be able to open the form later, and modify the design further if you wish.

- 2 Close the form when you have finished.

14.8 Creating a form from multiple tables

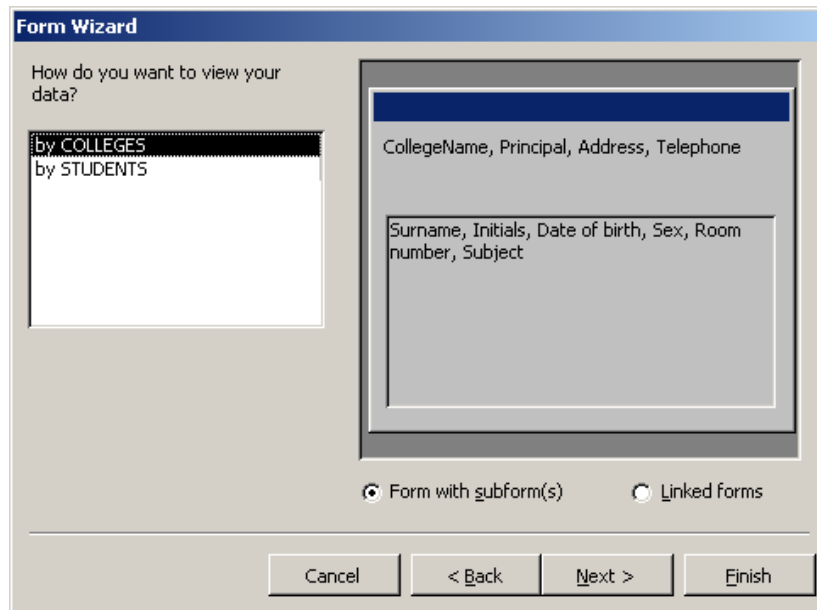
The form created above was based on a single table, which already existed. We will now look at two examples of forms where fields can come from more than one table. This will re-introduce the concepts of relationships between tables and linking fields.

The first example creates a form showing each college with a table of all the students in that college. The table of students appears as a **subform** within the Colleges **main form**.

The table chosen for a subform must be at the **many** end of a one-to-many relationship with the table chosen for the main form. This is the case with the **COLLEGES** and **STUDENTS** tables. A field that contains the college names links the two tables. For every unique occurrence of **College Name** in the **COLLEGES** table, there may be many occurrences of **College** in the **STUDENTS** table, since a college has many students. The relationship between **COLLEGES** and **STUDENTS** is therefore one-to-many.

This relationship has already been formally defined (see Section 9.1), so the new form can be created.

- 1 Select the **Forms** button in the Database window and click **New**.
- 2 In the **New Form** dialog box, select **Form Wizard** and choose **COLLEGES** as the table where the form's data comes from.
- 3 Click **OK**.
- 4 In the **Form Wizard** dialog box, **COLLEGES** should be already entered in the **Tables/Queries:** box. Click the double right pointing arrow (>>) to select all fields from the **COLLEGES** table to appear on the main form.
- 5 Now select the **STUDENTS** table from the **Tables/Queries:** drop-down list.
- 6 Choose the fields from **STUDENTS** that you want to appear on the subform, by highlighting each one then clicking the single right pointing arrow. (Choose **Surname**, **Initials**, **Date of birth**, **Sex**, **Room number** and **Subject** as the minimum.)
- 7 Click on **Next>**



- 8 The settings in the next window should be as shown above. They are as required, so click on **Next>**
- 9 In the next window select **Tabular** as the layout for the subform, and click on **Next>**.
- 10 You can experiment with different styles for your form in the next window (each style is previewed as you click on it), otherwise just click on **Next>** to accept the **Standard** style.
- 11 In the final window, enter the title **STUDENTS IN COLLEGES** for the form and then click **Finish**.

The new form appears on the screen. Scrolling through the college records of the main form causes the list of students in the subform to change.

- 12 Close the form.

In addition to the form above, it may be useful to create a form based on the **STUDENTS** table, which also contains data about the college of which each student is a member. A main form/subform structure cannot be used for this form, because the **COLLEGES** table (in this case needed for the subform) is not at the **many** end of a one-to-many relationship with **STUDENTS**. Instead, the form will be based upon a query.

First, construct the query.

- 1 Select the **Queries** button from the Database window and then click **New**.
- 2 Click **OK** to open a new query in **Design view**.
- 3 Add the **STUDENTS** and **COLLEGES** tables to the query design, then close the **Show Table** box.

