University Computing Service

A practical introduction to Access

AD03

Overview

This document is aimed at students and staff who are going to store data for research. It applies to all aspects of database work, using Access 7 or Access 2000/XP for the examples. The example databases are based upon real research projects, demonstrating the main features of a relational database.

You do not have to work through the whole document: choose different parts depending on what you plan to do. Everyone should know how to get the example files (Part 1) and should work through the tutorial in Part 2. After that, Part 3 helps you create your own database. Two further sections are on the UCS Database Web pages (see page 2).

Contents

Applications: Databases
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Author: Dr Lorna Scammell

References and learning more about Access

The best way to learn Access is to use it with some real data. It has a lot of features, many of which you will not need for data storage and manipulation.

Using on-line Help

On-line Help can be useful, but beware that most entries are about advanced aspects of Access.

Access 2000/XP has Books Online (Help - Contents). The early chapters cover the basics. Help pages can be printed.

Select Help / Microsoft Access Help To Topics

Relevant UCS documents

AD01 The UCS Database Service

AD04 Using data from Access in SPSS

Contacts

The UCS specialist database adviser is

Dr Lorna Scammell, Lorna.Scammell@ncl.ac.uk (Web site http://seastorm.ncl.ac.uk/)

Database Web sites

The UCS DatabaseWeb pages are at

http://www.ncl.ac.uk/ucs/databases/

This site has links to all other information about databases in Newcastle, including using a database on the Web, and the design of databases:

Access and ASP on the Web: http://www.ncl.ac.uk/ucs/java/webguide/

Design of databases http://www.ncl.ac.uk/ucs/databases/design/

See also http://www.ncl.ac.uk/ucs/databases/access/ This contains further information and also detailed examples — originally Parts 4 and 5 of this document.

Mailbase lists

Other database users at Newcastle University can be contacted through one of two local e-mail (Mailbase) lists:

The list for general aspects of database work is dbinfo, that for databases used over the Web is dataweb

Join the lists yourself by sending a message to the address mailbase@ncl.ac.uk:

join dbinfo *firstname lastname*
stop

or

join dataweb *firstname lastname*
stop

(where *firstname lastname* are your names). See EM10 *Using Mailbase* for how to get the best from Mailbase lists.

Part 1: Getting the example files

It is assumed that you can make a new folder and copy files, and that you generally know how to use a Windows NT or a Windows 2000 PC.

Make a folder for your own work

It is good practice to keep the files associated with any project in its own folder.

Open Windows Explorer (or open the My Computer icon in Windows 2000)

From the menu

Select File / New / Folder

A folder called New Folder is created – edit the name to something meaningful (click once inside the box containing its name, then type the new name).

Copy the example data files: Windows NT service

There are two example databases used in this part of the Guide, which is a "hands-on class"; each database is in one file.

There are three stages in copying the database files:

1. Connect to the data storage area on the UCS Windows NT service:

Click the Start menu
Click Programs -
Click Department Software
Click connect t to J,K & L

The database examples are down several levels on the J: drive

2. Find the files on the J: drive:

Use Windows Explorer

In the left panel you will see "vol1 on Mall (J:)"

Double Click on vol1 on Mall (J:)
In the right-hand panel double-click Data
Double-click UCS
Double-click Access

This lists all the database files available.

2. Copy two files.

There are various example files here: you only need these two:

dig.mdb
latham.mdb

These are among the files listed in the right-hand panel of Explorer's display. Find your own folders in the left-hand panel (by scrolling up, and if necessary clicking on the little "+" at the left of the name), and then drag the two files required to your own folder.

Copy the example data files: Windows 2000 service

1. Open Windows Explorer

Right-click the My Computer icon and select Explore.

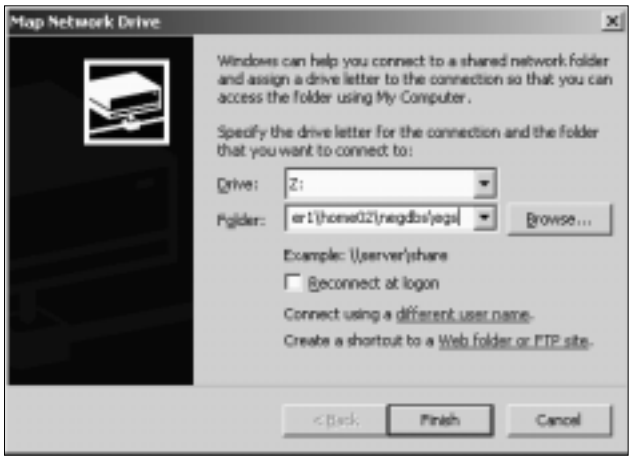
You should see two panels (if not, use View - Explorer Bar - Folders). In the left-hand panel, your own file space (H:) is listed. The following enables you to see another drive which contains the example files.

2. Make a connection to the location where the files are.

Under Tools in the menu

Select Map Network Drive

This allows you to enter a drive letter and the location ("pathname") of the folder containing the examples. Choose any of X: Y: or Z: for the drive to be "mapped", and the path to enter is \\tower1\home02\negdb\egs You may not wish to connect ***every*** time you login – make sure that there is no tick in the box called Reconnect at logon.



3. Open the folder with the examples

This should now appear in the right-hand window. (Click on the drive letter.)

4. Copy the files.

There are various example files here: you only need these two:

dig2000.mdb
latham2000.mdb

Find your own Drive H: in the left-hand panel (by scrolling up, and if necessary clicking on the little "+" at the left of the name), and then drag the two files required on to the icon of your Drive H:.

