

INTRODUCTION TO MICROSOFT ACCESS MINIMAL MANUAL

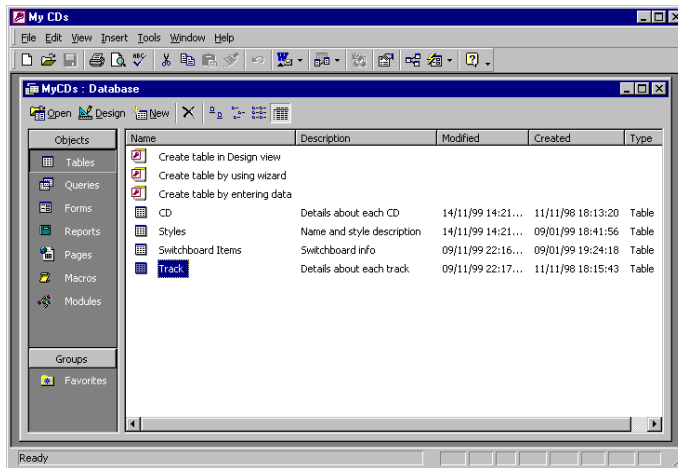
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1 Databases in Access

An Access database consists of the following kinds of objects : tables, queries, forms, reports, data access pages, macros and modules. (Macros and modules are not covered here.) To create a new database do *File:New* and then follow these steps:

- a) Start with a blank database, or use the wizard
- b) Create tables
- c) Create relationships
- d) Create data entry forms
- e) Create other queries and reports

2 The Database Window



There are various Toolbars and Menus depending which **view** your active object is in. Hold the mouse over a button to discover its' function.

There are tabs down the left hand side for each of the main objects in Access.

There are shortcuts and buttons to open, design or create a new object.

For each kind of object, there are usually several interfaces which support interaction. These are called **Views**, which is unfortunate since the term View has a quite different meaning in database theory i.e. a calculated table.

3 Help

Select Help : Microsoft Office or press F1.

- *Contents* lists the major topics grouped by task - click on each to see topic submenus.
- In the help diagrams, click on labels with a red bar to see more details.
- *Index* displays an alphabetical list of topics. Type in the first few letters to jump to that point.
- There are also some example databases provided with Access. They are in C:\Program Files\Microsoft Office\Office\Samples.
- See the topic Getting Help for details of other kinds of help – screen tips and office assistant.

Look up the help whenever you want to more about a topic.

4 Saving

Access saves the database automatically when an object is created or deleted, and when data is added or deleted. It does not save changes to objects automatically, so you should save frequently if, for example, you are in the middle of creating a complicated form, or writing Visual Basic code.

5 Wizards

Access has many 'Wizards' which automate the creation of objects according to your specification. This means that many parts of an Access database can be quickly and easily created. However they are limited, and a novice is unlikely to understand exactly what has been done. At worst, the wizard may misinterpret your intentions, setting up something for you which is not what you intended. The best approach is to use the wizard, but DON'T STOP at this point. Look at the object in design view, look at the properties and see if you agree with their settings. Resize controls on forms, adapt validation on tables etc.

6 Tables

Tables are the heart of an Access database. They are made up of records and fields. A record corresponds to a row of the table, and contains information about a single entity described by the table. The fields correspond to the columns of the table, and are the basic unit of the database, storing a particular piece of data.