Notice that the relationship between the two tables, defined earlier, is shown automatically.



- 4 Now drag some fields from the **STUDENTS** table to the QBE grid, say, **Surname, Initials, Date of birth, Sex, College, Room number** and **Subject**, as before. (You can use the **Ctrl** key to select the fields then move them together.)
- 5 Add all the fields from the **Colleges** table, except the College Name, to the QBE grid.
- 6 Run the query to check that the resulting recordset is as you expect, then save and close the query (you could call it **Students Plus College**).

Now create the form.

- 1 Click the **Forms** button then **New**.
- 2 Select **AutoForm: Columnar** (AutoForms are just abbreviated types of Form wizard), then **Students Plus College** as the query to take the form's data from.
- 3 Click **OK**.

A new form appears, which contains student data plus all the appropriate college data for each student. Note that if you make any changes or additions to the data on the form these will be reflected in the underlying tables.

The linking of tables in forms is not limited to two tables. Quite complicated data models can be set up if required, but this subject will not be covered in any further detail here.

- 4 Close all windows except the Database window when you have finished. You could save the form with the same name as the query if you like — that is, **STUDENTS PLUS COLLEGE**.

15 Producing reports

The creation of reports is similar to that of forms, but reports are usually intended for hard copy printout whilst forms are usually intended to be viewed and used on the screen. Reports are also useful for grouping together data and for producing summary statistics. Note also that you cannot use a report for editing data.

15.1 Producing a simple report

To produce a simple report:

- 1 Select the **Reports** button in the Database window and click **New**.
- 2 Select **AutoReport: Columnar** and select **STUDENTS** as the table from which to take the report data.
- 3 Click **OK**.

- 4 Close the report without saving it.

The report is displayed in **Print Preview**. Reports are displayed in either this or **Design view**.

The report is produced as a single column, with each field of a record one beneath another and each record following the last.

More commonly, a tabular report is what is required, with each new record appearing on a single line with the relevant fields displayed in columns. This could be achieved by using the **AutoReport: Tabular** wizard, but using the **Report Wizard** instead gives you more control over what is to appear on your report. For example, using AutoReport produces a report containing **all** the fields of the table, whereas the Report Wizard allows you to specify which fields you want on your report. You may also want to group the records in some way, say by college, and to sort the data in some of the fields.

- 1 As before, select the **Reports** button in the Database window, click **New**.
- 2 This time select the **Report Wizard** to create the report, select **STUDENTS** as the table from which to take the report data, and click on **OK**.

You are now able to specify the fields to appear in the report and have a number of other options to choose from.

- 3 In the first **Report Wizard** window, select the fields to appear in the report, say all of them except **Tutor** and **Emergency phone**, then click **Next>**.
- 4 The next window suggests that the data are grouped by **College**. This is the grouping option required, so click **Next>**.
- 5 You are then given the chance to display the data sorted on up to four fields. In the first sort box, select **Surname**, to display students in alphabetical order under each college grouping. Notice that you could also elect to produce some summary statistics at this point, but this will be covered later in the section.
- 6 Click **Next>**.
- 7 The following two windows are concerned with the layout and style of the report. When you have experimented with the different options and made your choices, click **Next>**.
- 8 In the final window, accept **STUDENTS** as the name of the report (or choose another of your own) and click **Finish**.

15.2 Modifying reports

As with a form, you must switch to **Design view** in order make any changes to the design of a report.



- 1 Click on the **View** button on the toolbar to switch to Design View.

Again, like a form, a report is laid out in a number of sections. These usually include **Report Header**, **Page Header**, **Detail**, **Page Footer** and **Report Footer**. In this example, because the records in your report are grouped by college, there is also a **College Header** section. The boundaries between these sections can be moved to make them wider or narrower.

- Anything in the **Report Header** will appear once at the start of the report. This already has **Students** entered as the report heading.
- Anything typed in the **Page Header** appears at the top of every page. The field names may be here, or they may be in the College header depending on the style you have chosen.
- The **College Header** contains the group heading **College**, and appears before the data for each college.
- The **Detail** section contains the data for each student.
- Anything typed in the **Page Footer** will appear at the bottom of every page. This already has code entered to generate the current date and page numbers (page # of #) as a page footer.
- Anything in the **Report Footer** will appear at the end of the report.