Part 2: Hands-on using Access

This applies to Access 97 and Access 2000/XP. The main difference when you begin is that the layouts of the screens are different.

The Latham example

The data

On NT - Open latham.mdb (double-click on the file)

On Access 2000/XP - Open latham2000.mdb (double-click on the file)

Richard Latham was a small-scale farmer in Lancashire in the mid 18th century. The database records each line of his notebook as one record, together with the year and a line number. This shows that a database does not have to have more than one table. The example contains records from the 1730s and 1740s. The full dataset can be searched (using different software) on my Web site at http://seastorm.ncl.ac.uk/latham/

[The account is published in full — Lorna Weatherill (ed:) *The Account Book of Richard Latham, 1724-1767, British Academy Records of Social and Economic History, New Series XV, (Oxford, 1990)]*

Access will open with the Database window which has a number of "buttons" on the tool bar, which acts as a sort of menu for viewing the Tables, Queries, Forms and Reports that have already been created:

Access 97

Access 2000/XP

You can use different aspects of the database by clicking the appropriate tab:

Click on each of Tables, Queries, Forms, Reports

There are buttons to Open the data, to look at the Design of the objects in the window or to create a New Table.

Holding the mouse pointer over a button on the toolbar produces a yellow "bubble" which tells you its function — they are short-cuts for menu choices.

You can see what the data looks like by opening a table — you can get a good idea of what kind of information a table contains by opening it:

Click the Table tab
Highlight the table
Click Open

(or simply double-click the table name) The fields are a line number, year and the text. The data is sorted here by line number.

Searching the data – Queries

This data is important because it covers a period of transition in the economic life of Lancashire — both in farming and in industrial work. These queries illustrate how you might explore aspects of farming and domestic industry. (It is also particularly strong on information about how people made clothes and shoes — and on literacy.)

Click the Query tab

To run a query

Highlight the query (for example) cotten

Click Open

Opening the query runs it and retrieves the records containing (in this case) the word "cotten" (18thC. spelling). The number found is at the bottom of the screen — 42 references to cotten in these 20 years. You would have to know something of the contemporary history to know if this has any significance. (It does.)

The query is put together in "design view".

Click on the Design view icon

Here just date and text are needed so these fields are used. There is also an entry in the "criteria" row to find references to cotton. In order to pick a word from the whole of the text entered in a record, you use a "wild-card". Here the wild-card is an asterisk (*) — which means "any character or characters". (If you leave out the wild card in this query, no records will be found because none are just one word.)

Close the query (double-click the top left corner.)

Things to find

There is a query called general.

Open this in Design View – click the Design button.

Try a few words (or parts of words) in the criteria row. Remember to put a wild-card (*) at each end of the word. You have to be a bit careful of the 18th century spelling and you would have to know how this was edited to be sure of getting all the "hits".

To run the query when you have entered something, click on the button to show Datasheet View in the top left corner. In the Text Criteria row enter one or other of these ... or any item you think seems interesting.

clock
book
wife
pot

Or in the year Criteria, enter an exact year or enter a wild-card after the first three numbers of the year to get the decade. You can also search for something in both fields – for example all references to *book* in 172*

The advantage of database queries for such data is that it would take a very long time to search through the printed edition for references to specific things.

A layout for printing: a Report

Sometimes it is useful to lay out the results of a query in a user-friendly way.

Click on the Report tab

There is a "report" here to lay out the retrievals for "cotten". This could be useful for a display of data for printing — it was done using a "wizard", of which more later.

Closing the database

To close a database...

From the main menu, choose File / Close

What this example shows: a summary

This example has demonstrated several important points — as well as showing you how to use queries:

- A database can be useful if you have a lot of data where you want to be able to search for all sorts of detail.
- The data is stored as tables, with rows and fields.
- There is only one table here, but there can be more than one table.

The "Dig" example

More than one table; more about text; more complex queries

The data

The database originated in work done by Dr S. Shennan of Southampton University. It refers to a settlement of copper workers which was occupied for 300–400 years. This is a sub-set of the main data and records only those contexts in which copper was found; a lot of the detailed description of the contexts is not included. A "context" is a unit of excavation.

A relational database has one or more tables. This example shows how more than one table is used.

Open the dig database (Double-click on dig.mdb or dig2000.mdb)

The tables

In order to use a database, you need to know something about the tables and how they are related to one another. Here there are three tables (the fields are annotated in Design View in the database).

Open each of these in Design View

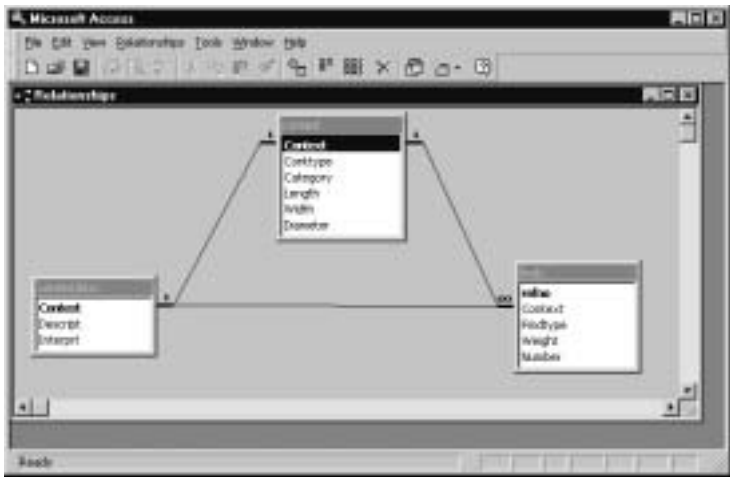
Context
: A context is a unit of the excavation. This gives some basic information. (Where codes are used and these are listed in the comments in Design View).

