Microsoft Access 2010™
An Essential Guide (Level 1)

Contents

This document is an introduction to Microsoft Access 2010, running under Microsoft Windows XP. For further information see _Microsoft Access 2010 - An Intermediate Guide_.

Introduction

A database is a computer program for storing information in an easily retrievable form. It is used mainly to store text and numbers (for example, the Library catalogue, which includes the author, title, class number and accession number for each book).

Most modern databases also allow the storage of other types of information such as dates, hyperlinks, pictures and sounds. As well as being able to store data, a database allows you to select information quickly and easily (for example, a list of the books written by a particular author or those on a certain subject). Finally, it may allow you to produce printed summaries (reports) of the information selected.

When setting up your own database, it is important to plan its use in advance. This is particularly important if you are setting one up which will be used by other people. Among the things which you should consider are:

- What information you will need to store
- What information you want to get out
- Who the data is intended for and how other users will use it
- Whether you want to restrict access to parts of the data to some users only
- Who is allowed to add or change data
- If your data refers to actual people, it may need to be registered under the _Data Protection Act_ (though this doesn't apply to a personal database of family and friends)

Although you can change the specifications of your database as you develop it, you will save yourself a lot of work if as much as possible is planned in advance.

Microsoft Access is a relational database management system (which allows you to link together data stored in more than one table). It is fully supported by IT Services and is available for personal purchase as part of the _Ultimate Steal_ and for departmental installation under the Microsoft _Select Agreement_.

Starting Microsoft Access

If you are using an IT Services machine, login as usual by entering your `username` and `password`. Then, to start up the program:

1. Open the Windows **Start** button and choose **All Programs**
2. Select **Microsoft Office** then **Microsoft Access 2010**

Tip: If you _right click_ on the **Microsoft Access** entry in the menu and choose **Send To** then **Desktop (create shortcut)** you'll have an icon on the _Desktop_ for future easy access. You can also do this with any Access file.

The Access Screen

On entering Access you are presented with a screen showing available templates, which have been designed to help you create your own databases. You can search for further templates at Office.com. These templates can be quite helpful for particular applications but you nearly always have to tailor the database produced to your own requirements.

You can also either create a new blank database (without help) or open an existing one. In this course you are going to use an existing database, to see how it is set up and how it can be used.
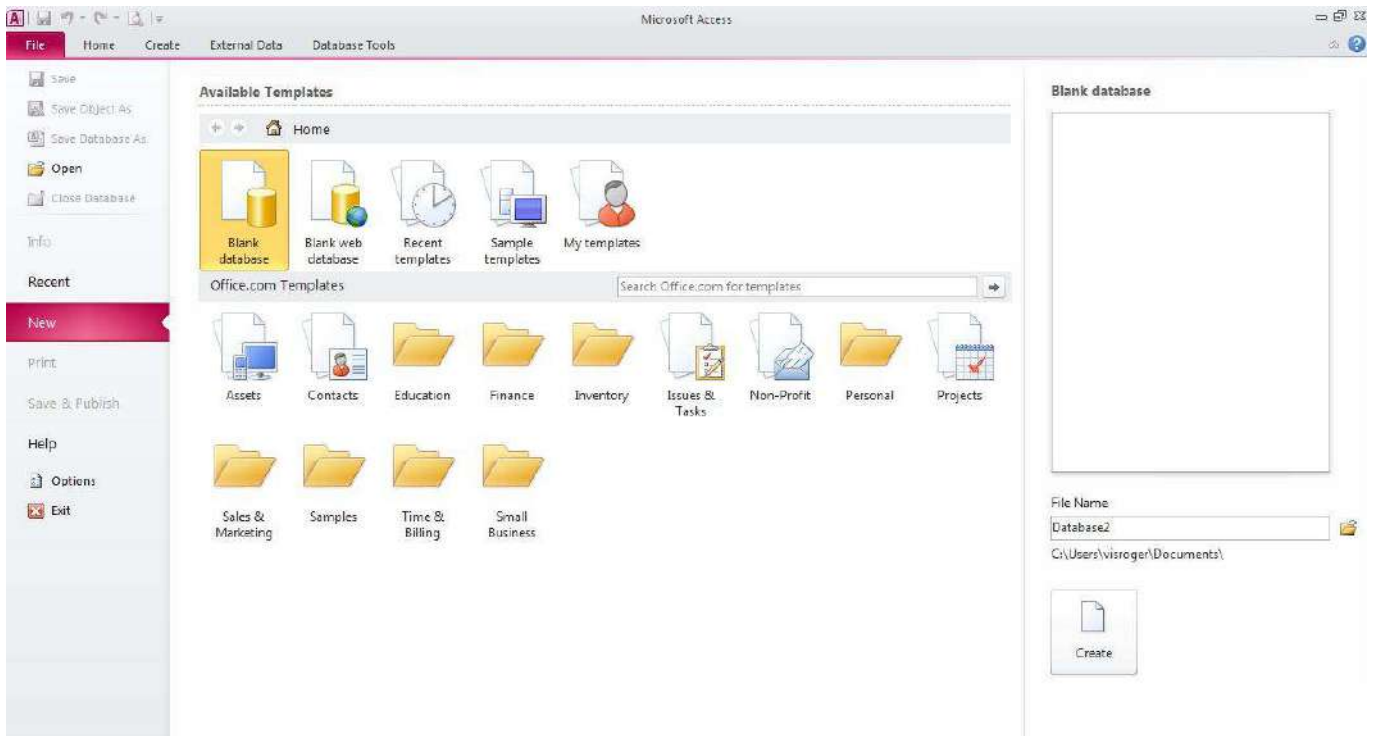
1. Click on **Open** (or simply press **<Ctrl o>**)
2. An *Open* window appears – scroll down on the left and click on **My Computer** then on **Data (D:)**
3. *Double click* on the folder called **Training** to open it
4. Click on **example2010.accdb** from the list which appears and press **<Enter>** or click on **[Open]**

*Note: For those using these notes on a computer not run by IT Services, the example file can be downloaded from the link provided at step **4** above.*

Users are welcome to take a copy of the example file if they want to practice.

The Navigation Pane
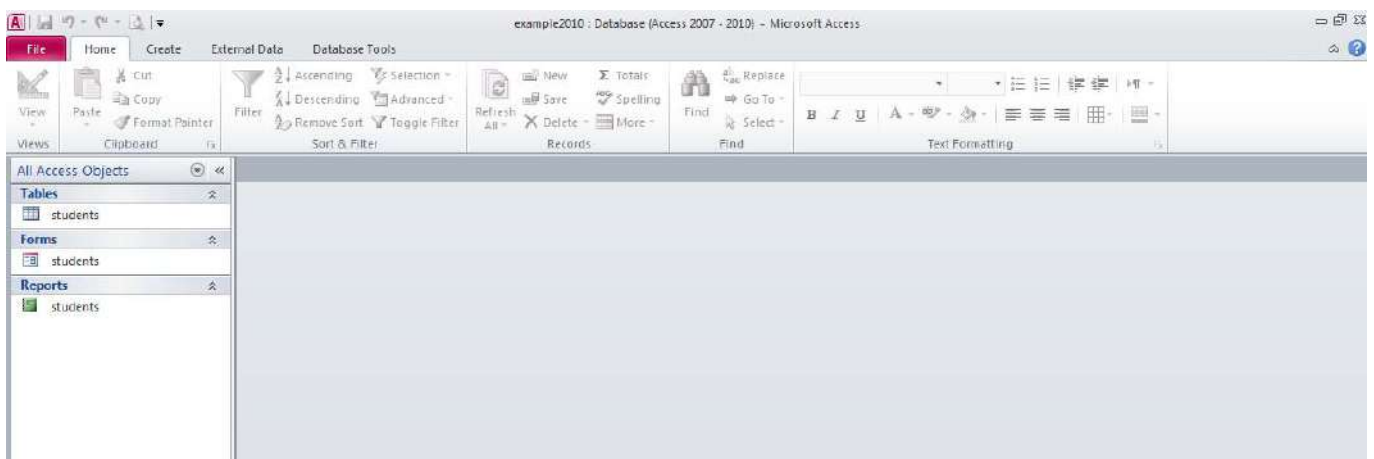
In the next screen, the *Navigation Pane* appears on the left. This controls navigation within a particular database. A database is made up of several *objects*, grouped into a single file. This database has been set up to show All Access Objects which currently exist in this database, but there are other types of object as well which do not currently appear. You will be meeting some of these later in the course.

The arrow at the top of the pane (to the right of *All Access Objects*) lets you select specific types of object.

The full list is:

- **Tables** - hold the raw data
- **Queries** - extract part of the raw data to produce *dynasets* - dynamic sets of data which can change each time the query is run (to reflect any changes to the data in the tables)
- **Forms** - user-friendly layouts to display data on the screen (either in a table or from a query)
- **Reports** - output files, ready for printing
- **Pages** - for creating/editing WWW pages
- **Macros** - lists of commands to perform particular functions
- **Modules** - programs which expert users write in a programming language called Access Basic to perform tailor-made functions not generally available

The objects are accessed from the *Navigation Pane*. Pages, Macros and Modules are not dealt with in this course. As you use the different objects, the tabs on the *Ribbon* change appropriately.