If creating a report is a relatively simple process using the Report Wizard, then modifying it will certainly be a test of your Windows skills!

First add some titles to the report header and the page header.



- 2 Use the mouse to widen the **Report Header** section.
- 3 Using the **Label** tool from the Toolbox enter **University of Durham** as an over all title for your report. You may have to reposition the **Students** label box to do this.
- 4 Right-click the new control, click on **Properties** from the shortcut menu and select a font size and style to make this information stand out.
- 5 Similarly, enter your name and department in the **Page Header** section. You will probably have to widen this section first.
- 6 Check to see that the report is correct by viewing it in **Print Preview**.

Even though your report has been generated by a Report Wizard, you may find that the text boxes are not large enough to display all the text in them. You may need to resize them and then possibly adjust their positions. The techniques for sizing and moving controls in a report are just the same as for a form, but depending on the number of fields you have chosen to include in the report, it can be quite a fiddly process to size and align them correctly.

- 7 If any of the text boxes in your report need resizing or repositioning, try to do this now, using techniques described in the section on Forms.

Remember that to select multiple objects in Access, you hold down the **Shift** key and click on each one in turn, or capture them in a rectangle drawn with the mouse.

Spacing controls evenly can be achieved with the **Format | Horizontal Spacing** and **Format | Vertical Spacing** commands. Select the controls you want to space (at least three), and select the **Make Equal** option. The controls at each end are not adjusted, but those in the middle are spaced evenly between them. You can also increase or decrease spacing using the **Format | Horizontal/ Vertical Spacing** command.

- 8 Check your progress from time to time by viewing it in **Print Preview**.
- 9 Once you have finished experimenting, return the report to **Design view**.

As you look through the pages of the report, you will probably find that some of the lists for a college are split between pages. It would be better to begin each college on a separate page.

- 10 Right-click the **College Header** section and select **Properties** from the shortcut menu.
- 11 Select the **Format** tab and set the **Force New Page** property to **Before Section**.

This will cause the information for each college to start on a new page.

15.3 Adding summary data to a report

As you saw earlier, the Report Wizard provided some simple options for including summary data in the report as it was created. To complete this introductory look at reports we will insert some summary data into the report while it is in Design view.

We will insert the total number of students, together with the average number of GCSE and A level passes, both for the whole population and for each college. To achieve this for the whole population, the summary statistics need to be inserted in the Report Footer.

- 1 Ensure that the report is in **Design view**.
- 2 Open up the **Report Footer**, and insert a **text box** from the Toolbox into it.
- 3 Click in the label to the text box and type **Total number of students**:
- 4 Right-click the text box itself and select **Properties** from the shortcut menu.
- 5 Select the **Data** tab and enter a **Control Source** by typing
=COUNT([Surname])



The **Surname** field has been chosen as the field to count because it is part of the primary key and so we can be sure that it will appear in every record. The count will therefore return an accurate result.

- 6 Now repeat this method to display the total and average number of GCSE and A level passes in the **Report Footer**. You will need to use the **AVG** (Average) and **SUM** functions instead of **COUNT**.
- 7 You could now use the techniques practised earlier to size and position the text boxes you have just created, align the text within them and format the averages to say, two decimal places.
- 8 Check **Print Preview** to see the results of the changes you have made (remember that the report footer appears only once at the very end of the report).

Finally, to show average exam passes for each college:

- 9 Return to **Design view**.

You will need a new section for this: the College Footer section.



- 10 Click on the **Sorting and Grouping** button on the toolbar.
- 11 In the **Sorting and Grouping** dialog box, change the **Group Footer** property for College to **Yes**.

Field/Expression	Sort Order
College	Ascending
Surname	Ascending

Group Properties

Group Header: Yes

Group Footer: Yes

Group On: Each Value

Group Interval: 1

Keep Together: No

Display a footer for this group?

- 12 Close the **Grouping and Sorting** dialog box.

You can now create text boxes in the **College Footer** section of the report to calculate the exam statistics for each college in the same way that you did in the **Report Footer**. However, instead of creating them from scratch as you did before, you can copy the two you have already created.



- 13 Highlight one of the text boxes in the **Report Footer**.
- 14 Click the **Copy** button on the toolbar.
- 15 Move to the **College Footer** section of the report.



- 16 Click the **Paste** button.
- 17 Repeat this for the other text box.

You may find that you need to drag the boxes to a sensible position after you have pasted them.