Contextdesc
: Normally, the data in a cell within the table is quite short and to the point. This shows how a more detailed description and interpretation can be entered in a separate table. It does not have to be in a separate table but it is convenient to place long texts elsewhere.

Finds
: This gives detail of groups of artefacts found in each context (this example only includes the contexts where copper was found). There were many finds in each context.

The Relationships

The relationships between the tables are an important part of the database. They can be shown graphically in Access as the illustration shows. Infact the relationships window should give a good impression of the tables and the relationships between them.



To do this...

Select Tools / Relationships.

or

Click the Relationships button on the tool bar.

Here there are many finds to each context, known as a "many-to-one" relationship – the "squiggle" in Access means "many".

Queries

There are a couple already saved — run one of them and inspect the Design View:

Click the Queries tab

Open the query listfind

This shows a listing of contexts containing pottery. Note that there is a search condition in the field findtype. and there are fields from both the finds and the context tables.

Building a query

Here we will look at some of the descriptions. With the Query tab selected

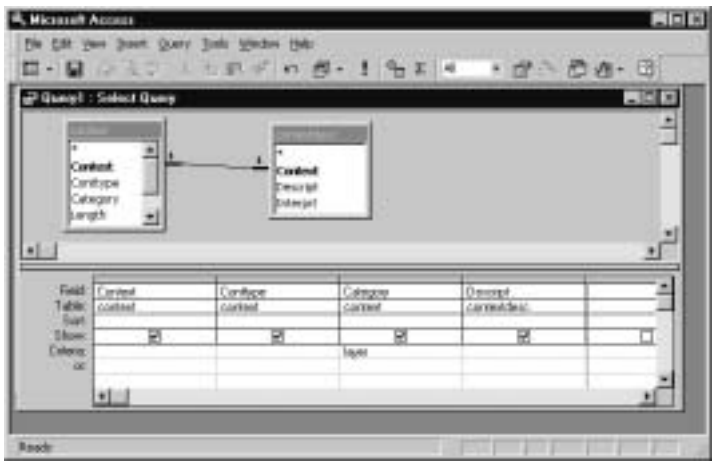
Click New (***Access 2000/XP: you can click on the button*** Create ***"Create query in Design view"***

Select Design View (avoid the Wizards) from the dialog box

In the Add Table box

Highlight the table context
Click Add
Highlight contextdesc
Click Add
Click Close

The Query screen is used to build the query. Boxes are displayed with the fields and the relationships between the tables in the Query design window. From here you can drag the required fields to the Query design form lower down the screen. In building a query, first select the fields to use, then select which records you want to display.



Adding fields

This is the easiest way, although there are several other methods:

Highlight the required field
Hold down the left mouse button
Drag and drop it to one of the columns in the design box

Add the following fields in this way (note that three are from one table and one is from the other table —this works because these tables are related; Design View shows which table each is from):

context
conttype
category
descript

To display the result of the query

Click the Datasheet View icon on the toolbar

All the data is displayed and there is a small box at the bottom that says there are 87 records retrieved.

Move around in the data. Note that you can scroll up and down, as you can in Excel or Word. There are also buttons at the bottom of the screen for the next record and the last record.

The field Descript can have longer entries than the space left to read them To see all the writing in one record:

Place the cursor in the line, at the end.

Use the arrow key to reveal more of the text.

This only works for one record at a time: for the final display of such data, you might use a report such as that demonstrated in the latham and pottery examples.

Selecting records

Normally you are interested in particular questions and thus the selection of particular groups of records. You can alter the design of the query to do this.

Click on the Design View icon
In the Criteria row in the Design View, type the word layer in the Category field
Click Datasheet View

It retrieves 25 contexts that were layers.

You might be interested in fills and the things found in them. To pick up fills we need to use a "wild card".

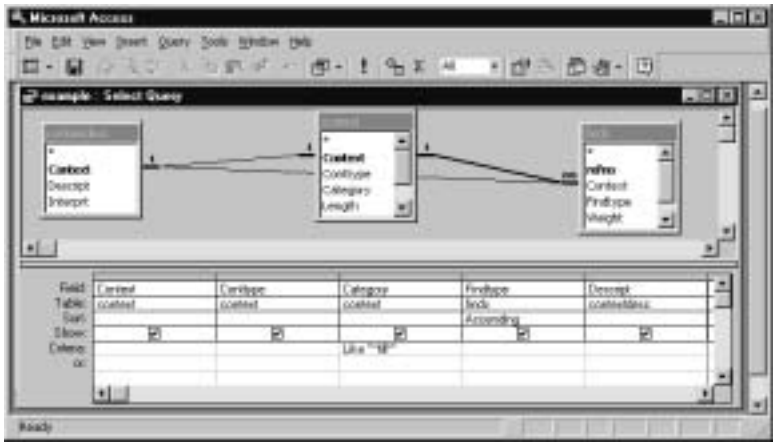
Click Design View
Instead of layer, (highlight and type over it or delete it, as when word processing)
Type *fill* (no spaces between the asterisks and the word "fill")
Click Datasheet View

This lists 14 contexts that are either fills of postholes or fills of other features.

Finds

We could now add a list of finds to see what turned up in the fills. In Design View with the same query:

Click the Add Table button (or menu Query / Show Table)
Click on Finds table
Click Add
Click Close



There are now three tables displayed — with the relationships between them — in the Design window.