1. Click on a double arrow on the right to show or hide the objects in a particular group
2. Click on the single arrow at the top of the *Navigation Pane* to view further display options

Part 1: Using an Existing Table

Begin by investigating the table named *students*. This contains data relating to imaginary students in a fictitious department in the University, but it could equally be members of a club or just information about your friends and relatives.

1. Select the **students** table then press **<Enter>** (or *double click* with the mouse) to open it

A new pane opens on the right showing the data set out in a table. This method of display (known as *Datasheet View*) shows the data in columns and rows, similar to a spreadsheet. There are a number of entries (*records*), one for each student, which each take up one line or row of the table. For each student, various items of data are recorded in columns - each column contains one variable (or *field*). On the top of the table is a tab, which provides easy access when you have more than one object open.
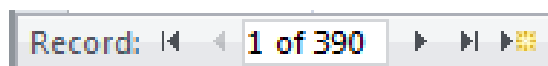
Record: |◄ ◄ 1 of 390 ► ►| ►▦

Immediately below the data is the *status bar*, which shows you are positioned at Record 1 (of 390). The *current record* has a slightly darker background, while the column on the far left is yellow-orange (the *current field* has a coloured border). You can move the indicator down to the next record by clicking on the button immediately to the right of the number 1 on the status bar. The next button to the right takes you to the end of the table - click on this and you should be at Record 390. Matching buttons on the left take you back a single record and back to Record 1 - try out these too. You can also move up and down using the arrow keys on the keyboard. The scroll bar down the right edge of the table window moves the display up and down.

Another scroll bar is provided at the foot of the window for moving to the left and right when the records extend over more than one screen. To move from field to field across a record, use the **<*right arrow*>** and **<*left arrow*>** keys or **<Tab>** and **<Shift Tab>**. The **<End>** key takes you to the last field, the **<Home>** key to the first. **<Page Up>** and **<Page Down>** take you up and down a screen, while **<Ctrl Home>** and **<Ctrl End>** take you to the first field of the top record and final field of the last record, respectively.

View: ⬚ or ⬚

To see exactly what each record contains and how it has been set up:

2. Click on the **[View]** button (the first on the **Home** tab) – a *Design* tab is added to the *Ribbon*

The *Table Design* pane lists the field names, indicates their data types and also shows the *field properties*. The screen appears as below:
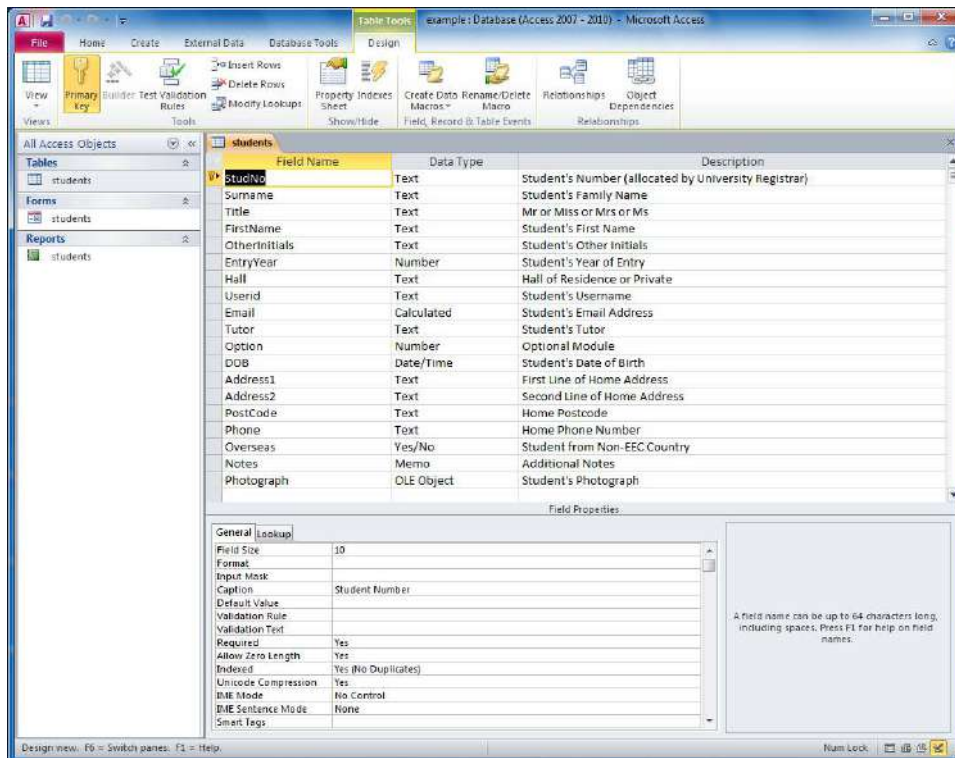
The fields (and properties) are as follows:

- **StudNo**: A *text* field containing each student's personal id, as allocated by the University Registrar's Office. Text fields are the commonest type of fields and can be used to store any characters (letters, punctuation, numbers etc). Numbers should be stored as *text* if not being used in calculations. This field is set up to hold up to 10 characters and a *Caption* is used to expand the field name. This number uniquely identifies each student - the *Required* property has been set to **Yes** and *Indexed* is set to **Yes (No Duplicates)**. This field has also been used to set up a *Primary Key*, which you will learn more about later.

Tip: It's good practice not to include spaces in field names (or in the names of tables / queries / forms / etc). Instead, make use of *Captions* to expand the field name (to include any spaces). Not only do you have less characters to type but it makes manipulation of the data much easier if you find you need to use more advanced database features.

3. Press **<down arrow>** to move to the next field (then repeat this for each field):

- **Surname**: A *text* field containing the Family Name of each student. This field is required, can hold up to 25 characters and is *Indexed* as **Yes (Duplicates OK)**

- **Title**: Another *text* field but this time for up to 4 characters. Here, we know the possible values (Mr/Mrs/Miss/Ms) and can set up a *Validation Rule* to check that the data entered is correct - if it is not, the *Validation Text* is displayed. A *Default Value* (Mr) has also been set

- **FirstName**: Another *text* field for student's first name - up to 20 characters

- **OtherInitials**: A *text* field for any other initials - up to 6 characters

- **EntryYear**: A *number* field recording the student's year of entry. Numbers can be stored using different field sizes; here, an *integer* is used - see the Appendix for a full explanation. This could also be stored as a *text* or *date/time* field, depending on how it is to be used. The *Default Value* is set to the current year using built-in *Functions*.

- **Hall**: Another *text* field where the values are known (there are only certain Halls of Residence) so a *Validation Rule* has been set - up to 15 characters. A *Default Value* (Private) has also been set

- **Userid**: This is the student's computer username, which can also be used for the student's email address (see next field) - a *text* field for up to 8 characters
- **Email:** The student's email address, calculated from the *Userid* – you'll learn more about this later
- **Tutor**: The student's tutor - again a *text* field for up to 20 characters
- **Option**: A *number* field which points towards different optional course modules the student can study. As the number of options is small (and always +ve), the field is stored as a *byte*. A slightly different *Validation Rule* is used to check the data entered
- **DOB**: The data type here is *Date/Time*, which has been set up in *Medium Date* format. Note that a *Caption* is used to expand the field name.
- **Address1**: First line of the student's home address - a *text* field storing up to 50 characters
- **Address2**: Second line of the student's home address - a *text* field storing up to 20 characters
- **PostCode**: The student's home post code - a *text* string storing up to 10 characters
- **Phone**: The student's home telephone number - note that even though this is a number it is stored as *text* (you won't be doing any mathematical calculations with it!)
- **Overseas**: A *Yes/No* (or logical) field storing whether the student is from an EEC country or not. The *Default Value* is set to *No*.
- **Notes**: For any other pieces of information - for longer pieces of text, a *memo* is used
- **Photograph**: Digital data (eg a passport photograph) are stored as *OLE Objects*

Other data types exist which are not included here, namely: *currency*, *autonumber*, *hyperlink* and *attachment* (see the [Appendix](#) for further details).

Tip: Note that the student's surname is stored separately from the first name (similarly each line of the address is in a separate field). Information should always be stored in its component parts. You can then, for example, sort by surname then first name, or reference the students formally (ie Mr X) or informally (by their first name). You will see later how to combine this data into a single field, if you need to.

To close the *Table Design* pane and return to the top of the datasheet:

4. Click again on the **[View]** button - note how the icon on the button changes as you move between *Design* and *Datasheet* view

Searching for a Particular Record

Find:

To search for a particular record (ie down a field), you should first move to the field you want to search:

1. Press **<Tab>** to move to the *Surname* field
2. Click on the **[Find]** button on the right hand side of the *Home* tab on the *Ribbon* (or press **<Ctrl f>**) and a *Find and Replace* window will appear
3. The cursor is already positioned in the *Find What:* box - type in `smith`

The default options should already be set correctly. The *Look In:* box shows the search is restricted to the current *Surname* field (alternatively, you can search the whole table). In the *Match:* box, you can choose to match the *Whole Field*, *Any Part of Field* or the *Start of Field*. *Search:* is set to *All* records.

The other options are *Up* and *Down*. *Match Case* lets you distinguish capitals from lower case (if you need to). Finally, *Search Fields as Formatted* is useful for finding data as displayed (a date format, for example). Note that you also have access to a *Replace* tab for editing data.