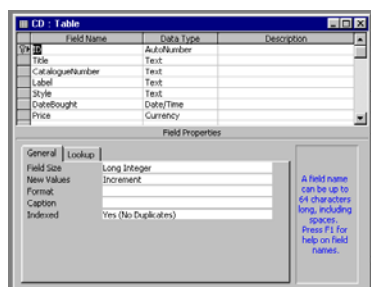
6.1 Datasheet view



ID	Title	CatalogueNumber	Label	Style	Bought	Price
1	Traveling Without Moving	40399-2	Sony	Acid Jazz	15/10/99	65.99
2	King of America	09AM11	Demon Records	Mainstream	21/02/99	64.50
3	Spike	7599-25685-2	Warner Brothers	Mainstream	21/02/99	67.00
4	End of Youth	1962-45555-2	Warner Brothers	Mainstream	05/03/99	63.50
5	Blood and Chocolate	09AM12	Demon Records	Mainstream	15/02/99	60.00
6	All This Useless Beauty	1962-46198-2	Warner Brothers	Mainstream	04/05/98	60.00
7	Automatic for the People	1962-45555-2	Warner Brothers	Mainstream	07/05/99	60.00
8	The Real Thing	1004154-2	Slack Records	Alternative	07/02/97	60.50
9	Stain	472656-2	Epic	Alternative	06/09/96	69.99
10	Rocks Off	525-487-2	Polygram TV/MCA	Alternative	21/06/97	610.00
11	Blood Sugar Sex Magic	7599-26681-2	Warner Brothers	Funk	14/03/99	69.99
12	1987	INFECT000X	Infectious Records	Mainstream	15/03/96	66.00
13	Live at the BBC	7243-8-31796-2-6	Apple	Mainstream	16/09/96	60.00
14	Symphony No 5	43	Sony	Punk	18/01/99	65.99
15	One Hot Minute	1962-45733-2	Warner Brothers	Funk	06/05/97	66.50
16	Public Enemy	0777-7-61409-4-6	Parlophone	Alternative	06/06/96	67.80
17	OK Computer	7243-8-65229-2-5	Parlophone	Alternative	21/02/96	60.00
18	Dookie	1962-45529-2	Reprise	Punk	06/03/96	60.00

Datasheet view displays the data in the table in a spreadsheet-like grid.

6.2 Design View



Field Name	Data Type	Description
Title	AutoNumber	
CatalogueNumber	Text	
Label	Text	
Style	Text	
Bought	Date/Time	
Price	Currency	

Field Properties

General: Field Size: Long Integer, New Values: Increment, Format: (empty), Caption: (empty), Indexed: Yes (No Duplicates)

Lookups: (empty)

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

Design view is used to create or alter the structure of the table, for example adding fields, and specifying the type of information stored in a field (e.g. numbers, date, text).

For each field in the table, the field name, data type and description are easy to see.

More details about each field – **properties** – are shown in the box at the left hand bottom corner. Click on a particular field to see its' properties.

6.3 Properties

Properties include

- Input mask : specifies format of data
- Caption : for user friendly text.
- Validation rule : specifies permitted values for the data
- Validation Text : message to be displayed if validation rule is not met

- Indexed : specifies whether field is indexed or not

The Lookup tab specifies permitted values for a field where the values must be one of a predefined list – either from a table which is naturally included in the database design, or by introducing a special ‘lookup’ table. You can choose ‘Lookup wizard’ as the data type or click on the Lookup tab and enter the details yourself. Don’t use a value list as it is a lot easier to modify values in a table.

6.4 Primary key

The primary key is the field or combination of fields that uniquely identifies each row. To set the primary key, highlight the field(s) (hold down the CTRL key and drag the mouse over the left hand edge of the fields in design view). Then click the key button in the toolbar.

6.5 Creating tables

- New tables can be created by selecting Tables, then the New in the Database window.
- Either choose Design View to build the table yourself, or use the Table Wizard.
- Field names should be readable, mixed case, don’t include spaces.
- Add field constraints such as input masks, validation rules, default value. If you used the Table Wizard, check whether you really want the constraints that the wizard inserted (e.g. input masks etc), and decide whether to add more of your own.
- Choose your own primary key, unless you want to use autonumbering.

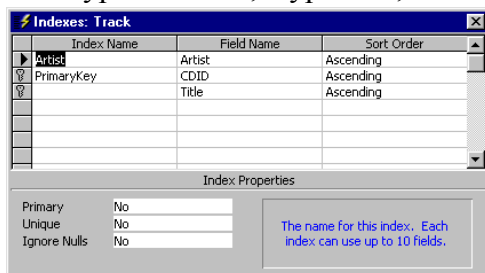
For any fields that refer to a lookup table, enter details for the type of control, row source, and probably Limit to List.

6.6 Altering a table

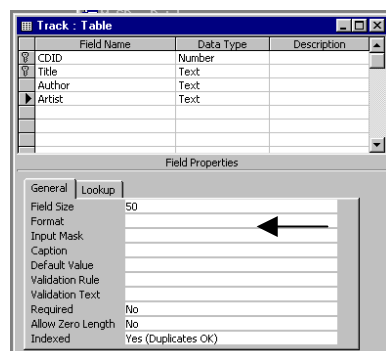
Open the table in design view, and amend.