Add the field findtype from the finds table
Look at the Datasheet View

Note that the listing is sorted according to the context number. This would be interesting if we wanted to look at the finds found in each context but if we wanted to group the finds together, sort by findtype.

Sorting output from Queries

In Design View

Click in the Sort row for findtype
Pull down the choices
Highlight Ascending

Look at the Datasheet View to see the result of this.

Sometimes one has to decide the best way of sorting in order to help explore the data. In this case sorting by Context gives a better result.

Save the Query and call it fill (Click on the Save icon or File/Save)
Close this query

It will be listed as fill in the Query Window. You can open it again and the data will be displayed.

Number and weight of finds

It would certainly be helpful to have an idea of the numbers and weights of finds. This can be done in Access using groupings and counts in a rough cross-tabulation.

Click New / Design View
Add the table finds
Close the Add Table window

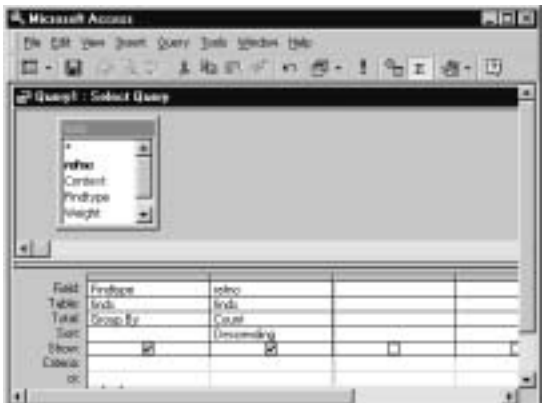
Now, in the design layout:

Add the fields findtype and refno (in that order) to the query from the finds table
Look at the Datasheet View

This is a listing of the data. It would be more interesting to know how many of each find there were, so you could group all the references to finds of one type together and count them. So, in Design View:

Click the Totals button (a sigma "∑" on the toolbar) or View / Totals from the menu

Notice that there is a new row in the design, with Group By in it. For the field findtype, this is OK.



For refno we need to alter it to count:

Click over Group By
Pull down the list of choices
Click over Count

There are a number of other pre-defined functions here — useful for numerical data.

Sort refno Descending
Look at the result in Datasheet View

Copper objects and Bronze Age pottery predominate (hardly surprising as this is a Bronze Age, copper producing site). It does not tell where the items were found.

The query can be built up further to include the total number of each type of find and their total weight. In Design View

Add the fields number and weight
Alter Group By to sum in both cases (use the pull-down list)
Look at Datasheet View.
Close this query and save it as findnos

Queries of this type are often very useful in giving a quick overview of the numbers of things in a dataset.

A question: In which contexts were Bronze Age pottery found?

Usually people have questions that they need to ask of the data — the technique is to build the query up by adding the fields and then selecting the data. You can check as you go along that it works.

Click New / Design View
Add all three tables

Begin to build up the query: add the fields which will tell you about contexts and finds from the appropriate table:

context
category
findtype
refno
descript
type *bronze* in findtype criteria row
Run the query

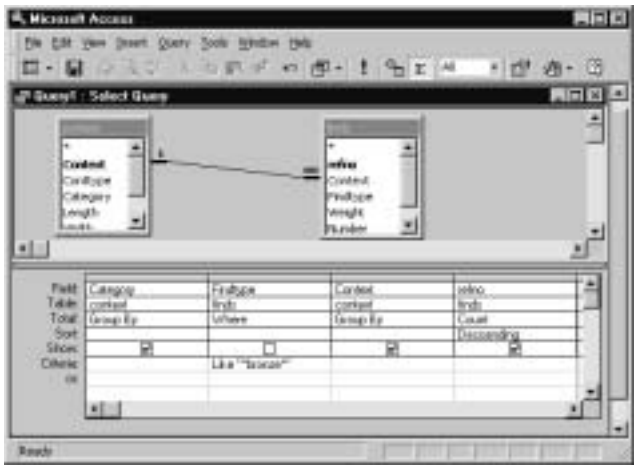
There are 285 finds, which are too many to inspect visually for patterns, so some sort of further exploration with queries is needed. You could look at the descrptions/ interpretations for the contexts with bronze to see if you spot any patterns. You could try to group and count the results.

For grouping, the field contextdesc is not needed:

Click Design View
Delete Contextdesc from the query design (highlight the whole column and press Del)
Click Totals button (∑)

Alter these as follows:

Context, Category and Findtype	Group By
refno	Count



Look at Datasheet View

This summarises data for all kinds of find in each kind of context. You could try counting and grouping in different ways — for example, which category of context had the most finds?

There is some bias in this data because it is a subset of the whole database in which only the contexts that had copper were selected. You would need the whole dataset for a comparison of contexts with copper and those without.

Summary

- A relational database can use more than one table.
- This example demonstrates a One-to-Many relationship, which is common in relational databases.
- Queries can be built up by adding the required fields and making selections. They can take data from more than one table.
- A "group by" query is useful as a simple cross-tabulation.

Study guide — what next?

- You could go to Part 5 (which is on the Database Web site – see page 2) and look at one or more of the other examples. There are examples of how to deal with data that might be used in SPSS, how to handle a "many-to-many" relationship, more on text and more on handling change over time.
- If you have some data of your own go to Part 3 to learn how to put your own data into a suitable form. You can, of course, use the examples in Part 5 to help with this.

Part 3: Creating a database for your own data

How to do it — five steps

There are five basic steps in creating and using a database for your own data, although steps 3 to 5 are often iterative. Security and many other issues are outlined in Part 4 (which is on the Database Web site – see page 2).