4. Press **<Enter>** for [**Find Next**] and the search should be carried out

5. Press **<Enter>** again and another *Smith* will be found

6. Keep pressing **<Enter>** until you get the message that the search item is not found

Obviously, this is not a very elegant way of retrieving information from the database - but it works! To close both the warning message and *Find* window:

7. Press the **<Esc>** key *twice* or click on [**Cancel**] (or on the red **[Close]** button)

8. Finally, press **<Ctrl Home>** to move back to the first record (or use the first button on the record indicator bar)

Sorting

The records, as you have seen them so far, are shown in the order that they were first entered into the database - as the data came from the Registrar's Office, it is in *Student Number* order. For this reason, it wouldn't have been easy to search for *Smith* simply by scrolling through the records (and imagine trying to find a book in the Library if they were all listed by their date of purchase!). If the data is sorted, however, then you can scroll through the records to search for a particular one.

Quick Sort

Ascending: [icon] Descending: [icon] Clear All Sorts: [icon]

To sort any field into alphabetical/numeric order, a quick sort facility is provided. First, you have to move to the column on which the sort is to be based:

1. Press **<Tab>** to move to the *Surname* field

2. Click on **[Ascending]** in the *Sort & Filter* group on the **Home** tab of the *Ribbon*

The names of the students are now in alphabetical order. Note that only the screen display is sorted - the records are still stored in the order in which they were typed, and they always will be.

3. Use the **[Remove Sort]** button to reset the data to its original unsorted order

Changing the Default Display Order

If you want to keep the new display order for the next time you open the table, all you have to do is close the table, saving the changes to its design. Try this next:

1. Move to the field you want sorted (eg *Surname*)

2. Click on **[Ascending]** (or **[Descending]** if you want the data in reverse order)

3. Close the table by clicking on its **[Close]** button

4. Save the changes to the table design when asked - press **<Enter>** or click on **[Yes]**

5. Now press **<Enter>** again to reopen the table - you should find it in the new order

BEWARE: it's very easy to accidentally save unwanted changes to the table design (if you perform a quick sort on another field, for example). Sort on the correct field again (then close and save) to get back your original table order.

Sorting in a Query

Sorts can also be carried out and stored in a *query*. Moreover, within a query you *must* set an explicit sort otherwise the records are displayed in their original order of entry. Queries are particularly useful where you have more than one field you need sorted - a simple quick sort only lets you sort on the one field (you can't for example sort by surname then firstname). By using a query you can produce a display sorted on any of the

fields and can even create complex sorts within sorts. You will be looking at queries shortly, and carrying out sorts in them, so there is no need to carry out an example here.

Indexes

An index can be likened to an index in a book (this adds just a few extra pages but is invaluable if you want to look up something). In a database it is used to speed up searching, sorting and grouping data - one should be set on any field used frequently in these ways. Access records the sort order in a hidden object so that it doesn't need to repeat the sort each time. Indexes also perform a second useful function in that they can be used to guard against duplicate data entry. They are always used when a field is set up as a *Primary Key*. Try setting up an index on another field:

1. Click on the **[View]** button to switch back to *Design View*
2. Note that the *StudNo* field already has an index - set to *Yes (No Duplicates)*. As this is used as the *Primary Key*, it must have this setting

The *Surname* field has an index of **Yes (Duplicates OK)**. This field is frequently used for sorting and duplicate values are allowed - as you have already seen with *Smith*. Try setting an index on *Hall* - another field likely to be used in sorting/selecting:

3. Click on the *Hall* field and, using the *list arrow*, set *Indexed* to **Yes (Duplicates OK)**
4. Next click on the *Userid* field and note the index here is set to **Yes (No Duplicates)**. The values in this field should be unique and the index will ensure this
5. Click on the **[View]** button again to switch back to *Datasheet View* - when asked, press **<Enter>** or click on **[Yes]** to save the changes to the design of the table

Adding, Editing and Deleting Records

New Record: Delete Record:

Whenever you make any changes (additions, deletions or edits) to a table, it is the original data file that you are altering. Unlike most other applications, a database does not make a working copy of the file first. For this reason, it is essential to keep a back-up copy of your file (to which you can always return), just in case you make mistakes when carrying out amendments.

To add a new record to the database, use the **[New]** button (on the status bar or in the *Records* group on the **Home** tab of the *Ribbon*) – you can also press **<Ctrl +>**. New records are always added at the end of the existing data. As soon as you start to type, Access creates a new empty record (marked with an asterisk), while the current record indicator changes from an arrow to a pencil:

1. Click on the **[New]** button - you should now be on Record 391
2. Type in a number for the *StudNo* (type in your own or just **99**) then press **<Enter>** (or **<right arrow>** or **<Tab>**) to move to *Surname*
3. Type in your own name then move to *Title* (press **<Tab>**, **<Enter>** or **<right arrow>**)
4. Repeat step **3** until you have filled out most of the record (at least the columns up to *Hall*)

Note that some fields already have a default value. To change a value in a field you simply type in a new one. Note also that some fields (eg *Hall* and *Option*) can only accept certain values, others (eg *StudNo*, *Surname* and *FirstName*) *cannot* be left blank. Calculated fields, such as *email*, cannot be edited.

The *Photograph* field can hold a picture. The best way to add one is via the *Clipboard* (ie **Copy** and **Paste**). If you *right click* on the field and choose **Insert Object...** then it may appear as an icon which you then have to *double click* to open. As pictures cannot be displayed in tables anyway, don't try filling out this field here.

Note: The best method for entering data is via a *form*, which you will be meeting later.

To delete the current record (in this case your own):

5. Click on the **[Delete]** button below **[New]** on the *Ribbon* and choose **Delete Record** (alternatively, select the record by clicking at the far left then simply press the **<Delete>** key)

Deleting records from a database is potentially very dangerous as they are erased once and for all, hence you are given one final chance to change your mind:

6. Press **<Enter>** for **[Yes]** to confirm the deletion

Note that you can't now use **[Undo]** to recover the record. If you have several records to delete:

7. Using the mouse, point to the left-hand edge of the first record to delete - you will find that the mouse cursor changes to an arrow

8. Hold down the mouse button - the record is marked - then drag through the records required

9. To delete them, press the **<Delete>** key (or use the **[Delete]** button)

10. When asked to confirm the deletions, this time click on **[No]** and the records will reappear

Note: Records must be next to each other in order to delete them (you cannot use *<Ctrl> click* like you can in other Microsoft software, though *<Shift> click* can be used to select a block of records). You will see next how to select a subset of non-contiguous records, which you could then delete.

Selecting Records

Databases offer you the facility of extracting sub-sets of records according to some pre-set conditions. In the Library, for example, you can search for the books written by a particular author or those dealing with a given subject. Access offers you two methods for selection, *Quick Select using a Filter* and *Selection using a Query*.

Quick Select

Selection: Toggle Filter: Filter:

Simple selections can be made directly on the table itself, using a filter. Access 2010 provides two mechanisms for this, as you will see:

1. Press **<Ctrl Home>** to move to the first record (press **<Enter>** first if this didn't work)

2. Move across to the *Hall* field - to find all the students living in a particular hall

3. Using the **<down arrow>** key, move to a record showing the *Hall of Residence* you require (or click on it using the mouse or you could use **[Find]** to search for a particular Hall)

4. Click on the **[Selection]** button (in the *Sort & Filter* group) and choose **Equals...**

Note that at the bottom of the screen it says *Record 1 of XX* and *Filtered*. To turn off the filter:

5. Click on the highlighted **[Toggle Filter]** button (below **[Selection]**)

You can also filter on part of a field - for example, you might want all students with a May birthday:

6. *Double click* on any occurrence of May in the *DOB* field (or drag through the word) to select it

7. Click on the **[Selection]** button and choose **Contains "May"** to carry out the filter

If you now also wanted to find the first year students born in May (we'll use the other method of filtering this time):

8. Click on the **[Filter]** button at the top of the *Year of Entry* field

9. Untick the *Select All* check box and tick the year required (here, **2011**) – press **<Enter>** for **[OK]**

Note that this method is more flexible in that it allows you to set more than one criterion:

10. Click on the **[Filter]** button again and tick a second year – press **<Enter>** for **[OK]**

You now have the *May* birthday students in two of the years. If you wanted the *July* birthday students instead, you use the **Date Filters** option followed by **All Dates in Period** in the *Filter* button window. Note that you can also open the filter selection by clicking on the filter icon shown on the right at the top of each column.

Having made your required selection, there are several things you might want to do next. For example, you might want to delete these records - even though they are not next to each other in the full dataset, you could drag through them here and delete them as before (but don't do so here).

Another thing you might want to do is to print off the data. However, you probably wouldn't want all of the fields, so you'll see next how to hide unwanted columns.

Changing the Fields Displayed

Tables often contain a lot of data, only some of which may be required. You can control which fields are shown and which hidden. Here, you may want just the student name and hall:

1. *Right click* on the *StudNo* column heading and choose **Hide Fields**

To hide several adjacent columns in one go:

2. Click on the *Userid* column heading
3. Scroll to the right then hold down **<Shift>** and click on the *Photograph* column heading
4. *Right click* on the selected columns and again choose **Hide Fields**

If you want to change the order of the fields on the screen, you can either use *cut and paste* or, more simply, *drag and drop*. Both these techniques should be familiar to the Microsoft Office user. To list the students starting with their full name (including title) in the correct order:

5. Click on the *Surname* column heading to select the column
6. Move the mouse cursor back into the column heading, hold down the mouse button then (with the button still depressed) drag the column to the right to a position immediately before the *Year* field
7. Release the mouse button to drop the field in its new position

Note: you are only changing the screen display - the data is still stored in its original order.

