

PrincetonUniversity



Office of Information Technology

Access 2007

Query Design

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Basic Queries

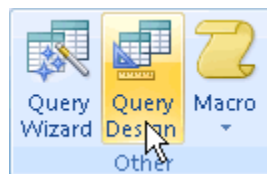
Queries are the second most important objects in a database (next to tables) because they have the ability to find information for you.

As a quick review, a query is a question that is asked of the data in a database. Although they are a structured piece of computer code, they are no more difficult than merely asking a question like, “How much did salesperson X sell in seafood products last year?” Queries primarily get their data from tables; however, a query can extract information from another query as well.

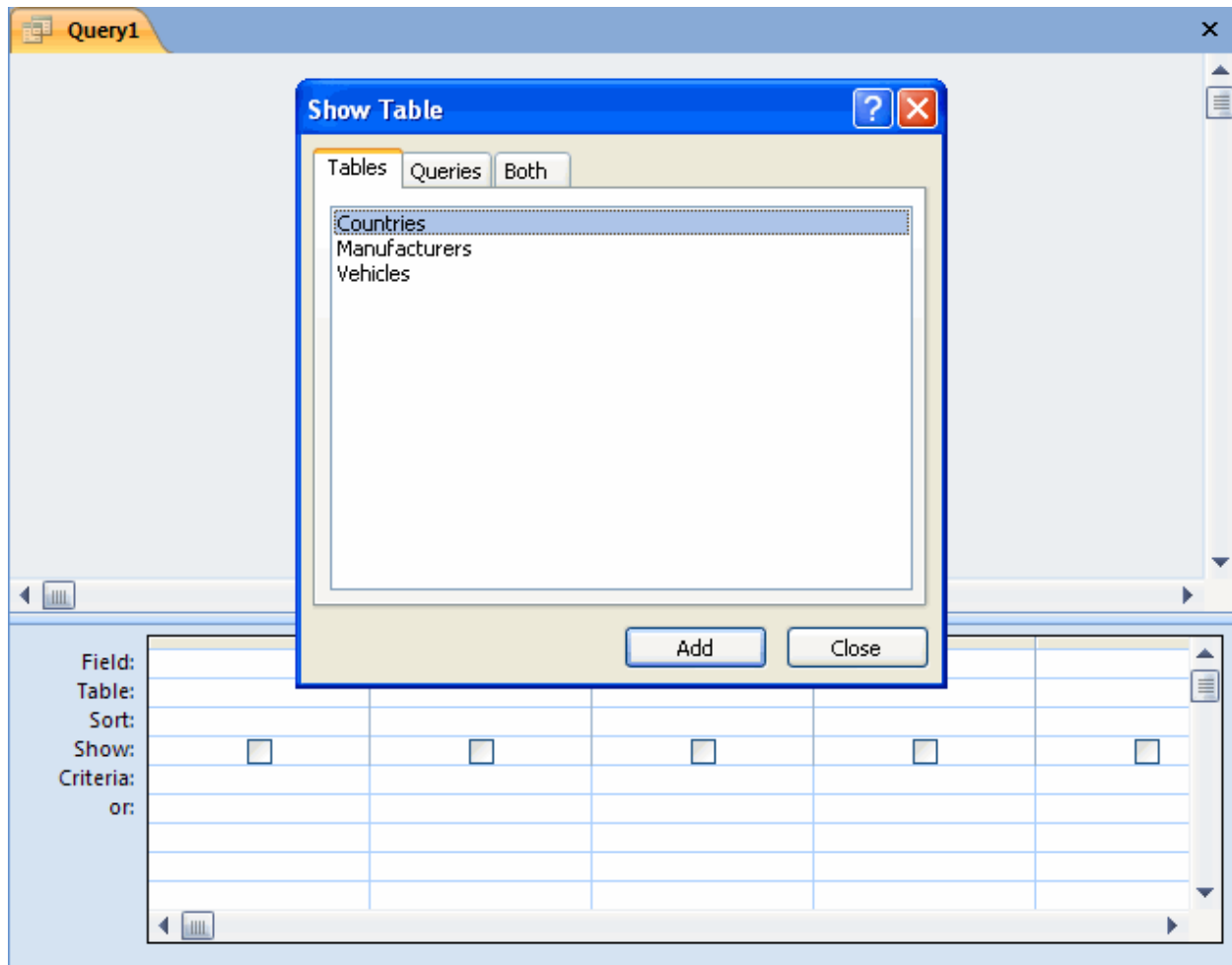
Most queries are called select queries; they search for information in your database based on criteria you specify. There is another category of query called an action query that is designed to insert new data into a new table, delete old data from a table, or append to data already in a database based on criteria.