1. Thinking about the data – the design
By this I mean getting the right data into the right table. This needs a bit of thought but there are some helpful diagrammatic techniques to enable you to visualise the data. Do this using paper and pencil! See also the on-line tutorial at http://www.ncl.ac.uk/ucs/databases/design/

2. Define the tables
This is the part where, having thought them through, you define the tables and fields for your new database and write down what they all mean.

3. The mechanics of creating a database
"The easy part": at the computer, you transform your design into an Access database.

4. Enter the data
The data is often entered into the tables but it can be loaded from other files.

5. Getting meaning from the data
Using Queries to get the database to tell you what you want to know.

Step 1: Thinking about the data — the design

(You need some data and a pencil and paper for this. You do ***not*** need a computer yet!)

By design, we mean a process of thinking about the data and working out what tables you need. At the end of this you will have a list of tables and fields which should match your data and allow you to go on to create the tables, enter the data and then be able to get something useful out of the data.

There are a series of logical steps to help you to identify what your database is about (even if you think you already know!):

(i) Decide on what subjects (entities) are covered by the database: the entities usually become tables.

(ii) Decide how the subjects are related to one another.

(iii) Decide on what characteristics (attributes) the subjects have: the attributes usually become the fields.

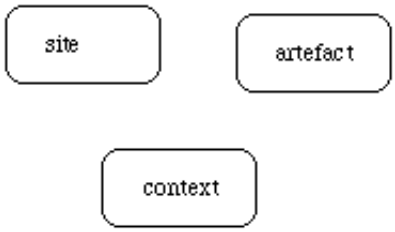
(iv) Finally, the diagrams enable you to decide what tables you need.

(i) What subjects (entities) are covered by the database?

Look at *what subjects are covered*, rather than the conclusions that you want to find or how you think you might use the database. The subjects may not be immediately obvious and it can be especially confusing if there are hidden structures in data that you have from elsewhere, perhaps in a spreadsheet.

It is important to identify them because they are potentially the tables in the database. An entity (or you can think of them as subjects) is represented diagrammatically by a box with rounded corners and a name written in the singular.

There are some diagrammatic techniques to help you visualise the data. Take a large sheet of paper and draw a box for each of the entities and put a name for each in the box. For example some entities for a dig are shown in the diagram.

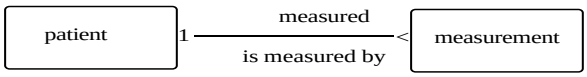


Sometimes there is only one entity, sometimes a large number.

(ii) How are the subjects related to each another?

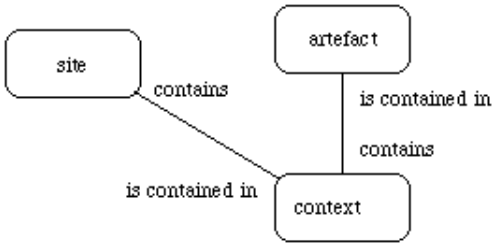
A relational database can handle more than one subject, as the examples illustrate. A relationship is an association between subjects/entities.

For example, projects often collect information about people in one form or another. The first shows a relationship between a person who is a patient or client of some sort, and a series of measurements taken of them.



In your design diagram, a relationship is represented by a line that joins two entity boxes. Each relationship has two ends, for each of which there is a name. Use a simple word that encapsulates the relationship you see between the entities.

The relationship between entities in the dig database are shown in this diagram.

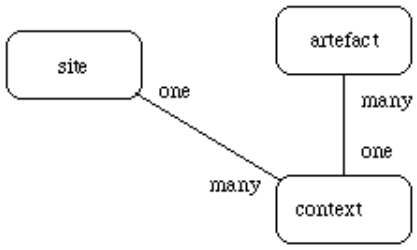


The diagrams seek to simplify the problem, so we are not interested (yet) in any detail but rather in a broad picture. There may well be more than one solution when the problem is a complex one. Be willing to alter the diagram and repostion the boxes and lines. If you find a complex set of entities and relationships, begin with a main subject and a few related ones – you can add others later.

(iii) The degree of relationship

A one-to-many relationship: The examples show that one instance of one subject can be related to many instances of another. For example there are many finds (artefacts) in one context: One patient can be given many treatments. Ask yourself if it is possible for there to be many of one subject related to one of another. The diagram for dig is annotated with these relations. The relationship window in Access itself (as the example databases show) displays the same information.

A one-to-many relationship is very important because it means that you can keep some data once only and not have to repeat it every time you make a new entry in the related table. For example, you do not have to repeat all the details about a patient every time you enter a new record about something like a drug or treatment. Queries (as we have seen) allow you to link tables together to retrieve the information.



One-to-one relationships: These are often used where it is convenient to handle extra detail, examples include the way that descriptions are handled in both the dig and pottery example databases.

Many-to-many relationships: There can be many occurrences of one entity related to many occurrences of another.

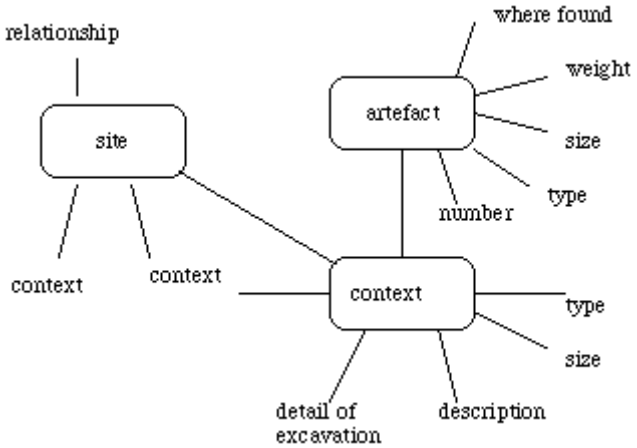
The *charter* example (see Part 5 on the Web site) shows how this works in practice. Here a charter can be signed by many witnesses. A witness can sign many charters. It turns out that these two entities are not enough to express the relationship in the database, so a third entity is devised to accommodate the notion of one witness signing one charter. This has a one-to-many relationship with each of the others and thus all three entities are related.