6.7 Indexes

The primary key of a table is automatically indexed, and you can’t index a field whose data type is Memo, Hyperlink, or OLE Object.



You can see the indexes for a table from the menu View:Indexes. This shows any indexes that you have created, and the primary key index.

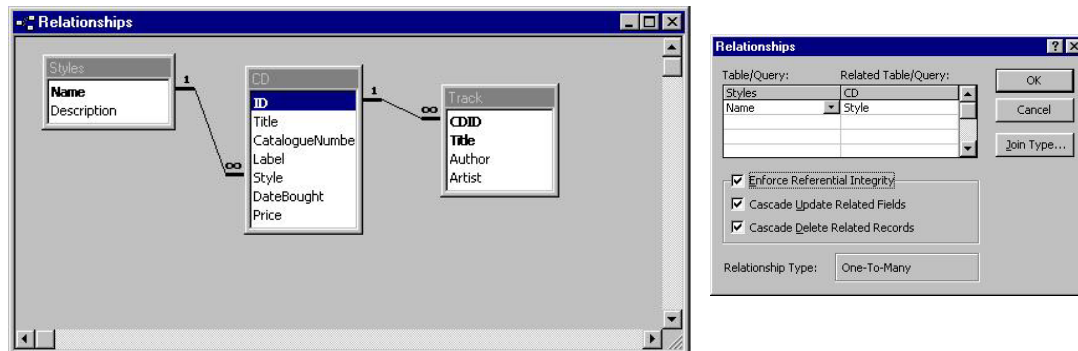


If the field name ends in 'ID', Access automatically creates an index for this field, whether you want it to or not. You should amend or delete the index if necessary.

7 Relationships

Relationships are the backbone of the ER model. The relationships between the tables must be created in the Relationships window (Choose Tools : Relationships).

The relationships are shown by the lines between the associated fields in the tables.



7.1 Viewing / altering relationships

Double click on the relationship line to see the relationships dialog box, which is used to create or alter relationship details.

7.2 Types of relationship

Microsoft Access creates the relationship **automatically**, depending on how the related fields are defined:

- A one-to-many relationship is created if only one of the related fields is a primary key or has a unique index.
- A one-to-one relationship is created if both of the related fields are primary keys or have unique indexes.
- If an indeterminate relationship is created, this means that one of the fields does not have a unique index. You should be able to correct this by ensuring that the fields are either primary keys or have a unique index.
- There are no many to many relationships.

7.3 Enforcing referential integrity

You should enforce referential integrity - the values of a foreign key must correspond to an existing value in the related table.

It may be appropriate to cascade updates or deletes. If you do not cascade, then you will not be permitted to update or delete a value if there are any records with that value in the related tables.

- **Cascade update** : if a value is altered in the table on the one side, it is automatically updated in the related tables. (Good for spelling mistakes or regrouping).
- **Cascade delete** : if a value is deleted from the table on the one side, then all records with that value will be deleted from the related tables on the many side.
- **Foreign keys not null**. If a foreign key is also the primary key, it cannot be null. Otherwise, if it cannot be null, set the field property 'Required' in the table design.

7.4 Deleting a relationship

Single click on the relationship line, and press the DEL key.

7.5 Creating relationships

- Click on the field in the table in the 'one' side and drag to the fields in the table on the 'many' side. To drag multiple fields, press the CTRL key and click each field, then drag them all.
- In most cases, you drag the primary key field (which is displayed in bold text) from one table to a similar field (often with the same name) called the foreign key in the other table.
- The related fields don't have to have the same names, but they must have the same data type (with two exceptions) and contain the same kind of information. In addition, when the matching fields are Number fields, they must have the same FieldSize property setting. The two exceptions to matching data types are that you can match an AutoNumber field with a Number field whose FieldSize property is set to Long Integer; and you can match an AutoNumber field with a Number field if both fields have their FieldSize property set to Replication ID.
- To create a recursive relationship (between a table and itself), add that table to the relationship window twice. Access supplies a second icon for that table, and you can then drag the field from the first icon to the related field on the second icon. This does not mean that there is another copy of this table in the database, merely that the designers of Access think that a second representation makes the diagram clearer.

