

Access

Advanced Queries



David Lexton
Computing Services
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These notes are for Access 2002, but
apply also to Access 97 and 2000

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Getting ready to query

Exercise 1



- i) Copy the file nwindtab.mdb from H:\Access to the My Documents folder
- ii) Select the copy in the My Documents folder, open the File menu and choose Properties, clear the Read Only box and click OK
- iii) Launch Microsoft Access and open the copy of the database in My Documents

Select Queries

A select query lets you select and display data from a table.

Exercise 2

Create and run a query to select all products whose name includes choc

- i) In the Database window, click  **Queries**, then click  **New** to display the New Query dialog box
- ii) In the **New Query** box, choose **Design View** as the method you want to use to create this query then click **OK** to display the **Show Table** dialog box
- iii) Select the table you want to query, click **Add**, then click **Close**
- iv) In the Query By Example (QBE) grid, put all the field names you want to see when the query is run and any others that you want to use to select records from the table.

Criteria

When you have added all the fields you want, you have to set the *criteria*. Criteria are the rules by which records are selected.

Criteria are expressions built from operators (<, =, > etc) and field values.

If you don't include an operator, Access assumes you mean equals (=).

Some special criteria expressions

To enter a criterion containing a space, you must put it between double quotes.

e.g. Old Banger will give a Syntax Error but "Old Banger" will be accepted.

To match a character string which may have other characters around it, use * which stands for any number of characters.

e.g. *AB* will match any of STAB, ABLE, STABLE, CAPABLE etc.

To match any single character, use ?. e.g H?LL will match HILL, HALL, HELL.

Entering criteria

- i) Click on the Criteria cell for the field for which you want to set a criterion
- ii) Enter the criteria expression into the cell

Running a query

Once you have designed the query, click the Run button, , on the Toolbar




Save all the queries which you create in the exercises that follow with a suitable name and close before you move on

Action queries

Select queries pick out records from a table and produce a transient object called a *dynaset*. The table itself does not change. If you did make changes to the dynaset, they would be made to the table itself. You could also make changes in the table directly. However, this is not the best way to change information in a large table. Access has *action* queries for deleting and updating records.

Designing and running a Delete Query

When a delete query is run, it deletes all selected records and they cannot then be retrieved. It is therefore best to follow this procedure:

- i) Design a Select query to select the records you want to delete (you did this in the previous exercise)
- ii) Run the query and check that it selects the right records
- iii) Switch to Design view and set the query to Delete by doing **Query**  **Delete**
- iv) Click  to check the dynaset, then return to Design view
- v) Click  to run the query. Access gives you one chance to change your mind

Exercise 3






Design and run a query to delete all products containing chocolate from the Product table.

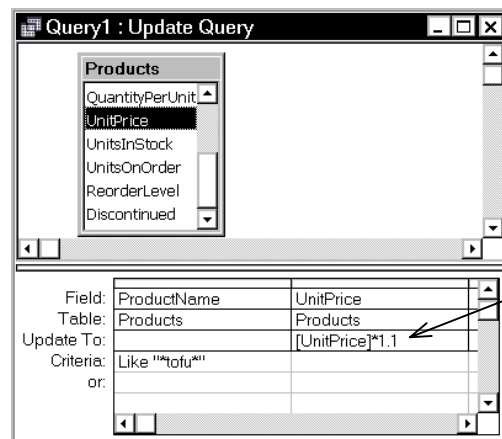
Designing and running an Update Query

An update query is used to change all records which match specified criteria. Changes are made directly in the table and occur **every time the query is run**.

Exercise 4

Follow the steps below to increase by 10% the price of all Products which contain Tofu

- i) With a new (or an existing) query in design view, **Query**  **Update** to change it to an update query: This replaces the **Sort** and **Show** rows on the QBE grid with an **Update To** row:
- ii) Enter on the QBE grid the field(s) to select on and the field(s) to be updated
- iii) Set the selection **Criteria**
- iv) For each field that you want to change, put an expression in the **Update To** row which specifies the changes. An expression can contain field names, numbers and operators (+, -, *, / etc)
- v) To refer to a field in an expression you have to enter its name in square brackets. [Amount to pay]*2 in the **Update To** cell of the Amount to pay field would double its contents when the query is run
- vi) When you have finished designing the query, **Query**  **Select Query** and click  to display the fields in the records that will be updated. Check them, then click  to return to Design view
- vii) **Query**  **Update Query** and run the query to modify the table. To see the changes, open the table.