Finally, you might want to print your list. First, it's a good idea to preview it:

8. Click on the **File** tab, choose **Print** then **Print Preview**

You will notice that Access automatically adds a header and footer to your page, which you may or may not want. Normally you would now print your list, but here:

9. Click on **[Close Print Preview]** on the far right of the new **Print Preview** tab to turn off the preview

To redisplay any of the hidden fields:

10. *Right click* on any column heading and choose **UnHide Fields**
11. Click in the box against the required hidden column to redisplay it then press **<Esc>** for **[Close]**

Advanced Filters

The relationship between queries and filters is a very close one. You can in fact save a filter as a query by turning on the advanced filter option. This can be a useful aid in designing a query. As an introduction to queries, save the current filter (students born in May who came in a particular year):

1. Click on the **[Advanced]** button in the *Sort & Filter* group and choose **Advanced Filter/Sort...**

A *Filter Design* pane appears. This is very similar to the *Query Design* pane, which you will be using next. Examine how the criteria have been set up.

2. Move to the **File** tab and choose **Save** – the *Save As Query* dialog box appears

3. Save the filter as `MayBirthdays` (press **<Enter>** for **[OK]**), then **[Close]** the filter window

4. Close the **students** table - ***don't save the changes to the design*** (click on **[No]**)

Tip: The simplest way to redisplay all the fields if some are hidden is to close the table without saving the changes to its design. When you reopen it, it will appear in its original format.

To rerun the filter:

5. Select **MayBirthdays** from the new *Queries* categoryin the *Objects* list and press **<Enter>** to open it

You'll find that all the fields are displayed. You'll see later how to specify particular fields in a query.

6. End by closing the query - click on its **[Close]** button

Once a filter has been saved as a query, it's easy to modify its design if necessary.

Using a filter in this way is straightforward but a little limited. To do more complicated selections you have to use a *Query*. Queries also offer various other facilities, including sorts within sorts. In fact you may always want to view your data through a query – here, for example, you might want to see the students listed alphabetically by *Surname* then by *FirstName*.

Sorting in a Query

Run:

To introduce you to queries (which may look a little complicated at first, but which are in fact very easy), try carrying out a sort within a sort. There are two ways to start a query:

- You can choose **[Query Wizard]** on the **Create** tab of the *Ribbon* to get help
- You can choose **[Query Design]** on the **Create** tab

The Query Wizard isn't very useful here, so try the second method instead:

1. Move to the **Create** tab on the *Ribbon* then click on **[Query Design]** in the *Queries* group

2. In the *Show Table* window, select the **students** table then press **<Enter>** to **[Add]** it

3. Press **<Esc>** to **[Close]** the *Show Table* window

Note: If you ever wanted to add a different table, click on the **[Show Table]** button in the *Query Setup* group on the new **Query Tools Design** tab on the *Ribbon*.
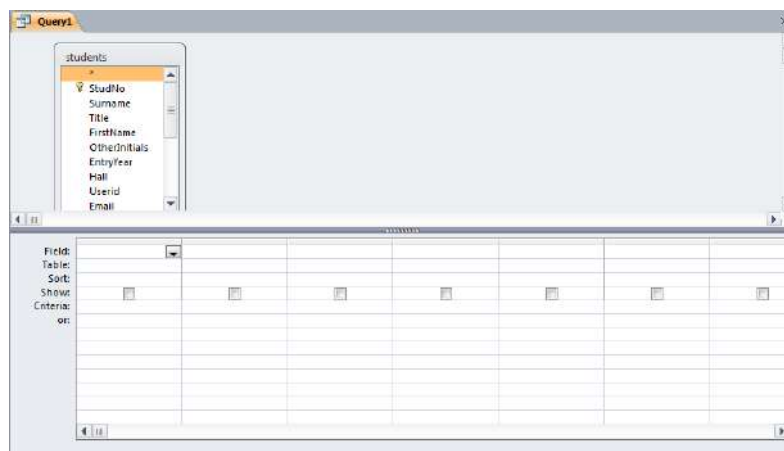
The *Select Query* pane may look a little confusing, but in fact it's very simple to use. The cursor should be flashing in the *Field:* row in the lower part of the screen waiting for you to define the fields to be displayed. Earlier, you sorted the *students* table by students' surnames but you couldn't then also sort by their first name. Here in a query, you can:

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4. Click on the *list arrow* on the right of the *Field:* cell and choose **students.***

The *asterisk* notation means *all* the fields in the *students* table (if you only want certain fields displayed you must choose them individually). If you were to run the query as it stands, you would see the data in its original unsorted format (ie the sort you set when the table is opened isn't carried across – instead you have to set up explicit sorting in the query).

5. Click on the *list arrow* in the *Field:* cell in the second column and choose **Surname**

6. Repeat step **5** in the third column but choose **FirstName**

7. Move down to the *Sort:* (third) row and type `a` (for **Ascending**) in *both* columns **2** and **3**

8. In the *Show:* (fourth) row, untick the check boxes in *both* columns **2** and **3** (you can click anywhere in the cell) - if you don't, the *names* will appear twice as they are already included in **students.***

9. To carry out the query, click on the **[Run]** button on the far left of the *Ribbon* (or you can use **[View]** to move from *Design View* to *Datasheet View*)

You should find that the students are now listed in their correct order (look at the Smiths) and that this query should act be used whenever you want to look at the complete set of data.

10. Click on the query's **[Close]** button

11. When asked, press **<Enter>** or click on **[Yes]** to save the query

12. Save the query as `SortedStudents` - press **<Enter>** or click on **[OK]**

Selection using a Query

Next, you are going to repeat the filter you carried out earlier to list all students from a particular hall. This time your new query will be making use of the fact that you already have the students sorted by name (a query can be based either on a table or another query):

1. Click on the **[Query Design]** button on the **Create** tab

2. In the *Show Table* window, click on the **Queries** tab and select the **SortedStudents** query

3. Press **<Enter>** to **[Add]** the sorted students then press **<Esc>** to **[Close]** the *Show Table* window

4. Set the *Field:* in the first column to **Surname** and that in the second column to **FirstName**

You now need the *Hall* field in a separate column to set up the selection criteria. Another way to fill up a field is to *double click* on it in the field list in the top half of the *Select Query* window. You can try this next:

5. *Double click* on the **Hall** – it should be added to the next empty column in the query

6. Move down to *Criteria:* in column **3** and type the name of the required hall - eg `Wessex`

7. To carry out the query, click on the **[Run]** button on the far left of the *Ribbon* (or use **[View]** to move from *Design View* to *Datasheet View*) or *right click* on the Query design and choose **Datasheet View**

The difference between this query and the earlier filter is that you can save it directly for future use.

8. Click on the query's **[Close]** button

9. When asked, press **<Enter>** or click on **[Yes]** to save the query

10. Save the query as `Hall` - press **<Enter>** or click on **[OK]**

Note: You can't give a table and query the same name.

Now try re-running the query:

11. *Double click* on the **Hall** query in the *Objects* list - you have your results again

Parameter Queries

The selections you have carried out so far have only met fixed criteria - in this case: *Show me the students who live in Wessex (or whichever) Hall*. With a query, however, you can change the criteria each time you run it by

making it a *parameter query*. The design is very similar to what you have already seen except that instead of setting a fixed criteria, Access asks for the information at run time. Modify the Hall query to do this:

1. With the *Hall* query still open, click on the **[View]** button to change to the *Design View*
2. Click in the *Criteria:* field in the third (*Hall*) column and **<Delete>** the current criteria
3. Type in a new criteria saying: **[Which Hall?]**

Note: square brackets tell Access that this is a question, to be displayed at run time.

4. Click on the **[Run]** button (or on **[View]** to switch to *Datasheet View*)
5. When asked the question *Which Hall?* type in the required hall of residence - eg **Sibly**
6. Press **<Enter>** or click on **[OK]** and the query will be run

Normally, you would run the query each time from the *Objects* list (or from a user-friendly interface - a form called a *switchboard*). Here, however, to run the query again:

7. Click on the **[View]** button to change to the *Design View*
8. Click on the **[Run]** (or **[View]**) button again
9. Type in the name of a different hall - eg **Windsor** - and press **<Enter>** or click on **[OK]**

As you can see, this query is much more useful than when it only worked for a fixed hall. The same mechanism is used when you look up a book in the Library. Here, the query picks up the parameter from a box on the screen (where you have typed in the author's name or the subject you are searching for).

More Complex Queries

Next, try some more complicated queries. What if you want to have an alternative criteria in a parameter query? For example, you might want a list of students living in *either* one hall *or* another. To do this, you have to set up criteria on two different lines.