NB If you drag a field that isn't a primary key and doesn't have a unique index to another field that isn't a primary key and doesn't have a unique index, an indeterminate relationship is created. In queries containing tables with an indeterminate relationship, Microsoft Access displays a default join line between the tables, but referential integrity won't be enforced, and there's no guarantee that records are unique in either table.

7.6 Printing relationships

In Access 2000, you can choose File:Print Relationships.

In Access 97, you will need to send the Relationships window to the clipboard (Alt PrintScreen) and paste into a document for printing.

8 FORMS : Data entry and update

8.1 Customised form

Viewing or entering the data in a table in datasheet view is very similar to looking at a spreadsheet. It can be adequate, but rows may not fit completely into the window width, and identification of foreign keys is unsatisfactory. You may also wish to include some explanatory text. It is far better to enter and update data using a **customised form**.

8.2 Forms can be open in 3 views:

- Form View* displays the form and the active record(s)
- Design View* you can create / alter the layout
- Datasheet View* presents the data from your form in a datasheet.

8.3 The underlying table or query

The form is **bound** to a table or query. Only fields in the underlying table or query can be shown on the form. These fields are listed in the **Field List** : open from button in toolbar.

8.4 Controls

- Fields are displayed in **controls** such as text boxes or combo boxes. Combo boxes should be used if the field is based on a lookup table. Each control can be **bound** to a particular field, or **unbound** (for calculated text).
- Other controls include command buttons, checkboxes, page breaks, lines and boxes.
- Subforms are often used for 1 → many relationships
- The constraints (eg validation rules) which are defined in the table before the form is created are inherited by the form. However, this is not the case for constraints added to the table after the form has been created.

8.5 Properties

The form itself and all the controls on it have **properties**.

These can be seen in Design View by double-clicking on the particular control.

Double-click on the small square, top left corner of the form, to see Form properties.

Many properties are set automatically when the control is created. They can be altered afterwards if required, sometimes graphically (e.g. size) or textually (e.g. border style).

8.6 Creating a form

8.6.1 Using a Wizard

The best way to create a form is often using the Form Wizard, then adapting the form. There are several styles available:

Tabular	like a table, one line per record
Columnar	one record per form, one line per field
Justified	one record per form, tightly packed.
Datasheet	in datasheet format

If the wizard is used, the form will usually need modification - adjusting the size of text boxes and labels, colours, the size of forms etc. Also check the properties for various controls. Controls can be added using the Toolbox (below)

8.6.2 Using Design View

All the controls can be added to the form via the Toolbox (View : Toolbox or toolbar Toolbox button).

- Add a **bound** control by dragging the field from the Field List (open by clicking on Field List icon).
- Add an **unbound** control by clicking first on the toolbox icon and then clicking on the form.
- In general each control has an associated **label** control (typically displaying the name of the field it is bound to).
- **Unattached labels** are used for placing explanatory text on the forms.

- There is also a **formatting toolbar** which usually appears automatically to assist with setting fonts & colours – if it's not there, find it in the menu View : Toolbars.
- There are several useful menu commands in the **Format** menu eg Align, Size, Spacing.
- The style of the form can be changed using Format : AutoFormat
- The **tab order** of the controls can be altered using the menu View : Tab Order

8.7 Subforms

Subforms are useful to show the 'many' (child) side of a 'one-to-many' relationship in a form based on the 'one' (parent) side. For example, all the tracks of a particular CD can be shown on a subform.

If the relationships between the tables have been set up correctly, a form with subforms can be created successfully with the wizard :

- Choose Create form using wizard
- Include all the required fields from the parent table, then the required fields from the child table.
- You want to view the data by the parent key and with subforms (the default)
- Choose a tabular or datasheet layout for the subform.
- Choose a suitable form style.
- View the form with data, adapt if required.
- Look at the linking child and master properties for the subform – in design view, select subform and view properties. The 'linking child and master field' properties should have been set correctly automatically because the relationships between the tables were set up before the form was created. They control which tracks are displayed on the form. Also, the value of the foreign key in the child table will be set automatically, even though it is not explicitly typed in. It is therefore optional to have the foreign key displayed on the subform, although when you are developing the form it is comforting to see it there.

8.8 Navigation buttons



These are at the bottom left hand corner of the form.