Creating a Query

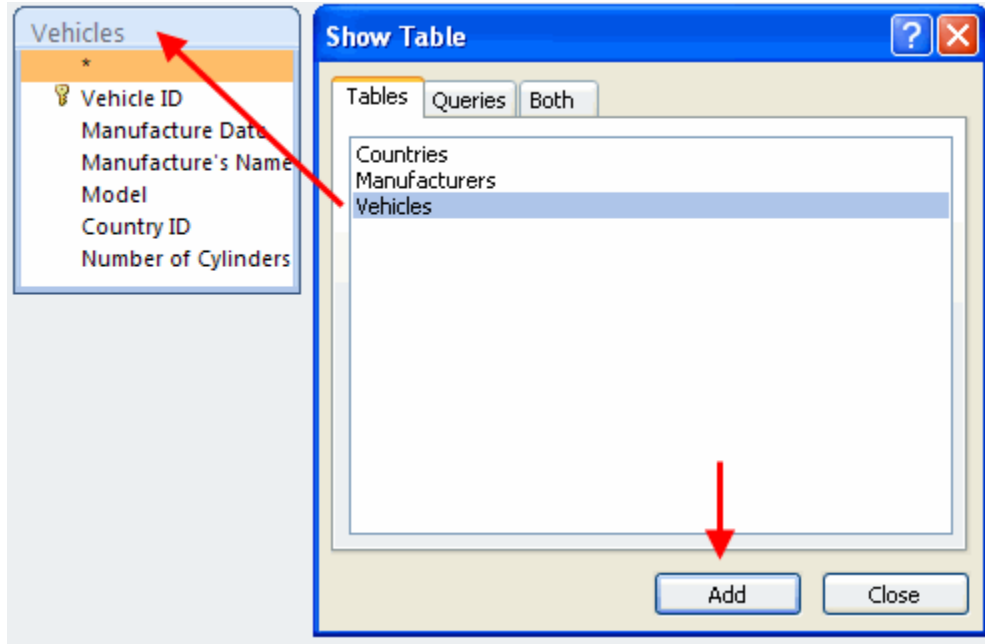
To start working with a new blank query, click the Query Design command:



Query Design view will open with the Show Table dialogue box.

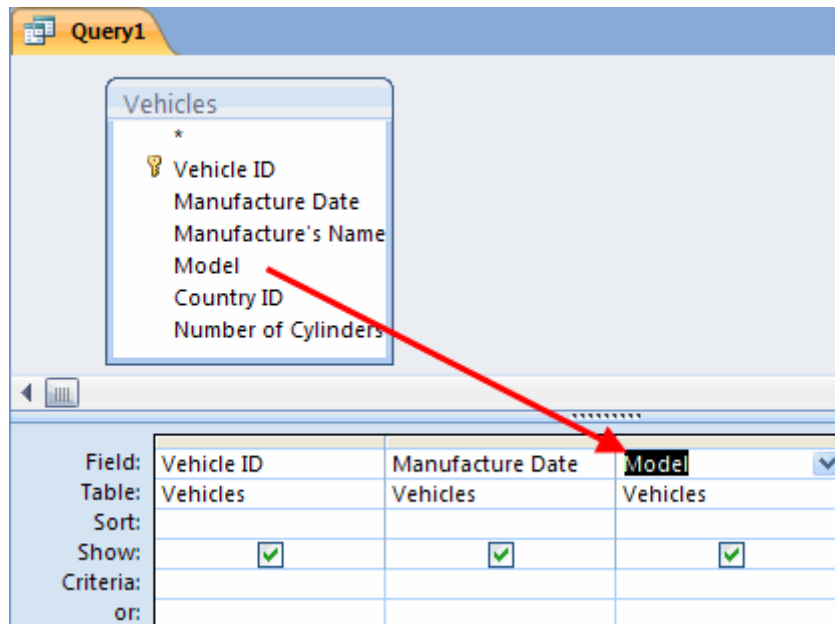


Using this box, add as many tables and/or queries as you need to get the information relevant to your query. Select each necessary object and click Add.



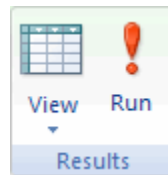
The source table will be added to the working space, with each field in the table listed. The primary key of the table contains a small key icon beside it. When you have finished adding the objects relevant to your table, click Close.

To add fields to your query, simply click and drag the fields from the tables to the areas provided in Design view:



You also have the ability to add certain search criteria, choose whether a field will be shown in the query results, add additional search criteria, and more. We will explore more of Design view's functionality later in this section.

To execute the query, click the Run command in the Results section of the Query Tools - Design ribbon:



The results will be displayed in Datasheet view:

Vehicle ID #	Manufacture Date	Model
	1982	Corvette
2	2003	V12 Vanquish
3	2000	S2000
4	2003	Tiburon
5	2002	575 Marinello
6	1979	Spider
7	1965	Falcon
8	2005	GT
* (New)		

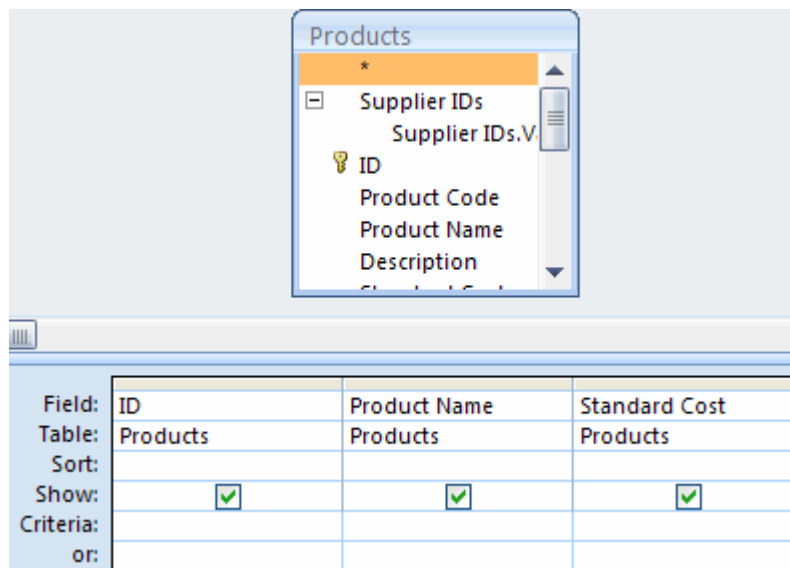
Using AND OR Operators

When dealing with AND and OR operations, it is important to understand how they work on a logical level. These operators require two pieces of input and produce one output, either true or false.

