Crosstab Queries

A Crosstab Query is a special kind of query that summarizes data by plotting one field against one or more other fields. Crosstab Queries can handle large amounts of data with ease and are very easy to create.

Suitable Data for a Crosstab Query

A Crosstab Query requires at least three fields to work with, one of which should be either numeric (so that its values can be calculated) or suitable for counting (i.e. to count the number of records). Here’s a typical example (Fig. 1):

This table holds details of grain shipments. Each record has, in addition to the primary key field CargoID, four fields one of which (Tonnes) is numeric. The other fields (ShippingDate, Origin and Commodity) all describe the shipment and can be used to plot the data. A typical Crosstab Query on this data might produce a result like this (Fig. 2):

How the Crosstab Query Works

When creating a Crosstab Query you must nominate one field as a Column Heading and up to three fields as Row Headings. You must also nominate a field whose values will be summarized. When you run the query Access looks through the data in the Column Heading field. For each unique value that it finds it creates a column and uses the value for the column heading. It also looks through the data in the Row Headings field and creates a row for each unique value that it finds, using that value as the row heading. If more than one field were nominated as row headings a row is created for each combination of unique values found.

The column headings are arranged across the top of the resulting datasheet. The row headings are arranged down the left-hand side.

In this example (Fig. 2) the Commodity field was set as the Column Heading. Access found six unique values in the Commodity field so it created six columns on the datasheet. The Origin field was set as the Row Heading. Access found five unique values in the Origin field so it created five rows on the datasheet.

The Tonnes field was chosen to be summarized so its values appear at the intersections of the columns and rows. The Sum option was chosen so the values displayed are the totals for each combination of values.
Crosstab Query Limits

You can nominate up to three fields as row headings but only one field as a column heading. The maximum number of columns that Access can display is 255 (including those used to display the row headings). It cannot execute a Crosstab Query where the number of unique values in the nominated column heading field would require it to exceed this value (Fig. 3).

![Image of Access warning]

*Fig. 3 Access warns that there are too many unique values.*

Building a Crosstab Query

Access provides a wizard for creating Crosstab Queries. There is no need to describe it here. To use the wizard go to the **Queries** section of the Database Window click the **New** button, or choose **Insert > Query**, and choose **Crosstab Query Wizard** from the **New Query** dialog.

To create a Crosstab Query manually, go to the **Queries** section of the Database Window and double-click **Create query in Design view** to open the query design window and add the table or tables containing the data you want to summarize. Click the down-arrow next to the **Query Type** button on the query design toolbar and choose **Crosstab Query** form the menu (Fig. 4). Alternatively choose **Crosstab Query** from the **Query** menu.

![Image of query design grid]

*Fig. 4 Select Crosstab Query from the Query Type menu.*

When you do this, two new rows appear in the query design grid labelled **Total** and **Crosstab**. Decide which field you want as a row heading and bring it into the design grid (e.g. by double-clicking its name in the field list). By default Access inserts **Group By** in the **Total** row. Click in the **Crosstab** row and choose **Row Heading** from the list (Fig. 5). Now choose a field for the column headings and add it to the grid, entering **Column Heading** in the **Crosstab** row (Fig. 6).

![Image of query design grid with row heading selected]

*Fig. 5 Select the Row Heading.*

![Image of query design grid with column heading selected]

*Fig. 6 Select the Column Heading.*

Add the field to be calculated and change the value in the **Total** row to the calculation you want to perform (Fig. 7) and the **Crosstab** row to **Value** (Fig. 8).
Access now has enough information to run your Crosstab Query. The settings described here produced the result shown earlier (Fig. 2). Crosstab Queries can be refined in several ways...

Adding Criteria

As with a regular query you can filter the data by supplying criteria. For the fields designated as row or column headings, do this in the normal way by entering values or expressions in the **Criteria** row of the query design grid (Fig. 9). The **Value** field does not accept criteria.