Many-to-many relationships can be difficult to identify and resolve. As a rule of thumb, if a relationship puzzles you, there is a good chance that it is a many-to-many.

[iv] What characteristics do the subjects have

The next step is to add details about the characteristics (attributes) of each entity. Researchers are often more aware of the importance of the ***characteristics*** of the things they are dealing with than the overall picture, so it is often easier for them to identify attributes than entities.

It is useful to write them on the diagram so that they are clearly associated with the entitiy, although the diagrams tend to look a bit weird at this stage. Sometimes they are obvious and sometimes they are not easy to identify. The attributes represent the data that is to be kept about the entities, and thus become the fields in the tables.



As a guide, there will probably be between two and eight attributes for each entity.

Attributes and entities can also be muddled because on different occasions the same items may be treated in ***different*** ways. An attribute becomes an entity when it is a thing of significance in its own right, with its own relationships and attributes.

One further point: It is helpful to indicate on the digarams which fields/attributes are needed to link the entities. This is often done with identifiers or codes, largely for practical reasons. Taking the dig diagram, for example, the idea of 'where found' is actually 'which context is it found in'. So you have the notion of a context identifier and you need to make sure that each context has an identifier and that this is used (many times of course) to identify 'where found'. If you do this on the diagrams it helps with the next stage.

You now have the information needed to define the tables — stay with your paper and pencil until you have a list of fields for each table.

Step 2: Define the tables

The final stage is to list the fields with short, sensible names and decide on what kind of data you expect in each field. In most cases each entity becomes a table and each attribute becomes a field. It is sometimes necessary to add extra fields, perhaps for comments or to tag something you want to make specific.

It may seem rather tedious to write it all down but it does mean that you have notes on the database.

When choosing data types, the main distinction is between numerical and text fields, but Access provides a certain amount of flexibility. For more detailed information about data types, search for 'data types' in the on-line Help:

AutoNumber
: This can be useful for identifiers to act as the primary key. It is automatically incremented when a new record is entered. The matching field in another table is defined as a Number / Long Integer.

Reference codes
: It is possible to build letters and numbers together to give a meaning within the number. The example databases show a variety of methods – charter references indicate the year and page number reference in the text from which they were drawn for instance.

Text
: Used for all sorts of purposes. Count the number of characters likely in names and addresses and alter the length of the text fields – the default of 50 characters is usually too long. It takes up to 255 characters.

Memo
: Useful for longer comments or descriptions; there are examples of the use of memo data types in Guide 114 (dig and pottery).

Date
: You can distinguish between short and long dates, which is sometimes useful.

Yes/No
: Useful for tagging particular characteristics in the data.

Other points

The fields used to link the tables are called "keys"; the primary key is the one that uniquely defines each record in a table; a foreign key is a field that links to the primary key in another table. Make sure you know which fields will be used to link two or more tables. The common fields ***must*** have the same field types (Autonumber matches Long Integer).

If you are going to perform calculations on numerical data in a field ... it must be a numerical field – and do not use an integer if you are going to use decimals!

Make text/alphanumeric fields wide enough but not too wide.

Descriptions are useful. Do not make them too long – the point is to remind you what the field means. You can remind yourself of codes here too.

Validation can be helpful if you are entering codes. For example if you wanted a field to contain only certain letters, type these in the Validation field. Use this with care because, although it sounds good it has a few hidden problems.

A default value is useful if one value is much more frequent than others.

Null values are essential if you need to distinguish between a zero and missing values, especially in numerical fields. Enter null as the default value. There is a longer account in the documentation – search for Null under the Help menu and ponder its meaning.

It is possible to alter a table if a field turns out to be too small, or too large.

Step 3: The mechanics of creating a database and tables

At the computer (at last!)

When you have a list of fields for each table, then you can do the work on the computer. This is the easy part.

Create a database

It is good practice to keep a database and associated files in its own folder. So begin by creating a new folder with a meaningful name. (Windows Explorer - File/New/Folder).

Create a blank database. (the detail depends on the version you are using)

Open Access and choose File/New Database
Choose an option for Blank Database
Give it a ***meaningful*** name and make sure it is stored in the appropriate folder.

The Database Window, empty of all tables, will be displayed. There are slight differences in appearance depending on the version you are using.