This is where to put the expression for a new value

Make Table queries


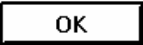

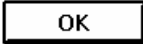
These create a table from the dynaset of a query. You could use this type of query to archive old records, make backup copies, make copies to export to another database or as a basis for reports that display data from a specific time.

Note: Make Table is an **action** query. Action queries, which include also Update, Delete and Append queries, operate directly on tables. Their effects cannot in general be simply undone. It is therefore good practice to avoid OPENing action queries once they have been saved and closed, because that causes them to be run. Instead, open them in DESIGN view before running them.

Exercise 5

- i) Follow the steps below to make a new table containing names and address fields of all employees. Name the table Employees Names.
- ii) Create a Select query based on the Employees table
- iii) Click  to check the dynaset. Click  to return to Design view
- iv) **Query**  **Make Table**. The **Make Table** dialog box is displayed:



- v) Type a name for the new table in the **Table Name** box. To replace the data in an existing table, select the table from the drop-down list which appears when you click 
- vi) Set any other options and click . The **Make Table Query** window is displayed
- vii) Click . A box is displayed that says how many records will be added to the new table.
- viii) Click  to run the query.

NOTE The fields in the new table inherit only the data type and field size of each field in the query's tables. No other field or table properties are transferred to the new table.

Append queries


Append queries are used to add records from a table or query in the current database to the end of another table in either the current database or another database.

Exercise 6

Open the table called New Employees and check that it contains three records.

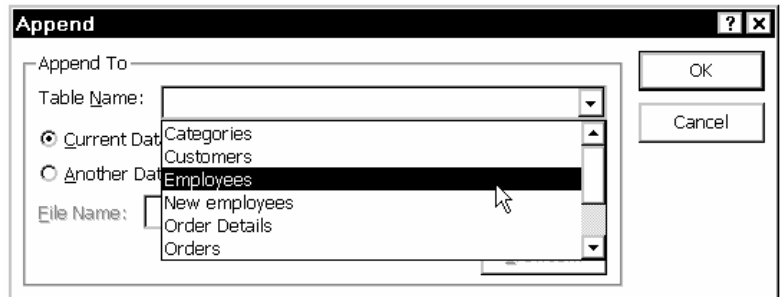
Close the table and then follow the steps below to create and run an Append query to append the data in New Employees to the Employees table.

- i) Create a Select query to select the fields of the records you want to append (from New Employees) to the target table (Employees)

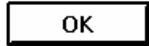
- ii) Click  to check the dynaset and ensure they are the right records

- iii) In Design view, **Query > Append**

This gives the **Append** dialog box, which is shown on the right



- iv) Select from the drop-down list box the table that you want to append to, in this case the Employees table

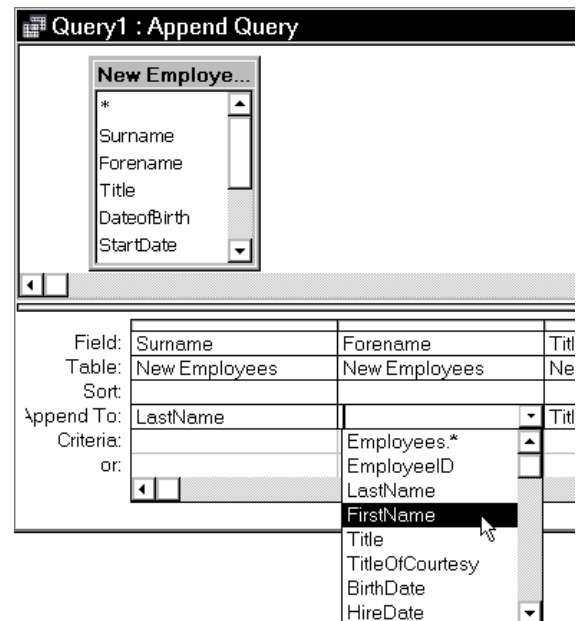
- v) Click . Access adds the **Append To** row to the QBE grid


- vi) In the **Append To** row, select the field names from the table you are appending to, matching them to the fields in the **Field** row.


Field names do not have to be the same in each table. It is what they contain that counts.


Access automatically displays the field names if they are the same.