1. Click on the **[View]** button to change to *Query Design*
2. In the *second* line of the *Criteria:* in column **3**, type: **[or?]** for a second question
3. Click on the **[Run]** button (or on **[View]** to switch to *Datasheet View*)
4. When asked *Which Hall?* type in the name of the first hall - eg **Wantage** (press **<Enter>**)
5. When asked *or?* type in the name of another hall - eg **Wessex** (press **<Enter>**)
6. You now have the students from both halls - **[Close]** the query, saving the new design

You have seen how to match values in a query but you can also use criteria such as greater than, less than, not equal to, between one value and another, or matching part of a field. For example, how do you set up a query to pick out just the female students? The answer is that you can use a special notation called *Like*.

The **Like** notation indicates that the words which follow must be embedded within the data in that field for a record to be selected - wildcards (* or ?) can be used to denote characters which may precede or follow the required text. ? represents a single character whereas * represents any number of characters. For example, **Like C**** could be used to give you all the students with names beginning with the letter *C*, while **Like ***son** would match students whose names end with *son*. For the female students:

1. Click on the **[Query Design]** button on the **Create** tab
2. In the *Show Table* window, click on the *Queries* tab, select **SortedStudents** and **[Add]** it
3. Press **<Esc>** or click on **[Close]** to close the *Show Table* window
4. Set the *Field:* in the first column to **SortedStudents.*** (ie *double click* on the *)
5. Set the *Field:* in the second column to **Title**
6. In *Criteria:* in the second column type: ***s** (this covers *Miss*, *Ms* and *Mrs*) and press **<Enter>** (Access automatically changes this to **Like "*s"** for you)
7. Turn off *Show:* by unticking the box

8. Click on the **[Run]** button to run the query - or switch to *Datasheet View*

To set up a second condition on this subset of data (eg female students who have a particular tutor) is very easy. Whereas alternative conditions are set up on different lines, simultaneous conditions must be set up on the *same* criteria line:

9. Click on the **[View]** button to move back to *Design View*

10. Set the *Field:* in the third column to **Tutor**

11. Turn off *Show:* by unticking the box

12. In *Criteria:* in the third column, top line, type: **[Which Tutor?]** - or set a fixed value

13. Click on the **[Run]** button to run the query - or switch to *Datasheet View*

14. When asked *Which Tutor?* type in the name of a tutor (eg `Foot`) - press **<Enter>** for **[OK]**

15. **[Close]** the query, saving it as `Females`

Adding New (Calculated) Fields

Earlier, you did a very simple selection to show just the student's name and hall of residence. One fault with the original example was that the students' names (first name and surname) were printed in separate columns. In a query you can calculate a new field, joining these together:

1. Click on the **[Query Design]** button on the **Create** tab of the *Ribbon*

2. In the *Show Table* window, select the **Students** table and **[Add]** it - press **<Esc>** to **[Close]** the window

3. In *Field:* in column one, type: `FullName: FirstName & " " & Surname` (don't forget the space between the double quotes) - press **<Enter>**

Tip: You should always use an ampersand (&) rather than plus (+) sign when joining text together. Though both appear to work, plus signs can occasionally cause problems.

4. Set the *Field:* in the second column to **Hall**

5. Set the *Field:* in the third column to **StudNo**

6. Set the *Field:* in the fourth column to **Surname** and set *Sort:* to **Ascending** and turn off *Show:*

7. In the fifth column, repeat step **6** but set the *Field:* to **FirstName**

8. Click on the **[Run]** button (or on **[View]** for *Datasheet View*) to run the query

9. *Double click* on the dividing lines between the column headings to widen the *FullName* column

10. *Right click* on the **StudNo** heading and choose **Hide Fields** (this field is needed later but doesn't need to be displayed here)

11. **[Close]** the query, saving it as `Names`

A calculated field also occurred in the original *students* table – you can add such fields both to queries and tables. To see how it was calculated

12. Open the **Students** table and click on the **[View]** button to move to *Design View*

13. Click on the **Email** *Field Name* and take note of the *Expression* in the *Field Properties*

14. You'll find the email address is defined as: `[Userid] & "@reading.ac.uk"`

Note **that** the *Result Type* of this email field is *Text* and not *Hyperlink*. This means it has not created an active hyperlink (ie you wouldn't be able to click on it to send a message).
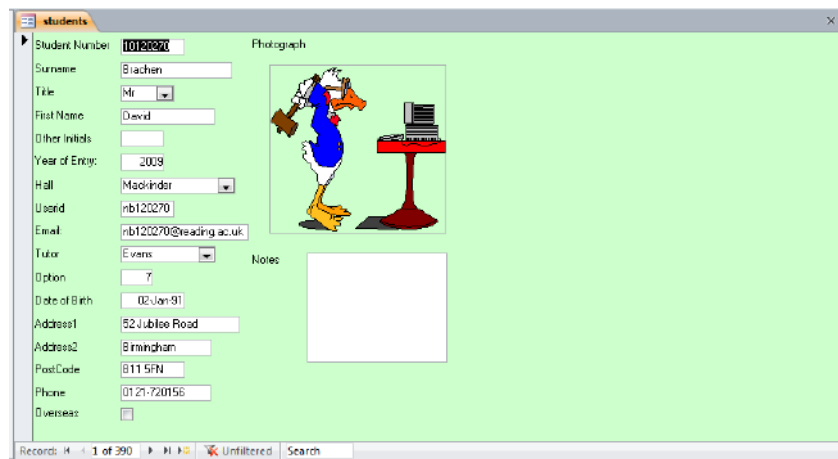
15. Finally, **[Close]** the *students* table

Tip: When creating complicated calculations, it's useful to evoke the *Expression Builder*. This appears if you *right click* in the *Field:* row (or, indeed in *Criteria:*) and choose **Build...** There's also a **[Builder]** button on the *Ribbon*. You then have access not just to the field names but also to built-in functions. Even more importantly, a *Criteria:* can be set to pick up values held on forms.

Using a Form

The next object to investigate is a *Form*. Forms offer a friendly way of viewing the data in that they show a single record at a time. Forms can also be used to display results from queries. They are also used to facilitate data input. A form has already been set up for the students table:

1. *Double click* on the **students** form in the *Objects* list (or click on it and press **<Enter>**) to open it

A user-friendly screen is displayed, with a title at the top and the fields listed and boxed. The buttons work as they did before, allowing you to move around, add new records, delete records, filter, sort and search etc.

2. Move to the *Surname* field (press **<Enter>**, **<Tab>** or **<*right* or *down arrow*>**)
3. Click on **[Ascending]** on the **Home** tab on the *Ribbon* to sort the forms into alphabetical order
4. **[Close]** the form then reopen it - the sort order remains, as it did with the table

Forms also provide short-cuts to data entry, including letting you select from a list of valid values. Use this form to type in your own information again:

5. Click on the **[New]** button in the *Records* group on the **Home** tab
6. Fill in the fields with your own information, as you did before
7. In the *Title* field, select the required title using the *list arrow*
8. In the *Hall* field, start typing the name of the hall and watch Access select from the list of values
9. Note that once you've filled in the *Userid* field, the *Email* field is automatically calculated
10. The *Tutor* field also has a *list arrow* attached
11. The *Overseas* field appears as a check box - click on it (or press **<spacebar>**) to set it on if necessary
12. In the *Notes* field, type several lines of text (type rubbish text, if you like) and watch how the box accommodates it - press **<Tab>** to move to the next field (the **<*down or right arrow*>** keys simply move through the text, while **<Enter>** gives you a new paragraph!)
13. For a *Photograph*, right click inside the box and choose **Insert Object...** then **Create from File** and **Browse** for the file.

If you haven't got a picture file handy, press **<Alt PrintScreen>** to dump the current window then press **<Esc>** followed by **<Ctrl v>** to **[Paste]** it from the *Clipboard* .

Tip: As was mentioned earlier, when you insert a picture file in *Access* it often appears as an icon. Insert it into *Word* or *PowerPoint* instead, then **Copy** and **Paste** into *Access* and it appears okay.

14. End by deleting your own record - click on the arrow attached to the **[Delete]** button and choose **Delete Record** then press **<Enter>** for **[Yes]** (or click on **[No]** if you really want to keep it)
15. Finally, press **<Ctrl Home>** to move back to the first record

Form Design

Though forms are very easy to use, they are not that easy to design from scratch. Fortunately, Access has wizards to do most of the work for you. To modify a form, you view the form design:

1. Click on the **[View]** button (or *right click* and choose **Design View**)

Note that Access provides you with three new tabs on the *Ribbon* to help you with the design. You are not going to modify the design of this form - you will see how to later, in Part 2 of these notes. For the moment:

2. Click on the **[View]** button to move back to *Form View*

Filter by Form

If you want to select a subset of the records using a filter, you can still use the **[Selection]** button as before. This isn't very convenient, however, if you want to base the filter on information not displayed on the current form. Here, you might want to search for students living in Wessex Hall (which isn't on the current record). You can do this using the **[Filter]** button as before, but Access also provides a special filter for use with forms.

1. Click on the **[Advanced]** button and choose **Filter by Form**
2. Click on the *list arrow* attached to the *Hall* field and select **Wessex**
3. Click on the **[Toggle Filter]** button - you should have just 9 records (use **<Page Down>** see them)
4. Click on the **[Toggle Filter]** button again to see all the records

Though this exercise could have been carried out using the **[Filter]** button, this next one can't:

5. Again. click on **[Advanced]** and choose **Filter by Form** – your previous filter is shown
6. Click on the *list arrow* attached to the *Title* field and select **Mr**
7. Now click on the *Or* tab at the bottom of the filter pane for a second filter
8. Select a *Title* of **Miss** and a *Hall* of **Windsor**
9. Click on the **[Toggle Filter]** button - you now have 19 records (press **<Page Down>** to see them)
10. Close the form by clicking on its **[Close]** button

Note that you can also use **[Filter by Form]** on a table (a blank record appears for you to type in the criteria).