Create new tables

In the database window:

Select the Tables tab or button:

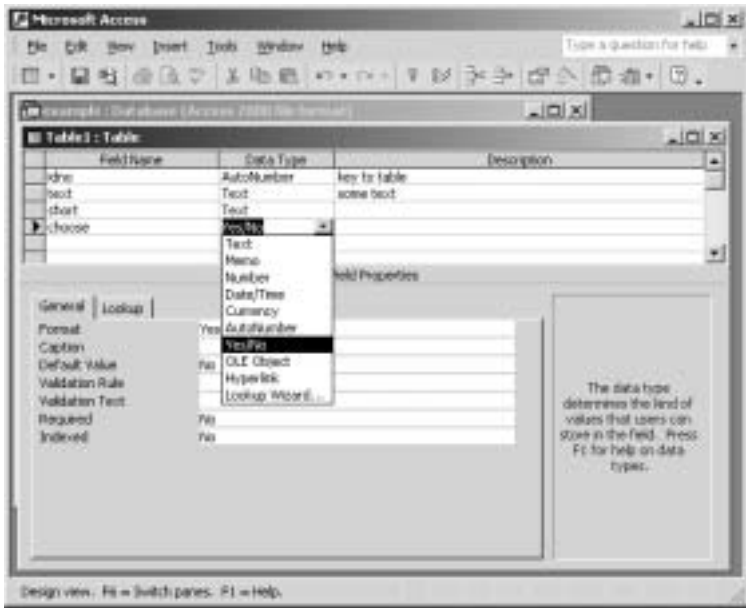
Using Access 97

Click New
Select Design View (***avoid the Wizards***)

Using Access 2000/XP

From the Tables window, double click on the Create Table in Design View

In the Table Design window, enter the definitions for each field...



Type in the name of the field (keep the names short)

Select the data type from the pull-down list

In the bottom window select further detail about data types, such as the length of text fields.

You can enter a default value (i.e. one that is entered every time) if there is data which normally has a particular value — it saves typing.

It is useful to add a Description to remind you what the fields mean. Most of the examples use this to comment on the fields and their likely content — also any codes.

Define the Primary Key	(See below for the mechanisms for doing this.)
Save the table	(Do not allow Access to create the Primary Key for you when you save it: take control and do it yourself.)

As you get more experience – try some of the options in Lookup.

Primary key

You should have decided which field to have to uniquely define the rows of data — known as the Primary Key. This is important in retrieving data from more than one table.

Place the pointer in the row to be the Primary Key

Click the Key button on the toolbar

Now save the design.

A key symbol is placed in the margin of the key field. (To remove the definition – click again on the key symbol.)

Create all the tables in the same way

Repeat the above for all the tables. You can add further tables at any time and edit the field definitions (except for primary and other keys.

Relationships

The relationships between the tables are an important part of the database; if you define them at this stage it helps with queries and to document the database.

To define the relationships that you have already identified in the diagrams:

Return to the Database window.

Choose Tools/Relationships. – or click on the Relationships button on the toolbar.

The Relationships window is displayed, along with the Add Table dialog box.

Add all tables to the window.
Close the dialogue box.

To define a relationship between two tables, drag the linking field from one table and drop it in the related table. Where there is a one-to-many relationship:

Drag the field *from* the one *to* the many.

The Relationship dialog box enables you to add to the definition. You should "Enforce Referential Integrity", in which case Access displays the symbols for a one-to-many relationship (a 1 and an infinity sign ∞) in the Relationship window.

If you link all the tables that should be linked, the Relationship window gives you a good overview of the relationships between the tables in your database. It can be viewed at any time from the menu or the toolbar.

To remove a relationship:

Highlight the line and delete it.

To alter it:

Double-click on the line.

Step 4: Enter the data

Test the database with a few records

Enter some rows of data in Datasheet View.

Repeating the entry in the previous record is useful if you have repeated data

Use Ctrl ' (That's the single-quote character, used with the Ctrl key.)

To delete a record

Highlight the record.
Press the Del key (or Edit/Delete from the menu).

When you have a few records entered, alter the layout on the screen to fit the data. You will probably find that the default column width is too wide or too narrow. This can be altered for the display on the screen without effecting the underlying data. You can simply drag the column border to a suitable position as you would in Excel.

Finally:

Save the table.

The datasheet will now be displayed with fields of appropriate widths.

Altering field properties

You can alter the table definitions at any time:

Click on the Design View

Access will not allow you to change the properties of a field that acts as a key in a relationship. Here you need to delete the relationship and then alter both keys and re-create the relationship.

Methods of capturing data

It is sometimes a problem to know how best to capture all the data for a database. There are a number of options.

Datasheet View

The most obvious is to enter records in Datasheet View in each table. This is often the easiest, even if you have to skip from table to table if you have data for several tables from one source. Sometimes a lookup table can be entered in one go and then the main data table.

Using a Form

If you are creating a 'database application' for other people to use, you will probably want to use a Form, or series of Forms, for entering data. Use Help and search for form: there is a section on sub-forms for entering data from more than one table.

From another package: general

It is often useful to enter data from another source. This is most likely to happen if you are moving data into Access from another database or a spreadsheet, but some people need (or even want) to enter data from text files. In doing this Access can be used in a variety of ways, briefly summarised here.

You can import a whole table into Access from other software: Access will read files from several spreadsheet and database packages. If the data needs to be added to an existing table, this can be done later using an Update Query (see below). To import a whole table:

From the File menu select Get External Data / Import

In the Files of Type box

Select the format of the file

Access creates a new table and converts the data types from the source package, which you can check and alter as necessary. Spreadsheets can be imported as separate tables.

Linking a spreadsheet or a table

A linked table behaves as if it is a table in the database.

File/Get External Data / Link Tables
Find the correct files in the Link window
Click Link.

Appending to an existing table

You can append data to the end of a table. If you do this the columns in the data must match the table. Use an Append Query (in Design View, select Query from the menu).

Importing text (Ascii) files

Here the data consists of plain text. The text file has to be set up either with known widths of each field or with "delimiters" between the fields. Sometimes this is done in the process of exporting the data from another package and sometimes the delimiters are entered at the same time as the data. The fields in the text file need to match those in the tables!