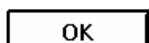
The **Append To** row must have the same number of fields as the **Field** row



- vii) Click  to view the records that will be appended

- viii) Click  to return to Design View and make any adjustments required

- ix) Click . Access displays a confirmation box that says how many records will be added

- x) Click  to run the query

Parameter queries

These are queries in which Access prompts for the criteria when the query runs.


Exercise 7

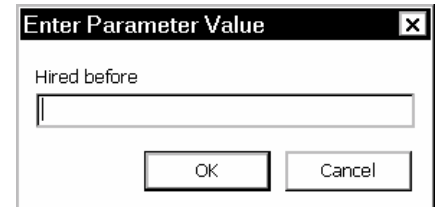
Follow the steps below to create a parameter query which displays the names and title of Employees who were hired before a given date.

- i) Create a Select query.
- ii) In the **Criteria** row, enter expressions as usual but in place of values put the prompt you want to appear in the dialog box, enclosed in square brackets:

Field:	FirstName	LastName	Title	HireDate
Table:	Employees	Employees	Employees	Employees
Sort:				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:				<[Hired before]
or:				

Do not use the field name by itself as the prompt. You can have multiple prompts.

- iii) Click  to test the query. The Enter Parameter Value dialog box is displayed. Type in the value you want to select on and click OK.



The dialog box titled "Enter Parameter Value" has a text input field containing "Hired before" and two buttons: "OK" and "Cancel".

Exercise 8

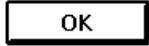
1. Use the query you just created to select the people hired before 1/1/93
2. Check your results

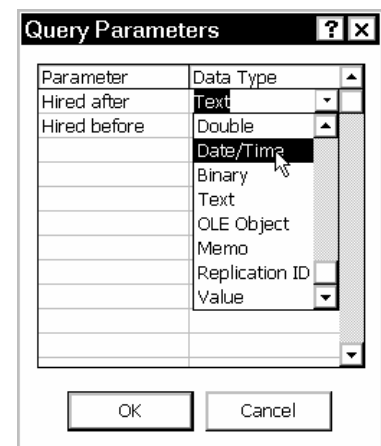
More complex Parameter queries

You can specify combinations of parameters using operators such as Between...And, And, Or. You can also set Query Parameters so that Access will detect bad data at an early stage.

Exercise 9

Follow the steps below to create and run a parameter query to select those hired between 1/1/92 and 2/2/93

- i) Create the same query as above but set the Hire Date criteria to Between [Hired after] And [Hired before]
- ii) **Query Parameters**
- iii) Under **Parameter** in the Query Parameters dialog box, type the same text as in the **Criteria** row, without the brackets, for each parameter.
- iv) Under **Data Type**, select or type the data type of the field. The drop-down list includes some data types for use with attached tables (including some from other database systems). Click  when done
- v) Run the query, providing data when prompted.



The dialog box titled "Query Parameters" has a table with two columns: "Parameter" and "Data Type".

Parameter	Data Type
Hired after	Text
Hired before	Double
	Date/Time
	Binary
	Text
	OLE Object
	Memo
	Replication ID
	Value

Buttons: OK, Cancel

Note: Steps (ii) - (v) are not essential for the query to work. What they will do is give you a sensible message if you enter inappropriate data.

Querying more than one table

The Northwind Traders database provided for this course contains 8 tables.

Although all these tables are physically separate, the data they contain are related and one would often want to work with data from more than one table.

Customers
Customer ID
Company Name
Contact Name
Contact Title
Address
City
Region
Postal Code
Country
Phone
Fax

Orders
Order ID
Customer ID
Employee ID
Ship Name
Ship Address
Ship City
Ship Region
Ship Postal Code
Ship Country
Ship Via
Order Date
Required Date
Shipped Date
Freight

Order Details
Order ID
Product ID
Unit Price
Quantity
Discount

Products
Product ID
Supplier ID
Category ID
Product Name
English Name
Quantity Per Unit
Unit Price
Units In Stock
Units On Order
Reorder Level
Discontinued

Suppliers
Supplier ID
Company Name
Contact Name
Contact Title
Address
City
Region
Postal Code
Country
Phone
Fax