Sometimes you may prefer to make your own navigation buttons elsewhere on the form, particularly if you have the bottom left hand corners of a subform and the main form next to each other, which can be confusing. This can easily be done using the command button wizard from the Toolbox.

- Double click on the square, top left corner of form, to see the Form properties.
- Set Scroll bars to Neither, navigation buttons to No.
- Move existing controls on the form to make space for the new buttons.
- Add a button to the form – make sure the Wizard button on the toolbar in ON. Click on the command button in the toolbox, click on the form. Follow the Wizard instructions to choose Record Navigation : Go To *Next* Record. Choose a picture or text. Call the button something more meaningful than Command16 e.g. *cmdNextRec*. However, there is a bug in Access2000 such that deleting a button does not remove the support code. *This means that every time you create a button you **must** give it a new and different name, even if you are replacing an old one.*

8.9 Inserting a picture

- Pictures can be stored with the OLE datatype.

- Pictures cannot be seen or stored in datasheet view – a form is needed.
- Store a picture by right mouse clicking on the destination control in the form, then choosing Insert Object and navigating to the file containing the picture.
- Objects can be either **linked** (the picture is not stored in the database, so any changes to the picture are shown in the database too) or **embedded** (the picture is stored in the database).

9 Forms : Navigation and finding data

9.1 A switchboard

For a finished application, the user should not see the database window at all but navigate through the application with forms. The switchboard is a special form for navigation. It can be created and edited using the menu : Tools : Database Utilities : Switchboard Manager.

- Give the switchboard a name
- Create new switchboard items by editing the switchboard page and clicking New. A list of possible actions are provided : e.g. Open Form, Open Report. It is not possible to run a query directly from the switchboard, you need to base a form or a report on the query and open that.
- When the switchboard contains all the items required, close the dialog.
- A form (Switchboard) and a table (Switchboard Items) have now been created for this switchboard.
- Set the switchboard to be opened when the database is opened by using the menu Tools : StartUp and entering the switchboard name as the Display Form.

An example is provided in MyCDs.

9.2 Dialog forms.

Alternatively you can make your own dialog forms. These are not bound to a particular table or query, and contain command buttons giving several options.

The Form DemoForm in MyCDs is an example.

- Create a new form using the Design view, double click on the small square, top left corner between the rulers, to see the properties. Set Border to Dialog, Scroll bars, navigation buttons and record selectors to No.
- To create the command buttons click on the command button icon on the Toolbox, then click on the form.

Follow the wizard instructions.

9.3 Navigation buttons

The navigation buttons can be used to tab through the records one by one.

9.4 The Find command

There is a Find command which can be used with any field to search for an exact match.

- In Form View, click on the text box of the field you want to search for.
- Click on binoculars in the toolbar, or choose the menu Edit : Find
- Type in the value in the dialog box, click on FindFirst
- The first record meeting these criteria is displayed.

9.5 Searching with a text or combo box

A text box or combo box can be placed on the form, listing all the possible values of the field to be searched for. When a value is selected, the record with that value is automatically displayed on the form.

A wizard can be used, although the ordering usually needs putting in manually.

- Using the wizard on a columnar form, create a combo box in the form header to 'find a record on the form based on the value selected in the combo box. The fields shown in the combo box should contain the primary key and other fields that can be used to usefully identify the record required. Often the primary key itself is hidden.
- Alter the combo box to display the values in order – in the combo box properties, enlarge the window so that you can see all (and more) of the row source. Alter this line : add *ORDER BY fieldname* at the end.
- Use the combo box in Form view to change from record to record.

More examples of finding data with combo boxes are in section 10.3

10 Queries

10.1 Types of query

10.1.1 Select queries (These are called Views in database theory)

Select	Find and display data according to supplied criteria
Parameter	As Select queries, but user is prompted for the criteria to use
Crosstab	Displays summarized values (sums, counts, and averages) from one field in a table and groups them by one set of values listed down the left side of the datasheet and another set of values listed across the top of the datasheet
Duplicates	Wizard used to find records in table that have same values in one or more fields
Unmatched	Wizard used to find records in one table with no corresponding records in another table.