The AND operation is perhaps the easier to understand. Both conditions of AND must be satisfied in order to produce a true result. For example, if you are making a cake, you need to have wet and dry ingredients mixed together. If you have wet and no dry, or dry and no wet, or neither, you cannot make a cake.

The OR operation is true as long as one condition is true. Let's say you want to go and see a movie, but you will only go if you have at least one friend to go with. You ask Alice and Bob if they want to come. If Alice and Bob can both come, then you will go to the movies. If Alice can make it but Bob can't, you will go, and vice versa. If neither Alice nor Bob can go to the movies, you are not going to go either.

The best place to apply AND/OR operators directly is using Design view of a query (or query results). Let's take a look at the Design view for the simple products query we have been using:



We would like to see the products that cost either \$7.50 or greater than \$12.75. To calculate this, specify the criteria in the Standard Cost field of the Products Query:

Field:	Standard Cost
Table:	Products
Sort:	
Show:	<input checked="" type="checkbox"/>
Criteria:	=7.5
or:	>12.75

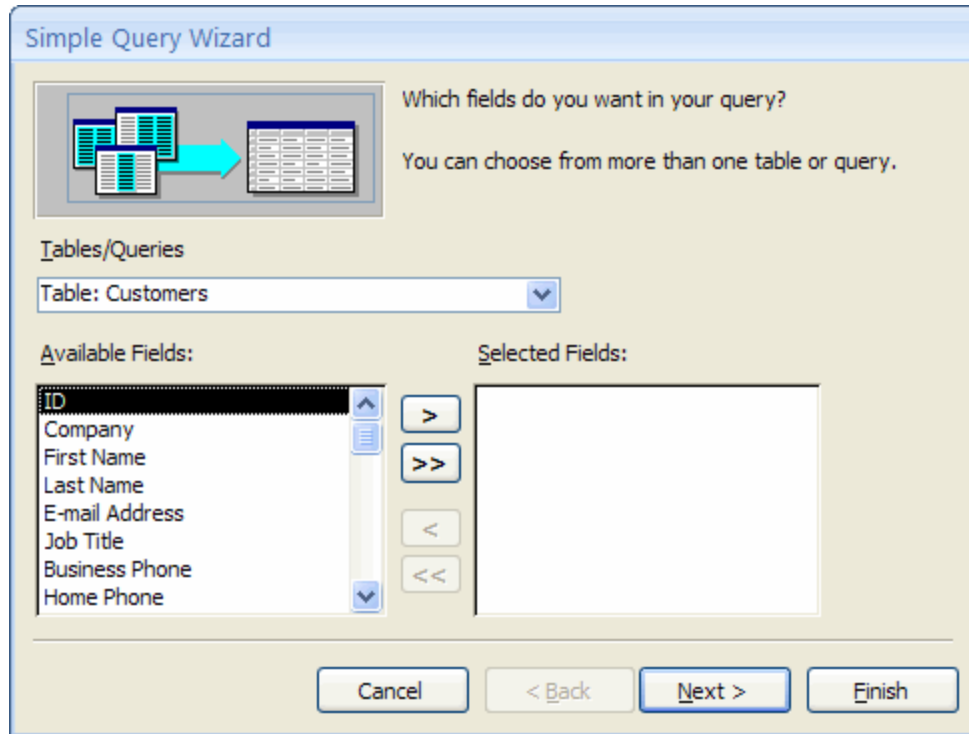
Each successive condition you enter in the column is called a where clause; you can add several where clauses to help find more specific values. For example, if you own a company and lost the paper copy of an invoice, and you knew that the total was \$960, entering the =960 criteria will consider only those records that match. When designing queries or filtering criteria that use AND operations, you essentially add more fields to a query and give each one a specific criteria. For example, if you know that the missing invoice was \$960 and sold by Salesperson A, enter the exact criteria into Design view.

Should you not get the results you were looking for, don't resort to merely trying different criteria that don't make sense to your situation. Think it out and ask why it isn't working or giving you the results you thought you should be getting. Another option for troubleshooting queries is to clear all of the criteria in your query and add it back one condition at a time. Make sure that before adding another field, the results of the previous query are accurate for your purposes.

Multiple Table Queries

The most indispensable quality of a database management program is its ability to query many tables at once. Database programs or third-party middleware are used to not only query multiple tables of data, but multiple databases as well. In this lesson we will cover some of the more advanced procedures that can be used in Access.