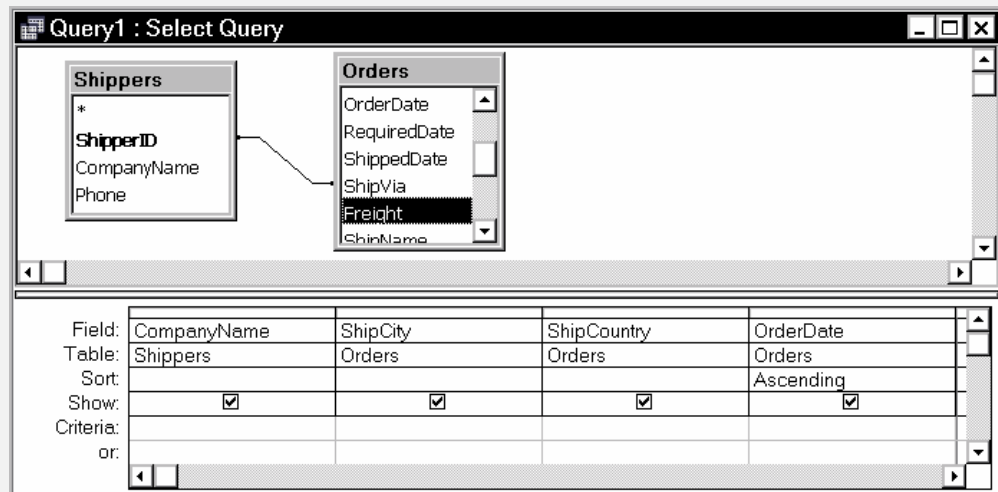
Shippers
Shipper ID
Company Name

Employees
Employee ID
Last Name
First Name
Title
Birth Date
Hire Date
Address
City
Region
Postal Code
Country
Home Phone
Extension
Photo
Notes
Reports To

Categories
Category ID
Category Name
Description
Picture

Exercise 10

- Create a Select query and add the Shippers table and the Orders table
- Enter on the QBE grid CompanyName, ShipCity, ShipCountry and OrderDate
- Set the Sort attribute for Order Date to Ascending
- Run the query and observe the results
- Scroll down the Orders field list until it shows the Ship Via field. Then drag the Shipper ID field from the Shippers field list onto the Ship Via field in the Orders field list so that a line appears between them as shown below:



The line represents a *join* between the two tables. If you need to remove the join, click it once and press the Delete key.

- Run the query again and observe the difference in the results this time
- Close the query and save it as Shipping Details

Crosstab queries

This type of query is used to summarise data in a row and column format. Access has a Crosstab Query Wizard which makes the task very straightforward.

Exercise 11

Follow the steps below to create and run a Crosstab query which summarises data from the previous query in a convenient tabular form.

i) In the Database window, choose **Query** then **NEW** then click Query Wizards

ii) Choose the Crosstab Query wizard and then click **Next >** to get the dialog box on the right

Crosstab Query Wizard

Which table or query contains the fields you want for the crosstab query results?

To include fields from more than one table, create a query containing all the fields you need and then use this query to make the crosstab query.

Categories
Customers
Employees
New Employees
Order Details
Orders
Products
Shippers
Suppliers

View
 Tables Queries Both

Sample:

	Header1	Header2	Header3
	TOTAL		

Cancel < Back Next > Finish

iii) In the **View** frame, click the Queries button to show the queries that are available as in the dialog box on the right.

iv) Select the Shipping Details query and then click **Next >** to go to the next stage.

Crosstab Query Wizard

Which table or query contains the fields you want for the crosstab query results?

To include fields from more than one table, create a query containing all the fields you need and then use this query to make the crosstab query.

Parameter
Shipping Details

View
 Tables Queries Both

Sample:

	Header1	Header2	Header3
	TOTAL		

Cancel < Back Next > Finish

v) To specify the field (Company Name) that you want for row headings, click on its name, click > to put it in the Left-most columns frame (see the picture on the right) and then click **Next >** to go to the next stage.

Crosstab Query Wizard

Which fields' values do you want as row headings?

You can select up to three fields.

Select fields in the order you want information sorted. For example, you could sort and group values by Country and then Region.

Available Fields:
Ship City
Ship Country
Order Date

Selected Fields:
Company Name

Sample:

Company Name	Header1	Header2	Header3
Company Name1	TOTAL		
Company Name2			
Company Name3			
Company Name4			

Cancel < Back Next > Finish

- vi) Select the field (Ship Country) which you want to provide the column headers (see the picture on the right) and click **Next >** to go to the next stage.