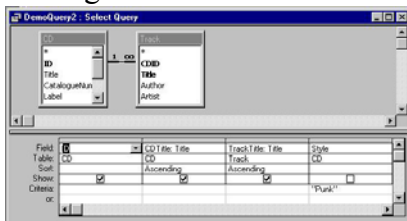
10.1.2 Action queries

Delete	Finds records and deletes them
Update	Finds records and changes one or more of their values
Append	Takes records from one or more tables and appends to the end of another table.
Make-Table	Selects a set of records and stores them in a new table

10.1.3 Access Views for queries

Queries can be looked at in three ways:

Design View



Grid for creating queries graphically. This generates SQL automatically, which can be seen in SQL view

SQL View



Window for typing in or viewing SQL

Datasheet View (Select queries only)

ID	CDTitle	TrackTitle
18	Dookie	Basket Case
18	Dookie	Burnout
18	Dookie	Chump
18	Dookie	Coming Clean
18	Dookie	Emenius Sleepus
18	Dookie	F.O.D.
18	Dookie	Having a Blast
18	Dookie	In the End
18	Dookie	Long View
18	Dookie	Pulling Teeth
18	Dookie	She
18	Dookie	Welcome to Paradise

Displays the results of the query. The data displayed here is the result of running the query at *this* time.

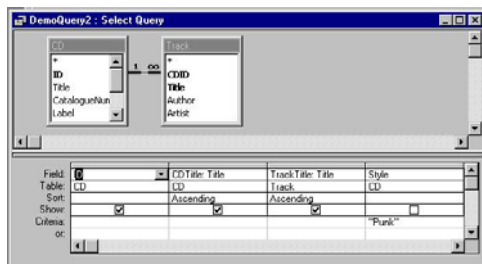
10.2 Select queries

Queries are used to view a required subset of data from the database.

e.g. All CDs bought after 1/1/99, all CDs with a track by Elvis Costello.

They can be defined by filling in a special grid, or by typing in SQL directly.

10.2.1 Design View : using a grid



- Add the tables required to the top of the grid (Query : ShowTable) , and the fields required (by double-clicking on them) to the bottom half of the grid.
- As long as the relationships have been set up properly before the query is created, Access will handle the relationships between the tables for you (shown by a line between the related fields)
- To sort, select either Ascending or Descending. Multiple sorts are left to right.
- To move the position of fields in the query grid, select the field column and drag.
- To delete fields from the query grid, select and delete.
- To calculate aggregated fields (sum, average, minimum, maximum) choose Totals (View : Totals from menu, total button from Toolbar). An extra row appears in the query grid : fields must either be an aggregate function or have GroupBy set.
- Run the query with the toolbar Run button (!) or the menu Query : Run
- Queries can be saved and then appear display in the database window in the Queries section.
- You can see the equivalent SQL by looking at the SQL view of the query. Choose the menu View : SQL or the toolbar SQL button.

10.2.2 SQL View

You can use this window to enter SQL directly or to view the SQL generated by Access. For new queries, choose design view, close Show table dialog box, change to SQL View.

Joins



SQL generated by Access joins tables using the terminology
FROM table1 INNER JOIN table2 ON table1.field1 = table2.field2
compared with the standard SQL
FROM table1, table2 WHERE table1.field1 = table2.field2

The advantage of using the grid is that all the joins are made for you automatically, and the 'WHERE' section of the SQL is reserved for selection criteria. However when more than about three tables are joined, the joining part of the generated SQL gets very difficult to read or modify.

Access can also do simple LEFT or RIGHT joins (where the data is always selected from the main table, regardless of whether data occurs or not in the other tables). See the Help for more details.

Other Access specific details in SQL

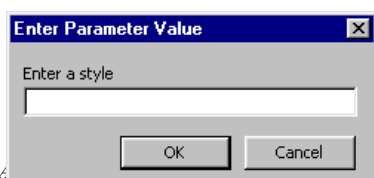
- Use SQL aggregate functions (e.g. Sum, Count, Avg,...)
- Fields are renamed using AS
SELECT SUM(CD.Price) AS TotalPrice
- You can use various Access SQL operators
WHERE Name Like (Red*)
WHERE CatNum Between 5 and 10
WHERE COUNTRY Not "Scotland"
WHERE Title Is Null
SELECT Price*Quantity AS TotalPrice
- There are many Access functions
WHERE Year([DateOfBirth]) = Year(Date())
SELECT Left(Firstname,1) & Left(Lastname,1) AS Initials

10.3 Parameter queries

The criteria are determined at runtime.