From the File menu select Get External Data / Import
In the Files of Type box select Text Files
Click Import
Choose Text Import Wizard
Choose Delimited
Click the Next button
Click Comma (if it is a comma-delimited file – otherwise choose the delimiter. You may need to specify no "" for text fields)
Click In an existing Table

Further help for entering data

Use the on-line Help and search for data entry or text file.

Final comment on entering data

It is sensible to enter a small amount of data and then try some queries to make sure the whole lot works!

Step 5: Getting meaning from the data: Queries

Exactly how to query and analyse the data will depend what you need to know. As the examples show, the queries can take data from many tables; you do not need to display all the fields; you can search for different groups of records. The "Group by" queries illustrated in the 'hands-on' section can also be a useful way of summarising some data. Query design is very flexible, so you can experiment with retrieving different fields and records — generally exploring the data.

Queries can be saved for use again or they can form the basis for Reports — see the examples for illustrations of this.

If you are going to use numerical or categorical data, it is possible to read Access tables into SPSS. See Part 5 (on the Web) for detailed references, and the *Aelfric* and *Ownership* examples.

Queries

At the database window

Click the Query tab

If there are any saved queries, they are listed here: in a new database, none are listed.

If you open an existing Query it will perform the search and list the result in Datasheet View, where the result can be treated as a table and (usually) edited. The Query can also be displayed in Design View and the query altered.

To query your own data, use similar techniques to those outlined in the hands-on part in Part 2.

Click New
Select Design View
In the Add Table box highlight one of the required tables
Click Add

Repeat this until you have all the tables needed for the query, then close the box. If you add more than one table, the relationship between them will also be displayed.

As in the examples in Part 2, build up queries by specifying the fields to use and the criteria to select.

Change to Datasheet View to run the query and test them as you go along.

Select View / Totals from the menu to allow some simple arithmetic as you go along.

Saving queries

Saving a Query saves the design so that it can be used again Some queries are *ad hoc* and you will not need them again, so it is best not to save them. Others are worth keeping and some are used as the basis for other work, such as Forms or Reports.

In either Datasheet View or Design View: Select Save

Make-Table queries

If you need to save the results of a query at one point in time, save the results as a table using a 'make-table' query. Start with the select query and when it extracts the data you want, use the menu to change the type of query:

Query / Make Table

Give it a meaningful name in the Queries Properties box.

This table will not be updated when the source tables are updated. If you want a table that is up to date, look at the result of running the select query again.

Data derived from more than one table can thus be placed in a temporary table for use with other packages – see below on exporting data.

Update Queries

If you need to make global changes, records can be updated using an Update or a Delete Query. This is much quicker than editing them manually.

To make sure you have the right group of records(!):

Enter the criteria of the records you want to update in a Select Query and view them.

Now change the Select Query to an Update Query:

Click on Design View
From the Query menu:
Choose Update Query

Access adds an Update To... row in the grid. Use this new row to specify the changes you want.

Run the Query (Query / Run from the menu, or the Run icon).

A dialog box asks you to confirm the update and tells how many records will be altered: this too provides a check. If it is OK:

Click on the OK button

Delete Queries work in much the same way and enable you to specify criteria for deleting whole rows – ***but run a*** Select Query ***first to make sure you will be deleting what you think you will be deleting!***

Analysing data: Totals and Crosstab Queries

Access provides nine totals functions for simple calculations on groups of records; the most useful are Sum, Avg, Count, StDev and Var.

Open a New Query.

Select the fields you want for the Query.

Click the Totals button on the toolbar.

A new row is displayed on the grid called Total. By default the function available is Group By.

Select the functions that you want from the list.

Crosstab Queries

These allow you to see calculated values in a tabular format. Choose a Cross-tab Wizard for the new query. Each field can have one of four crosstab settings

Row Heading
Column Heading
Value (calculated in the grid)
Not shown (used for criteria)

Exporting data: using all or part of the data in another package

This can be important in research because statistical tests are often needed, so a specialist package must be used. You can export the result of a query on more than one table for use in other packages; for example, if you have data that lends itself to cross-tabulations, use SPSS for the final analysis. .

Exporting to a text file

As in importing, you need first to decide on the structure of the text file; whether there are to be delimiters or whether to use fixed format. Use:

File / Save As Export

In the Save As box

Check To an External File or Database

In the Save Table box

Choose Text Files from the Save As Type box

Note that there are a lot of other choices here. The filename probably ends in .txt to indicate a text file.

You are then stepped through the process with the Export Text Wizard.

Choose Delimited (to have special characters to delimit the fields)

If you need something other than a comma as a delimiter (which you might if there are commas in your data itself) you get a chance to choose other possibilities. $ or | (vertical bar – Shift "\") are reliable delimiters.

The sample export format shows what the delimited data will look like; if the fields look wrong, try a different delimiter.

You do not always need a text qualifier to indicate text fields. Choose {none} for text qualifier.

Click Next after each choice and finally click Finish.

Using Access data in SPSS

You can read Access data directly into SPSS. See detail in AD04 *Using Data for SPSS in Access*, which is devoted to this subject.

Where next? – Parts 4 and 5

Parts 4 and 5 of this document are on-line at http://www.ncl.ac.uk/ucs/databases/access

Part 4 includes information on: Forms, Reports, Documenting a database, Security, Using Excel and Access, Using Access with SPSS, Using Access on the Web.

Part 5 begins thus:

> "It is often useful to see how other people have tackled problems, and these more detailed examples illustrate how a database can cope with different types of data and research questions. These examples fulfil two functions – they show you how to use Access and, at the same time, give you ideas about how to handle your own data. All the data here has been used in "real" research projects..."