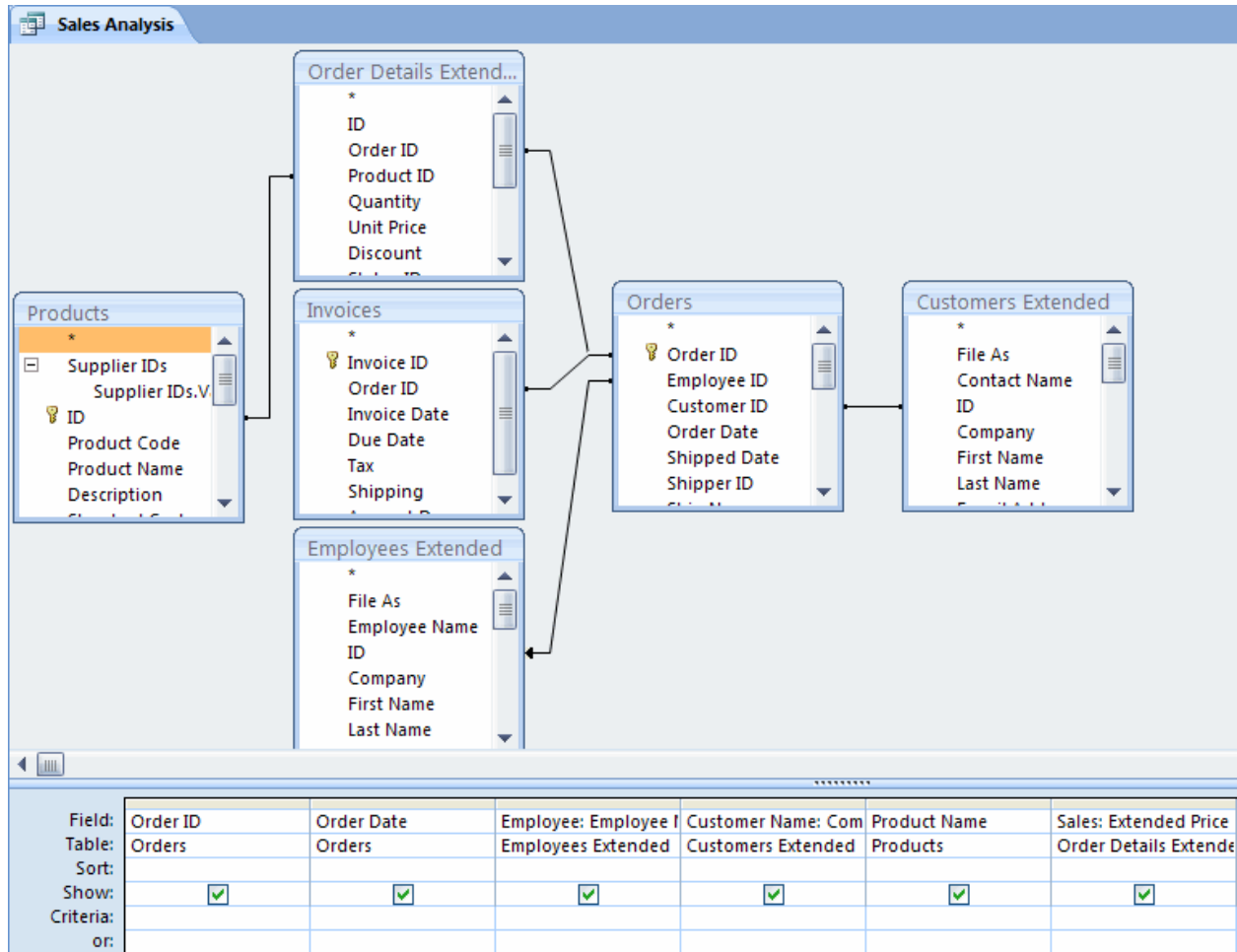
We have already seen a few multiple-table queries, including one in the last Step-By-Step exercise. The easiest way to make use of multiple table queries is to use the query Wizard:



The first page of the Wizard lets you specify what fields and data you want considered in your query. Choose the table(s) or existing query(s) you want to extract data from by using the Tables/Queries combo box. Then highlight the fields you want from the Available Fields list and click either (>) to transfer a single highlighted field or (>>) to transfer all fields in the current table or query to the Selected Fields list.

At times it may seem that you have almost too many fields. Don't worry – there are occasions where many fields are needed in order to calculate some values using a query. If you didn't include enough fields, you will not be able to successfully extract the information you need.

Once you have selected all the fields you want, click the Finish button in the Wizard. This will use the standard features of a query and allow you to either run the query right away or enter Design view. Consider the Design view of the Sales Analysis query from the Northwind sample database:



This query alone features 19 fields from 6 tables of information! If more fields are needed from any of the related tables, simply drag and drop any field listed in the tables into any field of Design view. Though every field has a purpose in this query, not every one needs to be displayed. Once the query results are shown, you can choose to hide a number of columns that are not necessary to view for your sales results.

Creating a Calculated Field

You likely recall our discussion of calculated controls inside a form and report. You can also have calculated fields in a query as well that will perform some calculation based on the data that was extracted from the query.