There are two ways of using parameters: either using the Access parameter dialog form, which is simple to use but not very user friendly, or using a customised form for parameter input.

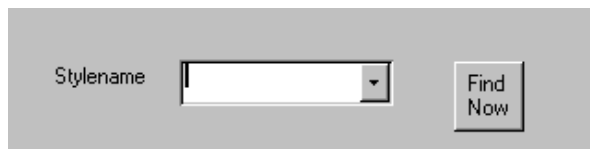
10.3.1 Using the Access parameter query dialog form



- Make a new query using the grid or SQL
- For the field which needs a parameter value, type a prompt within square brackets in the 'criteria' box of the grid, or on the RHS of a WHERE condition.
E.g. [Enter style] in criteria grid
Or WHERE Style = [Enter style] in SQL
- A parameter dialog box appears with this prompt when the query is run.

You will also see this dialog form if there are any unrecognised field names in your SQL. They will be interpreted as a parameter.

10.3.2 Displaying a subset of records on a form or report , using a text or combo box



It is possible to use the wizards to create the combo box displaying possible values, and the button which opens a form displaying only those records matching the criteria in the combo box. However, sometimes the wizard is too clever, especially if the combo box is based on a non-key field, and creates something that is not required at all.

Also, the wizard does not enable reports to be opened this way.

Open a form:

- Make a form which is based on the table, or on a query which selects the relevant fields from one or more tables. The query must include the field used for the parameter comparison, even if the field will not be displayed on the form. However, do not do any parameter comparisons at this stage.
- Make a dialog form containing an unbound text box or a combo box based on all possible parameter values, and a button which opens the first form, displaying specified records depending on the values in the text or combo box.
 1. Create a new form using the Design view, double click on the small square, top left corner between the rulers, to see the properties. Set Border to Dialog, Scroll bars, navigation buttons and record selectors to No.
 2. Add a text or combo box to the form. For the combo box, make sure Wizard button is ON in the toolbox. Click on the combo box icon in the toolbox, click on form to position combo box on form. The combo box should contain the possible parameter values. **NB** The wizard only works for selecting primary or candidate key fields from a table – otherwise the combo box must be based on a query which selects just the relevant field. E.g. `SELECT Name FROM Styles;`
 3. Add a command button to the form. Follow the Wizard instructions to choose Form Operations : Open Form : the first form : to display specific data
Indicate that the selection is to match the contents of the combo box and the style of the CD : click both and then the icon <->. Choose a picture or text for the button.

Report:

The easiest way to do this is to follow the form instructions to use the wizard to open a form on specific data. Unfortunately you will need to create a basic form. Then, using common sense, alter the Visual Basic code for the button's event procedure to open the report instead of a form. If you start typing the line afresh, you are prompted for suitable parameters.

11 Reports

Reports can be defined to display and print formatted, grouped and aggregated data. They are a specialised kind of form where there is no data entry. The controls are similar to a form too.

Reports can be opened in

Design View	for creating or altering the layout of your report
Print Preview	displays the report ready for printing
Layout View	displays what the layout will look like – but the data is not always correct. This can be worrying!

- There are wizards, similar to Form Wizards. A report will probably need adapting when it has been made with the wizard. Consider the size, colour, location of controls, also the text in labels and headings. A border is sometimes drawn which can be changed to be transparent. Lines across the page are often useful. The underlying format of a report can be changed using Format:AutoFormat. It's not so easy to change the style.
- All reports are based on a table or query.
- Reports are divided into sections. There are 3 headers (Report, Page, Group), a Details section and 3 footers (Group, Page, Report).
- The detail section is triggered by every record, so to get a summary report you make the detail section empty.
- Multiple groups are allowed and the sections are nested.
- Calculated text boxes can be included in report.
- Group summaries like totals are included by defining a calculated text box with an expression containing a summarising function. Alternatively the summary can be an aggregate function produced as part of the query that the report is based on. These controls should be located in the group or report footer.
- Use Sorting and Grouping button to determine whether any group headers / footers, keep all group together on page. Footers may just be white space.
- Grid property can be increased from 10 to 20 for easy positioning.
- Report query might not need Order property because this can be done in Sorting/grouping control
- The report wizards are quite good and allow you to choose how to group your records. As with forms, the controls will need adjusting for a satisfactory appearance.