Crosstab Query Wizard

Which field's values do you want as column headings?
For example, you would select Employee Name to see each employee's name as a column

ShipCity
ShipCountry
OrderDate

Sample:

CompanyNan	ShipCountry1	ShipCountry2	ShipCountry3
CompanyNan	TOTAL		
CompanyNan			
CompanyNan			
CompanyNan			

Cancel < Back Next > Finish

- vii) Select the field which you want to provide the values(see the picture on the right) and then choose the Function to use. In this case choose Count. Note that since Count only counts the records, any field could be specified.

Crosstab Query Wizard

What number do you want calculated for each column and row intersection?
For example, you could calculate the sum of the field Order Amount for each employee (column) by country and region (row).

Fields:
ShipCity
OrderDate

Functions:
Count
First
Last
Max
Min

Do you want to summarize each row?
 Yes, include row sums.

Sample:

CompanyNan	ShipCountry1	ShipCountry2	ShipCountry3
CompanyNan	Count(OrderDate)		
CompanyNan			
CompanyNan			
CompanyNan			

Cancel < Back Next > Finish

- viii) Click **Next >** to go to the next stage.

- ix) In the box shown on the right, name the query and then click **Finish**. Access will display the dynaset.

Crosstab Query Wizard

What do you want to name your query?
Shipping Crosstab

That's all the information the wizard needs to create the query.

Do you want to view the query, or modify the query design?
 View the query.
 Modify the design.

Display Help on working with the crosstab query.

Cancel < Back Next > Finish

Because **Calculate Summary for Each Row** was left checked, the total for each row is shown. The layout of this data is not entirely satisfactory since the tabulation is much wider than it is deep, making it difficult to read. In the next steps you will rectify this.

- i) Switch to Design View and
change the Crosstab setting for Company Name to **Column Heading**
change the Crosstab setting for Ship Country to **Row Heading**
remove the **Row Summary** field from the QBE grid.
- ii) Run the query again

Note: You could have done this Crosstab and the Select query upon which it was based all in one go

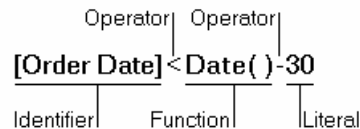
Expressions

Expressions are a fundamental part of many Access operations. You have already used expressions in queries as criteria or to update records. Shortly you will see how to use expressions to create calculated fields.

In general, an expression can include operators, identifiers, functions, literal values, and constants.

Element	Examples	Description
Operator	=, <, &, And, Or, Like	Indicates an operation to be performed on one or more elements
Identifier	[Order ID], [First name]	Refers to the value of a field
Function	Date, Sum, DLookup	Returns a value based on the results of a calculation or other operation. You can also create your own functions using Access Basic
Literal	100, #1-Jan-92#, "New York"	Represents a value that doesn't change
Constant	True, False, Yes, No, Null	Represents a value such as a number, string, or date that Access evaluates exactly as written

This shows an expression and its parts:



The elements of an expression that an **operator** acts upon are called **operands**.

In this expression, `Date()` and `30` are operands of the `-` operator.

`[Order Date]` and `Date()-30` are operands of the `<` operator

Using a Builder to build expressions

You can often use the Expression Builder by clicking  if it is available. You will do an example involving this on the next page.

Entering field names

When you type a field name in an identifier, it is good practice to surround it with brackets, although sometimes Access will do it for you. Eg, the following expression calculates the sum of the Freight and Order Amount fields:

`=[Freight]+[Order Amount]`

Entering text

Quotation marks around an element of an expression indicate that the element is text. In a validation or Criteria expression, put the text in quotation marks if it contains a space or punctuation. If it doesn't, type the text without quotation marks and Access will insert them. Eg, if you type Quotation, Access displays "Quotation".

Using calculated criteria

Exercise 12

List all Products whose Units in Stock value is less than the Reorder Level

How to do it

- i) Start a new query on the Products table
- ii) Put the Product Name field, the Units in Stock field and the Reorder Level field onto the QBE grid
- iii) Set the **Criteria** cell for Units in Stock to the appropriate value (if you want to see what to use, look at the footnote¹) and run the query

Creating a calculated field (in a single record) in a query



You can define calculated fields to perform numeric and date calculations or to combine several values in a Text field.