Using a Report

The fourth object button in the *Navigation Pane* is *Report*. This allows you to create (and store) reports which can then be printed. A students report has already been prepared (you'll see how to create one later):

1. *Double click* on the **students** report in the *Objects* list (or click on it and press **<Enter>**) to preview it
2. The mouse button acts as a zoom facility - position the magnifying glass over a particular piece of text and click on the mouse button to magnify it or use *Zoom* in the bottom left corner of the screen

Note: if you use *Zoom*, this will alter the magnification level setting for the mouse button.

3. Use the page selection buttons at the foot of the *Preview* window to move to other pages (**<Page Up>** and **< Page Down>** stop working temporarily if you change the Zoom level)

To see how the report is designed:

4. *Right click* on the report and choose **Design View**

Note how similar *Report Design* and *Form Design* are - you have matching *Design* tabs on the *Ribbon* to draw the various components. Again, you will see how this is done later. Reports can also be viewed in *Report View*:

5. *Right click* on the report and choose **Report View**
6. Scroll down (or use **<Page Down>**) to see the results
7. Close the report - click on its **[Close]** button

Part 2 : Creating a New Table

In this next section you will be creating your own table (and form). You will be typing in a couple of records and then retrieve some more from a file.

Designing the Table

As much as possible of a table design should be done in advance on paper. Here, however, you will be creating the table on the screen so that you can see the stages as they are implemented. The table you are going to create contains information about the Halls of Residence at the University. In Part 3 of these notes, you will see how to link this information to the data in the **students** table:

1. Click on the **Create** tab on the *Ribbon*

The *Tables* group on the left offers you various alternative methods to create a new table:

- *Table* creates a blank datasheet for you, with an *ID* field and an *Add New Field* column. As you enter data into this column, another *Add New Field* appears and the first column is relabelled *Field1*. Access recognises the type of data entered and automatically allocates a *Data Type* to it (eg if you type a date, the field will be set up as a Date/Time field). To rename the fields, double click on each column heading and type in its new name

- *Table Templates* has predefined *Sample Tables* (Contacts, Tasks, Issues, Events, Assets). Each sample table has many fields, which you may or may not want to include in your own table design. Templates have the disadvantage that they sometimes try to be too clever and are very much geared to the American market (eg Addresses have States, not Counties)

- *SharePoint Lists* - SharePoint is not supported by the University, so this is irrelevant

- *Table Design* lets you do everything yourself, from scratch

It's important to understand the fundamentals of table design, so choose that method:

2. Click on the **[Table Design]** button
3. The first field is for the name of the hall - type in `Name` and press **<Enter>**

A warning message appears telling you that *Name* is a *reserved word* and could cause problems later. Other reserved words include *Date* and *Year*. There's a problem here in that it's necessary for this field to be called *Name* in order to import the Halls' data in the later exercise. *Indeed, it's important that you name the fields exactly as specified in these notes for this exercise to work.*

4. Press **<Enter>** for **[OK]** to cancel the warning and accept the field name
5. The *Data Type* is **Text** by default - press **<Enter>** as this is what you want for this field
6. The *Description* is optional - type in `Name of Hall of Residence` if you want
7. Move down to the *Field Properties*

Tip: Key **<F6>** can be used to *Switch* panes - or you can use the mouse.

8. Set a *Field Size* of `15` and press **<Enter>**

If you need to increase the field size at some time in the future there should be no problem (any existing data stays exactly the same). However, if you ever choose to decrease it then you could lose some data. This is called truncation.

9. Set up a *Caption* of `Name of Hall` then *Required* to **Yes**
10. Set *Indexed* to **Yes (No Duplicates)** - it's important to put an *index* on this field since it will be used to link up the students' data and it also insures that the data for a particular hall is not entered twice
11. Move to the second row - use the mouse this time
12. Set the *Field Name* to `Warden` and the *Data Type* to **Text**

You could now fill in the *Description* and set some *Properties* but, to speed things up, just leave the settings for this (and subsequent fields) as they are.

13. Press **<*down arrow*>** then **<*back arrow*>** to move to the third field

14. Set the *Field Name* to `Phone` and the *Data Type* to **Text**

15. Press **<*down arrow*>** then **<*back arrow*>** to move to the fourth field

16. Set the *Field Name* to `Road` and the *Data Type* to **Text**

17. Press **<*down arrow*>** then **<*back arrow*>** to move to the fifth field

18. Set the *Field Name* to `Town` and the *Data Type* to **Text**

19. Press **<*down arrow*>** then **<*back arrow*>** to move to the sixth field

20. Set the *Field Name* to `Rooms`, the *Data Type* to **Number** (for a *Description* add **Number of rooms in the Hall**) and the *Field Size* property to **Integer**

21. Move to the seventh field

22. Set the *Field Name* to `Meals`, the *Data Type* to **Yes/No** , add `Are meals provided?` for a *Description* and the *Default Value* property to `Yes`

Note: The *Lookup* tab in the *Field Properties* allows you to set up a different *Display Control* on a form or table. For a *Yes/No* field, this is set to *Check Box* but can be *Text* or *Combo Box*:

23. For the *Meals* field, click on the **Lookup** tab and set *Display Control* to **Text Box**

Setting up a Primary Key

Primary Key:

Whenever you design a new table, it's a good idea to set up a *Primary Key* on one of the fields. Primary Keys help Access uniquely identify each individual record in a table and hence work more efficiently. If a table doesn't contain a unique identifier then Access will ask to set up an ID field for you. Here, the *Halls of Residence* table already has a unique field - the name of the hall:

1. Click on the **Name** field (row 1)

2. Click on the **[Primary Key]** button - a key symbol appears in the *field indicator* column

3. Click on the **[View]** button to move to *Datasheet View*

4. When asked (press **<Enter>** for **[Yes]**), save the table as `HoR` - press **<Enter>** for **[OK]**

You'll find you have an extra column labelled *Add New Field*. To hide this:

5. *Right click* on the column heading and choose **Hide Fields**

You could now type in your data, if you wanted to. Using a datasheet isn't very friendly, however, so try setting up a special *data-entry form*. A form gives you more control over what data is entered and can be designed to cut down on typing mistakes, as you saw with the students form.

Creating a Data Entry Form

There are two simple ways of creating a form; you can either use a *Form Wizard* or *AutoForm*. AutoForm is a very quick and easy way to produce a form - it does so at the click of a button:

1. With the **HoR** table still open, click on the **Create** tab then on **[Form]** - the form appears instantaneously in a new window

2. Click on its **[Close]** button to **Close** the form - don't save it this time (click on **[No]**) as you will be creating the form using a *Wizard* next

The *Form Wizard* is equally easy to use and offers you various additional options.

3. Still on the **Create** tab, click on **[More Forms]** then choose **Form Wizard**

As you already had the *HOR* table open, that is chosen automatically. If you start up the *Wizard* without a table or query open (or if you wish to base the form on a different set of data) then you would select it here.

You are now asked which fields you want to appear on your form (here you have the choice - *AutoForm* gave you them all). As it happens, for a data entry form, you need all the fields:

4. Click on the double arrow **[>>]** to move them all (alternatively select individual fields in the order you want and use the [>] button) - press **<Enter>** or click on **[Next>]**
5. Choose a *layout* for your form (explore the alternatives, if you like); **Columnar** is best so choose that then press **<Enter>** or click on [**Next>**]
6. Set a *style* for your form - choose **None** (press **<Enter>** or click on [**Next>**])
7. Add a title - type `Halls of Residence` (press **<Enter>** to **[Finish]**)

The form is now opened for you to use. As it stands it is neat and simple, but a little boring - in fact it's almost exactly the same as that produced using *AutoForm*. To improve it

8. *Right click* on the form (or use the arrow attached to the base of the **[View]** button) and choose **Design View** to move to *Design View*

Forms have three (sometimes more) sections - a *header*, *footer* and the *detail*. The data itself is entered into the detail section; the header and footer can be used for titles etc. To add a footer:

9. Position the mouse over the bottom border of the *Form Footer* - the cursor should change shape to a double-headed arrow. Hold the mouse button down and drag the border down one unit (there's a scale on the left-hand side)
10. Click once on the **[Label]** tool in the *Controls* group - the mouse pointer now has an A attached
11. Move the pointer into the form footer (top left corner) and click once
12. A small label box is drawn - type your form footer: `The University of Reading`
13. Press **<Enter>** and the label box is completed
14. Change the **[Font Size]** (eg to **14** point) and click on **[Bold]** to make the title more imposing

To display the enlarged label:

15. *Right click* on the label box and choose **Size** then **To Fit**
16. *Right click* on the *label* box and choose **Font/Fore Color** - pick a colour to apply to your footer
17. *Right click* on the header background (away from the label) and choose a **Fill/Back Color**

Note: If you wanted to add a picture to the form (eg the University identity) then simply click on the **[Logo]** tool, choose where you want the picture, click the mouse button then browse for the required picture file.