- 18 Now preview the report again and the required summary statistics will appear for each college and for the whole population at the end of the report.

It can be very tricky to get a report looking right, so don't be surprised if a lot of trial and error seems to be involved!

When you are happy with the appearance of the report, you can print it to obtain hard copy.

- 19 In **Print Preview**, select **File | Print**.
- 20 Check that the correct printer is selected and click **OK**.
- 21 Close and save the report.

The report generating capabilities of Access are very powerful and flexible and only a small number have been demonstrated here.

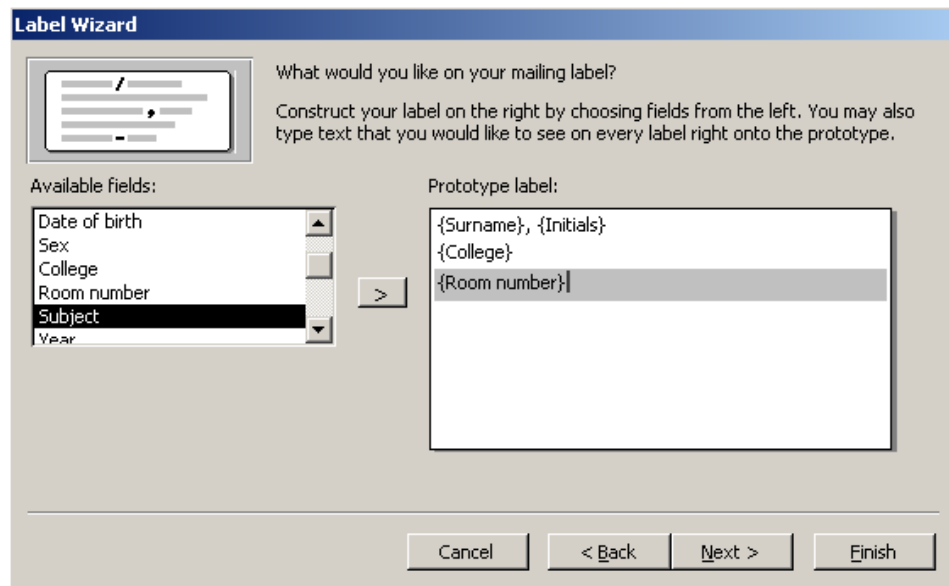
15.4 Preparing a set of labels

There is a special kind of report that you can use to prepare a set of labels. For example you could prepare a set of labels giving the college and room number details for all the students in the **STUDENTS** table.

- 1 Select the **Reports** button in the Database window and click on **New**.
- 2 Select the **Label Wizard** to create the report, select **STUDENTS** as the table from which to take the data for the report, and click on **OK**.

The wizard takes you through the various steps in creating your labels:

- 3 Choose a standard Avery label — or create your own, then click on **Next>**.
- 4 Select the font you would like to use, then click on **Next>**.
- 5 Prepare a prototype of the label by entering text and fields as required, then click on **Next>**.



- 6 Sort by College and within College by Surname, then click on **Next>**.
- 7 Alter the suggested name for the report, if you wish, then click on **Finish>**.

The labels will be displayed in **Print Preview**.

16 Miscellaneous

16.1 Exporting and Importing data and other database objects

Access provides quite a wide range of facilities for importing and exporting data in different formats. You have already seen (in section 9.4) how the results of a query may be exported as a text file, or an Excel file. The same procedure may be used to export the data in a table. It is also possible to export data to, and import data from, another Access database file.

For instance you may wish to export the data in the Students table as an Excel file.

- 1 Select the **STUDENTS** table.
- 2 From the **File** menu select **Export....**
- 3 Select the location you wish to save the table to by clicking the down arrow to the right of the **Save in:** dialog box.
- 4 In the **Save as type** dialog box, select **Microsoft Excel 97-2000 (*.xls)**.
- 5 Change the file name to what you want, then click on **Save**.

You could open the file in Excel to confirm that the export has worked successfully.

It is also possible to read into Access data from an Excel or text file. To illustrate this you could read into a new table the data that you have just exported to Excel.