To filter by a field whose data you don't want to appear in the result, add the field to the query design grid, enter your criteria as usual, and set the **Total row** to **Where**. The **Crosstab** row should be left empty (to clear it you can choose (not shown) from the list) (Fig. 10).
Multiple Row Headings

You can nominate up to three fields as row headings. They can be existing data or new, calculated fields as shown in this example (Fig. 11) in which a Year field has been created by extracting the year from the ShippingDate field.

The relative positions left to right of the row heading fields in the query design grid control the arrangement of the data on the resulting datasheet (Fig. 12).

As you would expect, Access creates columns only for the data it finds in the column heading field. It also omits rows for which there is no data. This is more apparent when working with more than one row heading field, especially when filtering the data. In the next example the Commodity field has been filtered to display just one of the commodities. Since this commodity has only a small number of records fewer rows are displayed (Fig. 13):
Sorting the Columns and Rows

By default Access sorts the row headings in ascending order (A-Z). If you prefer you can have the query sort these fields in descending order in the normal way by entering Descending in the Sort row of the query design grid. Since the columns are created from the data itself the same option does not apply. Access will sort the columns in ascending order from left to right across the datasheet unless you specify otherwise. This is unlikely to be a problem unless, for example, you are working with items which have a recognised but non-alphanumeric order such as day or month names.

Here the ShippingDate field, used as the column heading, has been formatted to show the name of the month (Fig. 14):

Fortunately Access allows you to specify the order in which you want the column heading items to appear. In design view right-click in the upper part of the query design window and choose Properties. In the Query Properties dialog you will find a textbox labelled Column Headings. Enter a list of column heading items in the order in which you want them to appear. Enclose each item in quotes and separate the items with commas (Fig. 16). When you run the query the columns will be displayed in the order you specified.

Be careful to spell each item correctly and to include all the columns you want to see. Access will only display columns for those items included in your list. If your list includes an item which does not occur in the data the column will still be displayed, but will contain no data (this is useful if you want your query always to display the same set of columns regardless of the data returned).
In this example a list of months in the correct order has been entered into the Column Headings property of the Query Properties dialog (Fig. 16) ensuring that the resulting datasheet displays the month columns in the required order (Fig. 17):

Adding a Totals Column

In addition to the columns that the query creates you can add one or more calculated fields summarising the values shown in each row. For example you might want to add a column showing a grand total of the value from all the columns in each row.

To do this enter an expression in the Field row of a new column in the query design grid. The expression should include a name for your new field (if you omit this Access will create one) followed by a colon (:) and the name of Value field (for example: **Total Tonnes**: **Tonnes**). In the Total row choose a calculation from the list (choose **Sum** to see a total of the values) and in the Crosstab row enter **Row Heading**. You are probably thinking that this should be a column heading but, as I mentioned earlier, you are only allowed one of them. Don’t worry, Access will understand what you mean.

In this example two summary columns have been created (Fig. 18), one using **Sum** to create a total for each row and another to show averages (Fig. 19).
More Ideas for Crosstab Queries

Now that you have built your crosstab query you will probably want to do something with the result. Here are some ideas.

Take a Snapshot of the Data

The Crosstab Query has essentially created an entirely new dataset with new fields that were not present in the original data. You might find it useful to preserve this dataset for other purposes. To do this close and save the Crosstab Query then create a new query based on it. Add all the fields to the query design grid then change your new query to a Make Table query (Query > Make Table Query). When you run the new query it will create a new table from the data with each column of data in the Crosstab Query becoming a field in the table (Fig. 20).

Export the Data to Excel

Data is often stored in an Access database because of the large volumes it can handle, and the speed with which it can create a summary with tools like the Crosstab Query. But you might prefer to work with your summarized data in another program such as Excel. Exporting the data is very easy. Open the Crosstab Query and choose Tools > Office Links > Analyze It with Microsoft Office Excel. This handy tool exports the recordset as an Excel workbook (Fig. 21).

The workbook will already have been saved, using the query's name for the file and worksheet names, into the Default database folder, usually My Documents. You can change the default save location from Tools > Options > General in Access.