You can also amend the design of a form (just the position of objects and their colour) in *Layout View*:

18. *Right click* on the tab at the top of the form and choose **Layout View**
19. Click on the detail area on the far right – the detail area is outlined in orange
20. Use the **[Fill/Back Color]** button on the *Ribbon* to change the colour of the detail background

Tip: Use the **[Format Painter]** to copy the colour scheme of one label or text box to the others - this speeds things up and gives a better overall design. *Double click* on the button if you want to paint the format to more than one object (then click on it again to turn it off when you have finished).

21. Press **<Ctrl s>** (or click on the **[Save]** button) to save the changes to the design of the form - the name of the form is picked up automatically as **Halls of Residence**
22. Click on the **[View]** button to move to *Form View*

The form is now ready for you to type in the data. Note how large the boxes are for the *Warden*, *Phone* etc compared to the *Name* box. This is because you left the *Field Size* at 255 (whereas for *Name* you set it at 15).

Entering Data Using the Form

You are now going to use the form to enter a couple of data records:

1. For the first record, type in the following:

   > Name: **`Wessex`** (and press **\<Tab\>** - if you press **\<Enter\>** by mistake, press **\<Backspace\>**)
   > Warden: **`Dr R.P.B. Smith`** (**\<Tab\>**)
   > Phone: **`x8643`** (**\<Tab\>**)
   > Road: **`Whiteknights Road`** (**\<Tab\>**)
   > Town: **`Reading RG6 6BQ`** (**\<Tab\>**)
   > Rooms: **`196`** (**\<Tab\>**)
   > Meals: the *option box* is already set on for **Yes**

2. Press **\<Tab\>** or **\<Enter\>** to move on to the second record, which is as follows:

   > Name: **`Windsor`** (and press **\<Tab\>**)
   > Warden: **`Prof A.L. Jones`** (**\<Tab\>**)
   > Phone: **`x8800`** (**\<Tab\>**)
   > Road: **`Upper Redlands Road`** (**\<Tab\>**)
   > Town: **`Reading RG1 5JL`** (**\<Tab\>**)
   > Rooms: **`353`** (**\<Tab\>**)
   > Meals: again, the *option box* is already set on for **Yes**

This is all you are going to enter explicitly; the remaining records are going to be *imported* from a data file created using another package.

3. Close the *Form* window by clicking on the **[Close]** button (save any changes to the design)

4. Also, close the *HoR* table by clicking on its **[Close]** button (saving any design changes)

You may be wondering why the records you entered weren't shown in the table (remember, the form is used as a friendly way to enter data into the table). The reason is that the screen wasn't refreshed. To see the data:

5. *Double click* on the **HoR** table in the *Objects* list then **[Close]** it again once you have seen the data

Importing Data

Access allows you to bring in information from other sources - this is called importing. Databases vary on how they bring in the data and on which sort of files they can import. If you have a really large dataset, it is a good idea to try importing a small section to a new table first and only if that works successfully to try to import it all.

Access can import data in various formats, including Dbase (another widely-used database) and HTML (from web pages). Microsoft Excel spreadsheet files can be imported directly. Here, the data has been saved as *tab separated values*, which is a standard format which any spreadsheet (or indeed word processor) should be able to produce. Other basic formats include *comma separated values* and just plain *text*. One thing to note when importing a file is that the first line may contain headings - Access has an option to cope with this and can use them for field names.

To *add* the data to an existing table (or create a *new* table) from a file:

1. Move to the **External Data** tab then click on **[Text File]** in the **Import** group

2. Click on **[Browse]** to search for the required file

3. Check that the current directory is set to **Training** on the **D:** drive (if using a lab PC; if not, the file can be downloaded from the WWW via the hyperlink at step **4**)

4. Select the file called **halls2010.txt** then press **\<Enter\>** to **[Open]** it

The default is to create a new table, but here:

5. Choose the **Append a copy of the records to the table** option and select **HoR** – click on **[OK]**

6. The *Import Text Wizard* now starts up. This has several stages, as follows:

    a. Choose whether the data is *Delimited* (eg tab, comma or space) or *Fixed Width* (where extra spaces have been used to line up the data in columns) - press **<Enter>** or click on **[Next>]** for *Delimited*

    b. Choose the delimiter (here, *Tab* is correctly chosen) and whether or not the *First Row Contains Field Names* (**here, it does, so *click* to set it**) - press **<Enter>** for **[Next>]**
    Tip: If you are adding to an existing table and the first row doesn't match the table field names then import them as an extra record, which you later delete

    c. The final step of the wizard confirms the table name (or asks you for a one if creating a new table) - press **<Enter>** for **[Finish]**

    d. Don't bother saving the import steps – press **<Esc>** for **[Close]**

You should have imported 11 new records – if a message appears press **<Enter>** for [**OK**] to cancel it.

7. *Double click* on the **HoR** table in the *Objects* list to see the new records

8. Resize the columns by *double clicking* on the column heading dividers

9. End by closing the table - click on its **[Close]** button, saving the changes to the layout of the table (press **<Enter>** for **[Yes]**)

Note: you can also export data from Access for another package via the **Export** buttons on the **External Data** tab. Amongst the formats available are *Excel*, *Word* and *Text File* (suitable for many applications, including SAS, SPSS and Minitab).

Part 3: Relating Tables Together

A relational database management system lets you store information in many tables which can then be linked together. This is particularly useful when you have information which is either heavily duplicated or sparse (many records having empty fields). This improves both performance and scalability.

For example, if you have an inventory of equipment, it's better to record information about the suppliers (the name, address, phone/fax numbers, contact etc) in a separate table. Then, in your inventory, you need only record the name of the supplier to find out the other information. As each supplier will be supplying several pieces of equipment, this avoids massive data duplication.

It's the same situation here with the students. There is no need to store information about Halls of Residence for each student - that can be picked up from the *HoR* table. You'll see next how this is done. The aim of the exercise is to create a list of students, living in hall, such that you can send a letter to them to their University address.

1. Move to the **Create** tab and click on **[Query Design]** in the *Other* group on the right of the *Ribbon*

2. **[Add]** both the **HoR** and **students** tables and the **Names** query - press **<Esc>** or click on **[Close]**

You next have to join the three tables together on common fields. Joins can be created between tables when you design the database (in a special *Relationships* window), or made in a query (in which case they only apply to that particular query).

Tables are automatically joined in a query if two fields have the same name. Here, the *StudentID* field in the *Names* query has been joined to the equivalent field in the *students* table. The other common field (the Hall of Residence) is called *Hall* in the *students* table but *Name* in the *HoR* table and has not been linked. In this case you have to create the join manually by dragging the field name from one table/query over to the corresponding name in the other table/query.

3. Position the cursor over the **Hall** field in the **students** table

4. Hold down the mouse button and drag the field over the **Name** field in the **Halls** table

When you release the mouse button, a *join line* appears. If you made a mistake, simply click on the join line to select it then press **<Delete>** and try again. Now you need to set up your query:

5. In column 1, set the *Field:* to **FullName** from the **Names** query (*double click* on it)
6. In column 2, set the *Field:* to **Hall** from the **students** query
7. In column 3, set the *Field:* to **Road** from the **HoR** table
8. In column 4, set the *Field:* to **Town** from the **HoR** table
9. Click on **[Run]** to run the query - you should find 265 records are displayed (if you spelt *Wessex* and *Windsor* correctly - the 125 students living in private accommodation are excluded)
10. Click on the query window's **[Close]** button, saving it as `Addresses`

Relationships

To save creating relationships each time you create a query, the tables and some existing queries can be linked and held as a hidden object in the database. This is done through the *Relationships* dialog box:

1. Move to the **Database Tools** tab on the *Ribbon* then click on **[Relationships]** in the *Show/Hide* group
2. Click on the **[Show Table]** button in the *Relationships* group on the new **Relationships Tools Design** tab if the *Show Table* dialog box isn't displayed (use this to add further tables/queries if you need to)
3. **[Add]** both the **HoR** and **students** tables and the **Names** and **Addresses** queries as you did in the previous exercise - press **<Esc>** to **[Close]** *Show Table*
4. Drag the **Hall** field in the **students** table over the **Name** field in the **Halls** table – an *Edit Relationships* dialog box appears:
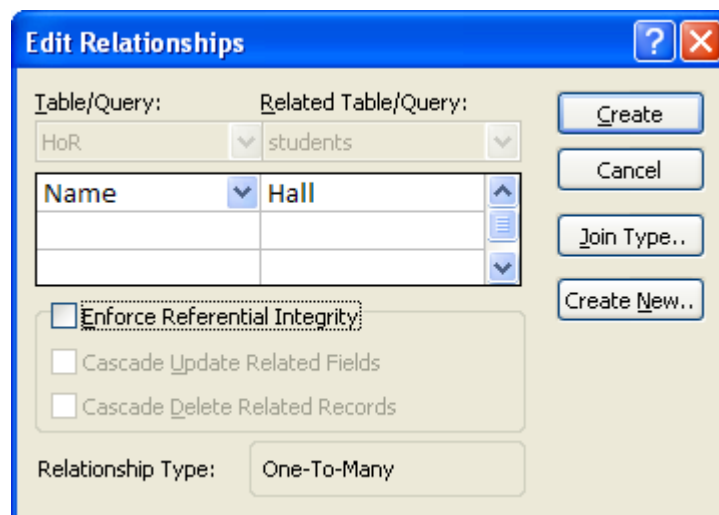
Various additional options can be set but some of these are only available if *Referential Integrity* exists. This happens if all the possible values in the field in the main table (the student's hall) are present in the matching field (the Hall name) in the related table. That isn't true here as many students are in Private accommodation.