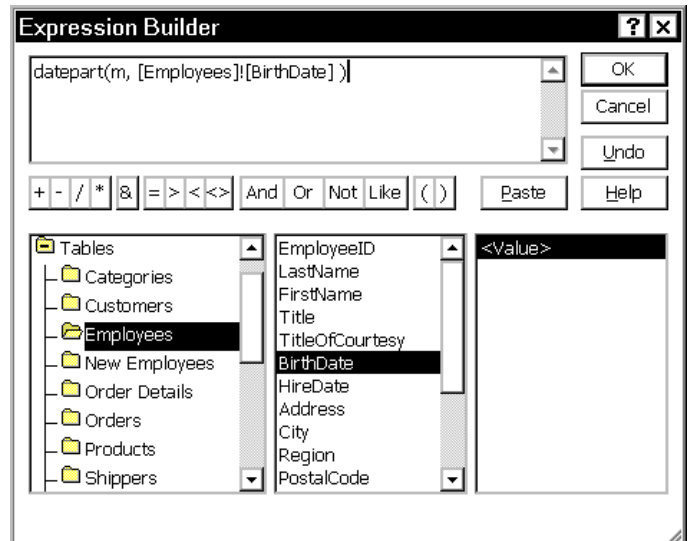
Exercise 13

Use the DatePart function to produce a list of Employees born in March

How to do it

This activity includes use of the Expression Builder. The DatePart function extracts part of a date from a date field.

- i) Start a new query on the Employees table
- ii) Put the First Name field, the Last Name field and the Date of Birth field onto the QBE grid
- iii) Click in the **Field** cell for the first blank column
- iv) Type in datepart(followed by the *Interval* setting in double quotes followed by a comma. Possible values for *Interval* include yyyy=Year, m=Month, d=Day. For more information, open Help and search for DatePart
- v) Click  to start the **Expression Builder** (see right)
- vi) Double-click Tables, then Employees, then Birth Date. This will put the correct field reference into the function. Click  then click **OK**. If a field name is omitted, Access enters "ExprN", where N=1,2,... You can rename the field by replacing ExprN. You could enter the name and the expression all in one go.
- vii) If you want to see what the final expression should be, look at footnote.²
- viii) Enter 3 into the **Criteria** cell
- ix) Run the query



NOTE that steps (v) and (vi) are not essential. The field reference may be entered from the keyboard.

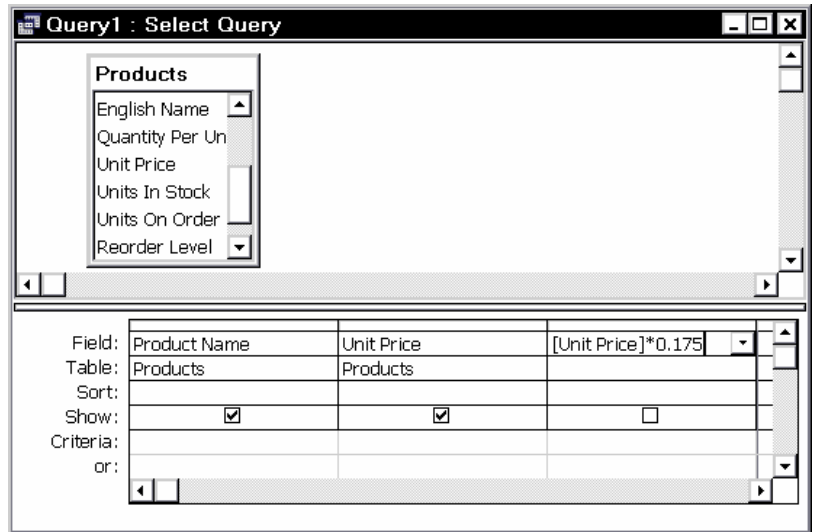
¹ <[Reorder Level]

² DatePart("m",[Birth Date]). If you would like to know more about this function, look it up in Help.

Exercise 14

Follow the steps below to calculate and show the VAT for all products

- i) Type the expression to do the calculation you want into an empty cell in the field row:



- ii) Press **Enter** and note how Access changes what you just typed in.

- iii) Click in the field you just typed in and then press Shift+F2 to open the **Zoom Box**:



- iv) Replace Expr1 with VAT

- v) Run the query

Exercise 15

- i) For all orders, display the Customer ID and the number of days between the date of the order and the date it was shipped
- ii) Display only the orders for which the number of days is greater than 20
- iii) Display a list of Employees sorted on Last Name and showing their full name in one field. There is a hint in the footnote³

Notes

In general, field names in a calculated field must be in one of the tables added to the query but they don't have to be on the QBE grid.