Consider the following simple query that extracts the product ID, Product Name, and Standard Cost fields from the Products table:

ID	Product Name	Standard Cost
1	Northwind Traders Chai	\$13.50
3	Northwind Traders Syrup	\$7.50
4	Northwind Traders Cajun Seasoning	\$16.50
5	Northwind Traders Olive Oil	\$16.01
6	Northwind Traders Boysenberry Spread	\$18.75
7	Northwind Traders Dried Pears	\$22.50
8	Northwind Traders Curry Sauce	\$30.00


With fuel and administration costs rising, it is necessary to increase the prices of the products by 5%. Rather than make a report of this query and figure them out by hand or by some other means, Access allows you to make a calculated field right inside a query. Open the query in Design view and then enter the expression `= [UnitPrice] * 1.05` in the next available column:

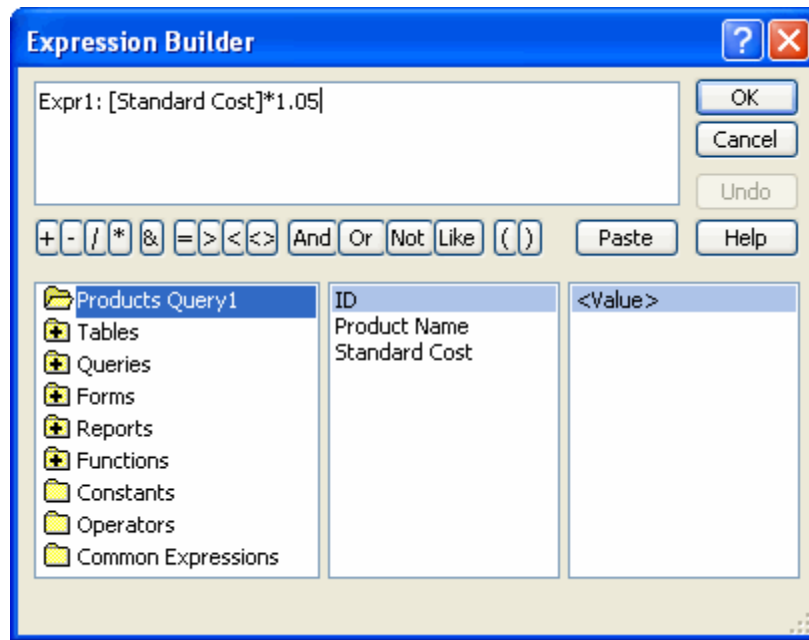
[Standard Cost] Products	Expr1: [Standard Cost]*1.05
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Access names each expression Expr1, Expr2, etc. This will become the column header for the new data that is calculated by the expression. Make sure you also check the Show check box so Access will actually display the data. Once you have built your expression, click the Run command to perform the query:

ID	Product Name	Standard Cost	Expr1
1	Northwind Traders Chai	\$13.50	14.175
3	Northwind Traders Syrup	\$7.50	7.875
4	Northwind Traders Cajun Seasoning	\$16.50	17.325
5	Northwind Traders Olive Oil	\$16.01	16.813125
6	Northwind Traders Boysenberry Spread	\$18.75	19.6875
7	Northwind Traders Dried Pears	\$22.50	23.625
8	Northwind Traders Curry Sauce	\$30.00	31.5

Using the Expression Builder

If you do not feel comfortable building expressions by hand or you want to build some more complicated expressions, Access contains a full-featured expression builder. When in Design view, either right-click in a field where you want to place an expression and then click Build or click the Builder command ( Builder) in the Query Tools - Design ribbon:



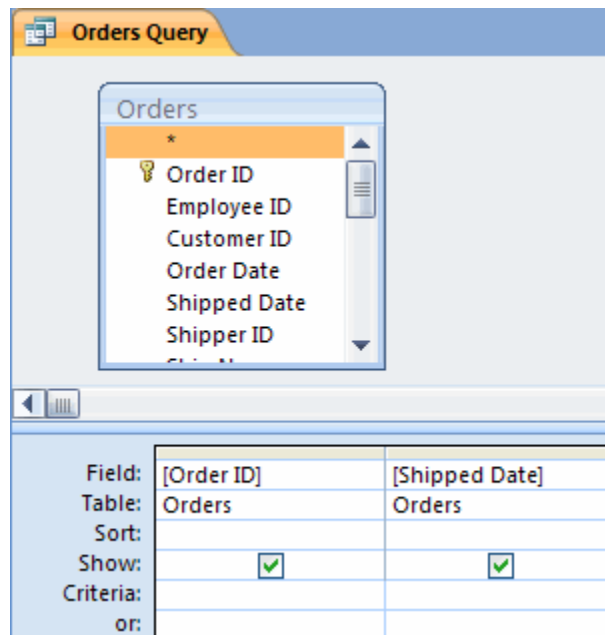
At the top of the Expression Builder dialogue box is the expression itself. This is a completely editable text box that lets you type whatever operators you wish by hand. The buttons beneath the expression insert symbols to add, subtract, multiply, divide, and compare. You can use logical operators like AND, OR, NOT and LIKE, as well as use parenthesis to enclose certain parts of your expression and ensure proper order of operation.

Underneath the buttons are listings of all objects currently in your database. Browse through these files just like they were files and folders on your computer: double-click a folder with a (+) to see all objects in that category and extract the values you need. Double-click the folder again (an open folder is denoted with a minus sign) to collapse it.

The last three folders in the far left column (Constants, Operators, and Common Expressions) contain more mathematical and logical operators which you may need to build more complicated expressions. The Common Expressions folder lets you even include page numbers, date, and time into the expression.