- 1 From the **File** menu select **Get External Data | Import**.
- 2 In the **Import** dialog box, select **Microsoft Excel (*.xls)** in the **Files of type** box.
- 3 Select the file you have just created, then click on **Import**.
- 4 In the **Import Spreadsheet Wizard** check that the worksheet **Students** is selected, then click on **Next>**.
- 5 Select the option **First Row Contains Column Headings**, then click on **Next>**.
- 6 Choose to store the data **In a New Table**, then click on **Next>**.
- 7 You can choose to specify some details of the new table's design, and/or not to import some of the fields. Experiment as you wish, then click on **Next>**.
- 8 There is no single field that can be used as a primary key, so choose **No primary key**, then click on **Next>**.
- 9 Enter a new name for the table (say **STUDENTS2**), then click on **Finish**.
- 10 Finally click on **OK**.
- 11 Now open the table to confirm that the import has worked successfully.
- 12 Delete the **STUDENTS2** table: close the table, then in the Database window select the **Tables** button, select the **STUDENTS2** table and press the **Delete** key.

Exporting to, and importing from, another Access database file is not limited to data in tables and queries. It is also possible to import and export other database objects such as queries, tables and reports.

16.2 Compacting an Access database file

When you make changes to an Access database the space in your .mdb file becomes fragmented. This is particularly likely to happen when you create and delete lots of objects such as forms and reports. As a result, the database file can take up much more space than it really needs. You can recover the unused space by **compacting** your database.

If the database is not open, but Access is, then select **Tools | Database Utilities | Compact Database and Repair Database**. Then in the **Database to Compact From** dialog box, select the .mdb file that you want to compact, and click on **Compact**. Finally in the **Compact Database Into** dialog box enter a new name for the compacted file, then click on **Save**. This provides you with a second copy of your database, and you may like to use one of these files as a backup whilst working on the other.

Alternatively, if the database is already open, select **Tools | Database Utilities | Compact Database and Repair Database. The currently open database file will be compacted. This method does not create a second copy of your database.**

Depending on how much work you have done on your database since you last compacted it, and what sort of things you have been doing, you may reduce the size of your database file quite considerably, sometimes by as much as half.

16.3 Converting from Access 97 to Access 2000

It is possible to open a database that you have created using Access 97 in Access 2000. Access 2000 will offer you the choice of opening your Access 97 database, or converting it to Access 2000.

If you choose simply to open it, you will be able to do nothing new with it. You will not be able to create or modify any objects such as queries or forms, nor will you be able to edit the data. However you will be able to continue to use it with Access 97.

The alternative is to convert your database to Access 2000.

- 1 Select **Tools | Database Utilities | Convert Database| To Access 2000 File Format.**
- 2 Select your Access 97 database file.
- 3 Type a new name for the Access 2000 version of your database.
- 4 Click **Save**.

Access 2000 will make a new copy of your database as an Access 2000 file.

Once you have converted your database to Access 2000 you can work with it in all the usual ways.

16.4 Converting from Access 2000 to Access 97

You can save your database back to the previous version

- 1 Selecting **Tools | Database Utilities | Convert Database| To Access 97 File Format.**
- 2 Select your Access 2000 database file.
- 3 Select Microsoft Access Database (*.mdb) as the **Save as type**.
- 4 Type a new name for the Access 2000 version of your database.
- 5 Click **Save**.

17 Further information

17.1 The Access online help

The Access online help contains much useful information including sections on getting started with Access, how to design a database, working with queries, forms, reports and much much more.

17.2 Books, manuals and other documents

The following books, published by Microsoft, are available from the I T Service Desk and the University Library (or are on order):

Running Microsoft Access 2000 by John Viescas, ISBN: 1-57231-323-4
Microsoft Office 97 Professional 6-in-1 Step by Step, ISBN 1-57231-703-5
Microsoft Office 97 Integration Step by Step, ISBN 1-57231-317-X

In addition, there are in the same locations, copies of the following useful Guide, produced as part of an ITTI funded project based in the University of Newcastle: *Using and Designing Databases for Academic work: A Practical Guide* by Weatherill and Hemingway.

17.3 Special interest group

There is, within the University, a special interest group for Access users. This group is an electronic mailing list. Members can offer help and advice to each other by sending questions to the mailing list. It is helpful, where the question and answer are of general interest, for the questioner to summarise any responses and send this back to the list.

The list is called **sigaccess@durham.ac.uk**.

The list is maintained by the maillist management program Majordomo (see **<http://www.dur.ac.uk/majordomo>**). To join the list send the following line as an e-mail message to **majordomo@durham.ac.uk**:

subscribe sigaccess

To leave the list, send the line:

unsubscribe sigaccess