Data in a calculated field cannot be added or edited in the datasheet or form. Values in calculated fields are updated automatically when values in fields used in the expression are updated.



³ use the & operator to concatenate the name fields with a space between them, ie [First Name]&" "&[Last Name]

Calculating totals in a query

A query can calculate totals for all records or groups of records. Access calculates "totals" based on the aggregate function selected in the Total row of the QBE grid. The possible aggregate functions are: Sum, Avg, Max, Min, Count, First, Last, StDev and Var.

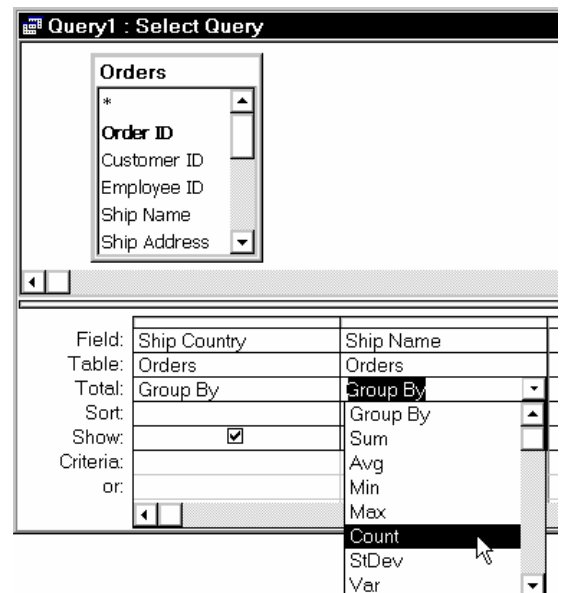
Exercise 16

Follow the steps below to show the number of orders destined for each country

- i) In the Tables tab of the **Database** window, click once on Orders
- ii) **Insert**  **Query** and click **OK**
- iii) Click  to add the **Total** row to the grid.
- iv) Drag onto the grid only those fields for which you want to calculate totals, define groupings, and specify criteria, in this case Ship Country and Ship Name (this could be any other field: it is just for counting)
- v) Select an option in the **Total** row for every field in the grid.

In this case, leave Ship Country as **Group by** and select **Count** for Ship Name

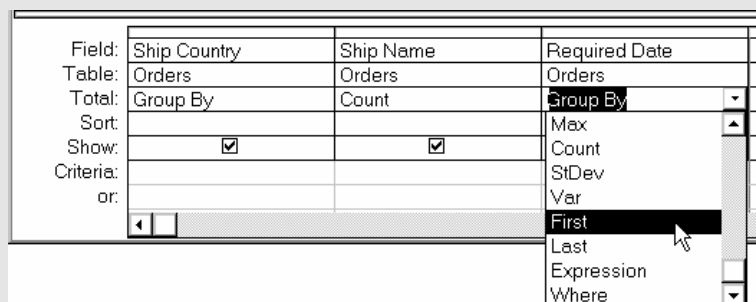
- vi) Run the query
- vii) Save the query as Count Shipments



Exercise 17

Now modify the query as shown on the right to display the first Required Date for each country.

Save the query as First Required Date



Exercise 18

Add another field to the query to show the average freight charge for each country. Save it as Average Freight Charge.

Specifying criteria when calculating totals

You can select on any of the types of criteria.

To limit the groups that are selected, specify the criteria in the **Group By** fields.

Exercise 19

Change the Average Freight Charge query to exclude France, Germany, Spain, UK and USA from the results. Save the query as Not France etc

To return only selected totals values, specify the criteria in the **Total** column itself (the field in which you select an aggregate function).

Exercise 20

Change the Not France **etc** query to show results only for countries where the number of shipments is less than 40. Save the query as Shipments < 40

To limit the records on which the calculation is performed, use the **Where** option in the **Total** row. To specify criteria for the same field used to calculate totals drag it down a second time. To specify criteria for other fields drag them down and select **Where** in the **Total** row.

Exercise 21

Change the Shipments < 40 query to show results only for shipments where the Freight charge is greater than 100. Save the query as Freight > 100

NOTES *Where* criteria are evaluated before calculations are performed. Access always hide fields for which *Where* is selected by clearing the check box in the Show row.