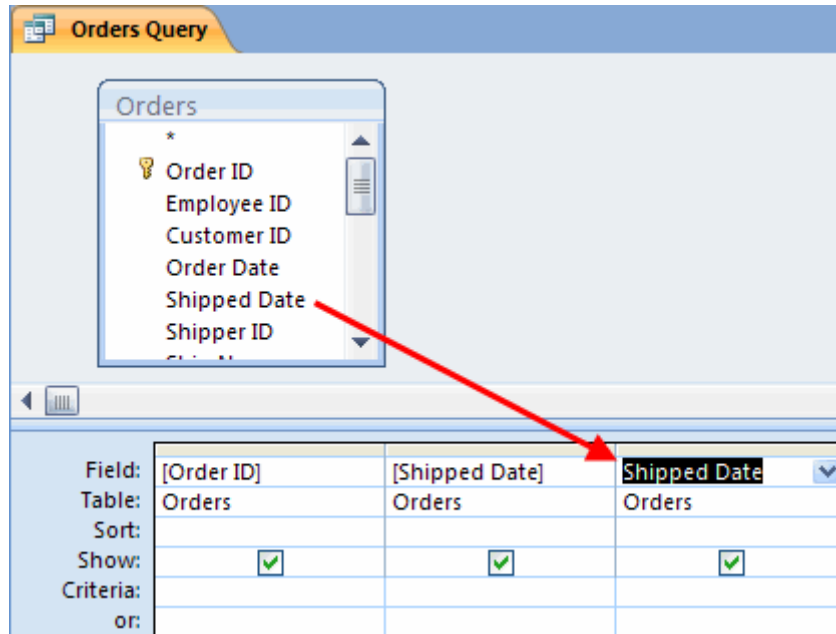
Using Queries to Summarize

Using the topics introduced in this lesson allows us to create queries that will provide a summary of data. There is no direct “Summary Query” option that you can pick from a list; instead you build your own depending on the data you are looking for. You might want to know how many orders were placed within a certain period of time, so you will use the AND operation. For example, if you work for Northwind and want to know the sales for the first three months of 2006, you would develop the following query:

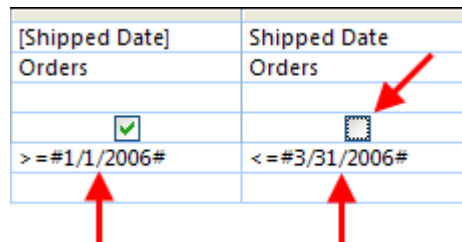


In the Northwind sample database, all of the shipping details are listed in the Orders table. Running this query as is will tell you when each order was shipped. But if we want to know what order shipped between Jan. 1, 2006 and Mar. 31, 2006 we need to do a bit of editing first. In fact, the first step is already done; it is hidden in the previous sentence! We want to retrieve the orders shipped on or after the 1st of January (meaning all dates greater than or equal to 01/10/2006) and retrieve the orders shipped on or before the 31st of March (meaning all dates less than or equal to 03/31/2006).

To perform this AND operation, we first need to add the Shipped Date to the list of fields a second time. This will make visualization easier for this example:

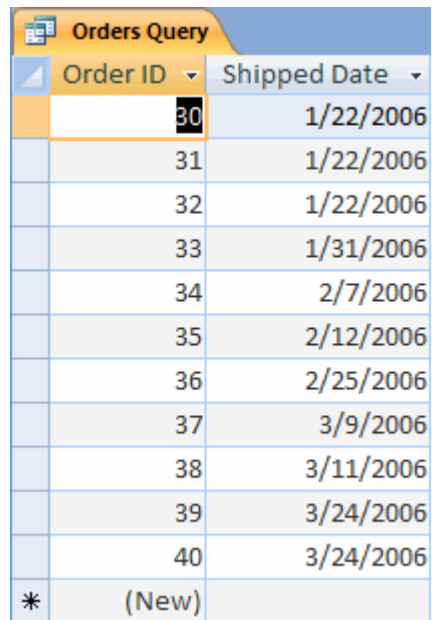


Now enter the search criteria. You can also deselect one of the Shipped Date show checkboxes because showing both does nothing more than show the same data twice:



When inputting dates, you don't need to follow syntax exactly like above. In fact, the criteria for the first ShippedDate field was entered >= 01/01/2006, but Access automatically removed the unnecessary 0's and placed a pound sign on either side of the date.

Click the Run button to display the results of the query:



Order ID	Shipped Date
30	1/22/2006
31	1/22/2006
32	1/22/2006
33	1/31/2006
34	2/7/2006
35	2/12/2006
36	2/25/2006
37	3/9/2006
38	3/11/2006
39	3/24/2006
40	3/24/2006
* (New)	