Referential Integrity can also be used to protect data. You wouldn't be able to remove a Hall from the HoR table as records in the SortedStudents depend on it. If you were to turn on *Cascade Delete Related Records* then you could delete a Hall ... but then all the students in that hall would be deleted from the database. This isn't a good idea here but would be if a customer of a business were to die. His related records (eg orders) could be deleted at a single stroke, just by deleting his record.

5. Click on **[Create]** to create the link
6. Repeat steps **3** and **4** to join the **StudNo** in the **students** table to that in the **Names** query
7. Repeat steps **3** and **4** to join the **FullName** in the **Addresses** query to that in the **Names** query
8. **[Close]** the *Relationships* – answer **[Yes]** to save the changes to the design
9. Start setting up the *Addresses* query again – you'll find the join links appear automatically
10. **[Close]** the new query – don't bother saving it, click on **[No]**

Creating a Report

Earlier you viewed an existing report; now, try to generate some yourself. Reports are saved within the database - you can then modify them at some later date if you need to tidy up the layout, for example. Note that you can also export data to Word or Excel via **Export** on the **External Data** tab.

Access gives you the opportunity of designing your own reports from scratch (using *Design View*), however, unless you are an expert, don't even attempt this. It's much easier to use *AutoReport* or a *Report Wizard* and then modify the design if you need to.

Using AutoReport

Begin by creating a report for the *HoR* table using *AutoReport*.

1. Click on the **HoR** table in the *Objects* list – there's no need to open it
2. Move to the **Create** tab and click on **[Report]**

Access shows you the results in *Layout View*. The dashed lines show the page breaks, but it's much easier to see the layout in *Print Preview*:

3. *Right click* on the report tab (or use the arrow below the **[View]** button)and choose **Print Preview**
4. In the *Zoom* group, click on **[Two Pages]**

You'll find that the information stretches over two pages, with the paper portrait (upright). It should be possible to display all the information on one sideways sheet. To do this:

5. *Right click* on the report tab again and this time choose **Layout View**
6. Move to the *Report Layout Tools* **Page Setup** tab and click on **[Landscape]**

You'll find the report still doesn't quite fit onto a single page; next, you have to manually shrink the columns:

7. Position the mouse cursor on the border between the *Phone* and *Warden* columns (it becomes a two-headed arrow)
8. Hold down the mouse button and drag the border to the left - release the mouse button when the column is properly sized
9. Repeat steps **6** and **7**on the other columns until all columns fit on the one page
10. Repeat step **3** to **Print Preview** the page

There are still some problems with the report – Access doesn't seem to have realised the paper has been changed to Landscape (the date and page number are in the wrong position). To rectify this:

11. *Right click* on the report tab and choose **Design View**
12. Click on the **Date** placeholder (where it says =Date()) in the *Report Header* then hold down the **<*right arrow*>** key to move it to the far right of the page (or *drag* it to the right with the mouse)
13. Repeat step **12** for the **Time** and **Page Number** placeholders, moving the latter to the centre
14. Next, click on the **Count(*)** placeholder in the *Report Footer* and **<Delete>** it
15. *Right click* on the report tab again and choose **Print Preview** to check your changes
16. Finally, close the report (click on the **[Close]** button) and, when asked, **[Save]** it as **HoR**

With AutoReport, you have no say in the way the report is produced. By using the *Report Wizard* instead, however, you can set various other options (as you found with the *Form Wizard*). You'll look at this next.

Using Report Wizards

To demonstrate the Report Wizard, you are going to produce a report listing the students by their hall of residence, with the hall address only appearing once for each group of students. You'll see how, at each step of the wizard, you have control over which fields appear and also over the layout of the report:

1. Click on the **Addresses** query in the *Objects* list
2. Move to the **Create** tab and click on **[Report Wizard]**
3. The *Report Wizard* now goes through six steps:
   a. Move across the fields you want on your report. Here, you just want the **FullName** and **Hall** (select each in turn then click on **[>]**) - press **<Enter>** or click on **[Next>]**
   b. Step two allows you to set grouping levels. You only need a list of names for each hall, so move across **Hall** (using **[>]**) then press **<Enter>** or click on **[Next>]**
   c. *Sort by:* **FullName** (*Ascending*) - press **<Enter>** or click on **[Next>]**
   d. Choose a *Layout*: **Outline** is fine - press **<Enter>** or click on **[Next>]**
   e. Choose a *Style* for your report (or, better still, **None**) - press **<Enter>** or click on **[Next>]**
   f. Call your report **Addresses** - press **<Enter>** or click on **[Finish]**

The resultant report may not be exactly what you want but it's easier to modify the design than to create one from scratch.

4. *Right click* on the report tab and choose **Design View**
5. Widen the *FullName* field by clicking on the box in the *Detail* and dragging the right border to the right
6. Minimise the height of the *Detail* by positioning the mouse on the border between it and the *Page Footer* and dragging it up a little
7. Next, click on the **[Property Sheet]** button – every object on a *Report* (or *Form*) has *properties*
8. Click on the **Hall** label on the left and, on the *Format* tab, set the *Visible* property to **No**
9. Repeat step **8** for the **FullName** label in the *Detail* section

To force each hall onto a separate page:

10. Click on the **Hall Header** and set **Force New Page** to **Before Section** then **[Close]** the *Property Sheet*
11. Finally, right click and choose **Print Preview** to see the changes you have made
12. Click on the window's **[Close]** button, saving the changes to the design of the report

Next, try using a special wizard to generate address labels for the students.

1. Click on the **Addresses** query in the *Objects* list
2. Move to the **Create** tab and click on **[Labels]**
3. The Label Wizard now goes through five steps:
   a. Setup the size for your labels - check *Filter by manufacturer:* is set to **Avery**, change the *Units of Measure* to **English** and select **5160** as the *Product number:* - press **<Enter>** or click on **[Next>]**
   b. Setup the *Font name* and *Font size* etc which you require (here leave them as they are) - press **<Enter>** or click on **[Next>]**
   c. Move the fields across to a *Prototype Label* by clicking on the *arrow* provided:
      - move across *FullName* then press **<Enter>**
      - move across *Hall* then press **<spacebar>** and type `Hall` - press **<Enter>**
      - move across *Road* - press **<Enter>**
      - move across *Town* - click on **[Next>]**
   d. *Sort by:* **Hall** and then **FullName** - press **<Enter>** or click on **[Next>]**
   e. Call your report **Labels Addresses** - press **<Enter>** or click on **[Finish]**
4. Press **<Enter>** (for **[OK]**) to cancel the warning message
5. View the report then click on its **[Close]** button to close it

Tip: Getting Access reports looking exactly the way you want can be very time-consuming. It may be easier to do the formatting in Excel or Word. On the **External Data** tab, the **[Excel]** button lets you send data to an Excel spreadsheet, while the **[Word]** button creates a *Rich Text Format* (.rtf) file. Using the **[More]** button you can export in various other formats or carry out a mail merge in Microsoft Word.

Leaving Access

You should now be back at the *Navigation Pane*, where you could continue to work on the students database, adding further tables and queries and producing more reports. When you have completely finished your work:

1. Click on the **[Office Button]** and choose **Close Database**

This closes any opened tables etc and ensures that the database file is properly shut down. You could now go on to use or create another database, but the course is now over so

2. Click on the **[Office Button]** and choose **Exit Access**
3. Finally, on the public machines, don't forget to **Log Off**

Appendix

Below is a summary of the different data types and what they are used to store. If you know how a computer works then the seemingly random values make sense. For example, the basic storage unit in a computer is a byte, which can hold 8 zeros or ones. These, in turn, represent whole numbers between 0 and 255. Two bytes can hold 65536 whole numbers (0 to 65535 or -32768 to +32767).

Data Type	Format/Field Size	Stores
Text	Up to 255 characters	Text - including numeric text (eg phone numbers)
Memo	Up to 65535 characters	Longer pieces of text
Number	Long Integer	Whole numbers between -2,147,483,648 and +2,147,483,647
	Integer	Whole numbers between -32768 and +32767
	Byte	Whole positive numbers between 0 and 255
	Single	^{38}
	Double	^{308}
Date/Time	General	Both date & time - eg 25/12/98 16:25:08
	Long/Med/Short Date	Dates: eg 25 December 1998 *or* 25-Dec-98 *or* 25/12/98
	Long/Med/Short Time	Times: eg 16:25:08 or 4:25 (12 hour) or 16:25 (24 hour)
Currency	Currency	Up to 15 figures before dec place, 4 after - eg £1,234.56
	Fixed/Standard	Numbers with above accuracy - eg 1234.56 or 1,234.56
	Percentage/Scientific	Ditto but using % or E notation
AutoNumber		Automatic counter - incremented by 1 for each record
Yes/No	Yes/No True/False On/Off	For data with only 2 possible values
OLE Object		For pictures, sound, video, Word/Excel documents etc
Hyperlink		For links to the WWW or e-mail