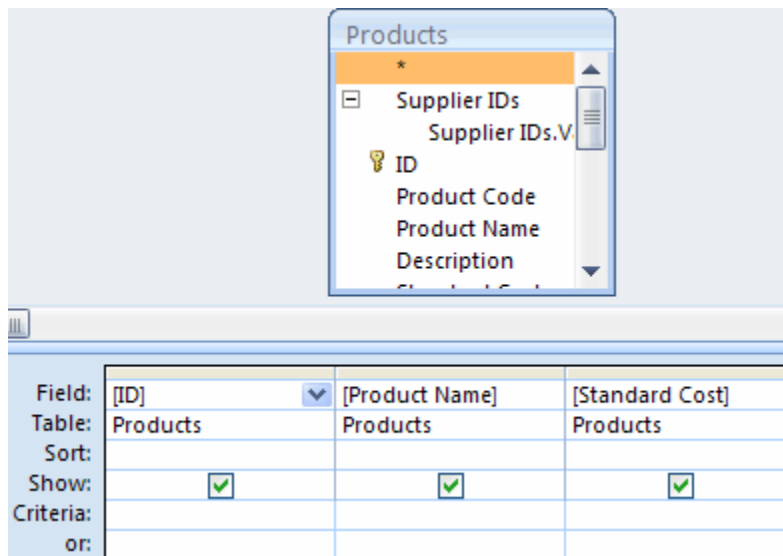
The query results show the ID and shipping date of each order, and show us that there were 11 orders shipped in the first three months of 2006.

Advanced Queries

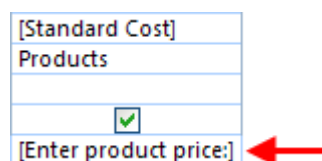
The query functionality in Access goes far beyond simply retrieving records. If you recall our review of queries, you know that there are two types of queries: select and action. We have dealt with select queries thus far, making Access retrieve records based on criteria that were entered. In this lesson, we will discuss some of the action queries. Action queries do more than simply retrieve records; they also perform some action on the database that modifies the data as well.

Creating a Parameter Query

Though a parameter query is not specifically an action query, its functionality is more specific than a select query. A parameter query lets you add specific search criteria every time you run a query. For example, let's say you are looking for a product in the Northwind sample database that is a particular price. Consider a simple product query in Design view:



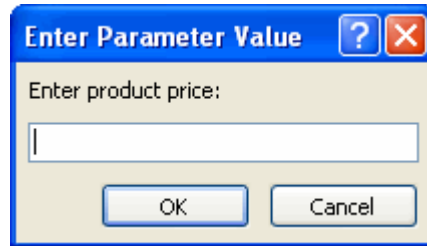
This query will retrieve the ID, name, and price of a product. We can transform this query into a parameter query by adding a new type of command to the Criteria row of a particular field. Add the text [Enter product price:] into the Criteria row.



As you will see in the next lesson, this text will appear in a special dialogue box that will prompt the user to enter a specific value.

Using Parameter Queries

Once parameter text has been entered into the Criteria cell of a field, running a parameter query will produce a dialogue box:

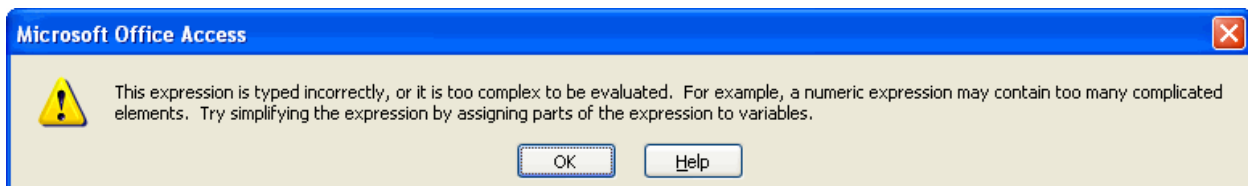


If you enter 7.50 into the text box and click OK, all products that are \$7.50 in price will be displayed:

ID	Product Name	Standard Cost
3	Northwind Traders Syrup	\$7.50
21	Northwind Traders Scones	\$7.50
74	Northwind Traders Almonds	\$7.50
* #####		\$0.00

That's all there is to using a parameter query. Parameter queries will incorporate the user input directly into the background design of the query before it is executed. You can have multiple parameters inside a query; they are filled in from left to right (if looking at the layout of the fields in Design view).

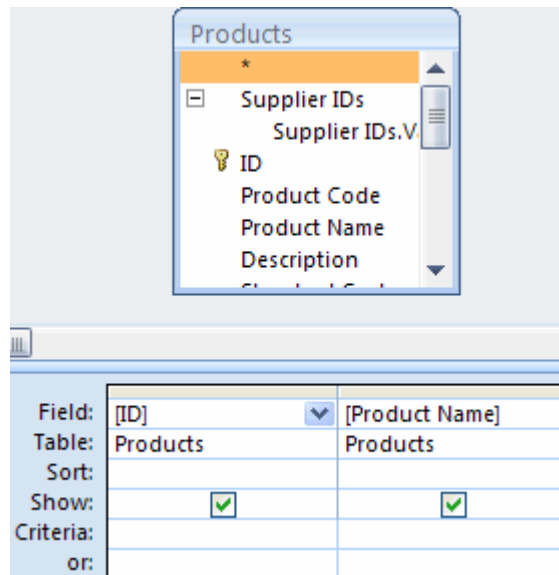
In the above example, entering 7.5, 7.50, or \$7.50 will all produce the same results so users with various levels of comfort with computers can enter information as simple or as complex as they like. Entering a price that is not in the database, such as the value 100, will not return any rows. Entering data of an incorrect data type, such as the word 'apple', will produce a syntax error:



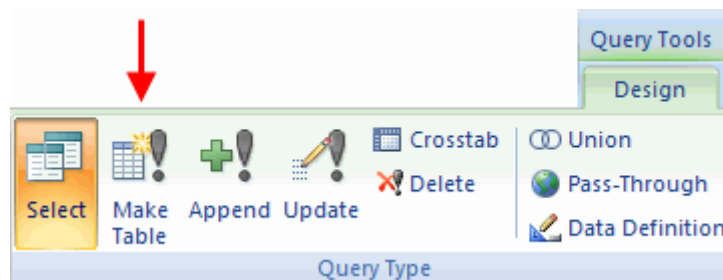
Creating a Table with Make-Table Queries

When a query returns its results to Datasheet view, what does it look like? Datasheet view of a table, of course! Technically, every time a query returns results, they are stored in a temporary table in the memory of your computer. We need only to add a step to make the query results a table in the database with its own information that can be viewed and modified independently of the data that was used to retrieve it. This section of the lesson is our first introduction to action queries.

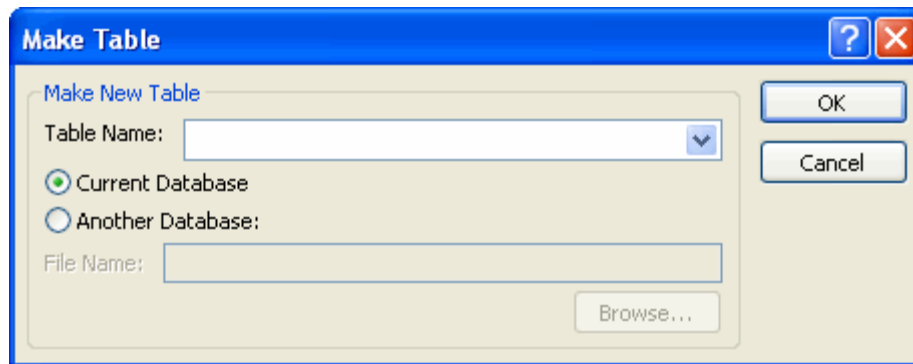
Imagine you are opening a new Northwind warehouse off site and want to make a table to send to the warehouse manager containing just the product ID and product name fields from the Products table. Create the query using whatever method you like and view it in Design view:



At the top of the Access window, you will see the Query Type section of the Query Tools - Design ribbon. Click the Make Table command:



The Make Table dialogue box will appear:

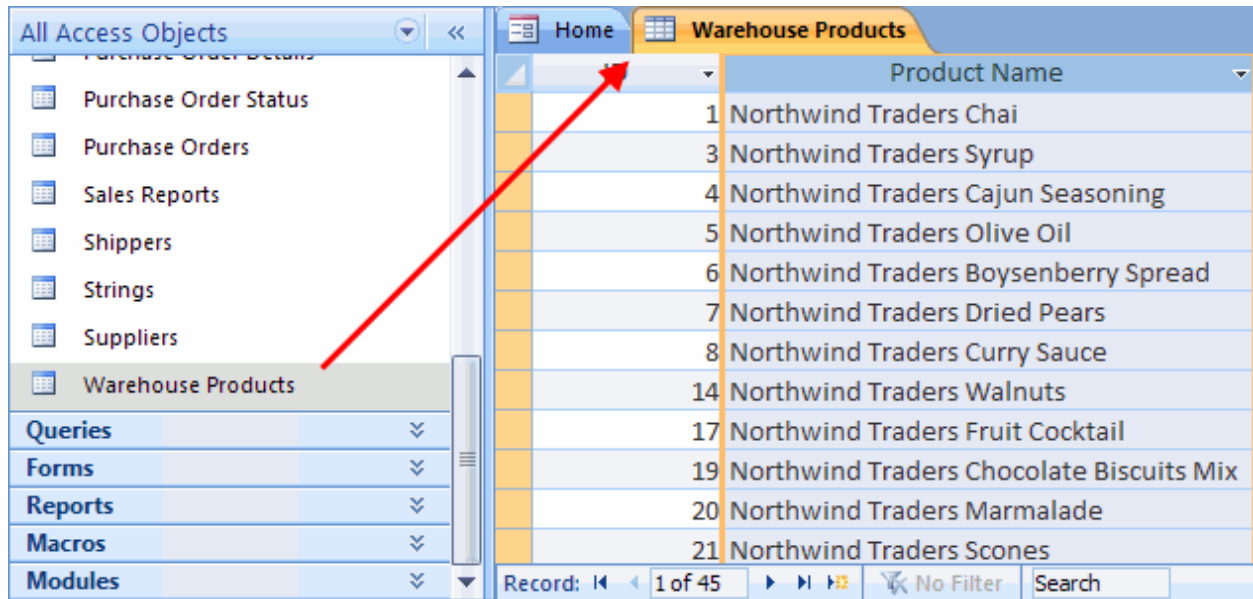


Give the table a new and meaningful name and specify where you would like it created. In order to save the table in another database, the database file must be stored on your computer (unless you have previously established the communication links necessary between your computer and another network). Click OK to confirm the details and then click the Run button:



Access informs you that you are about to create a new table and that the operation cannot be reversed. Click Yes to proceed.

Then, click the Tables object in the Database window to see the new table that was created from the query:



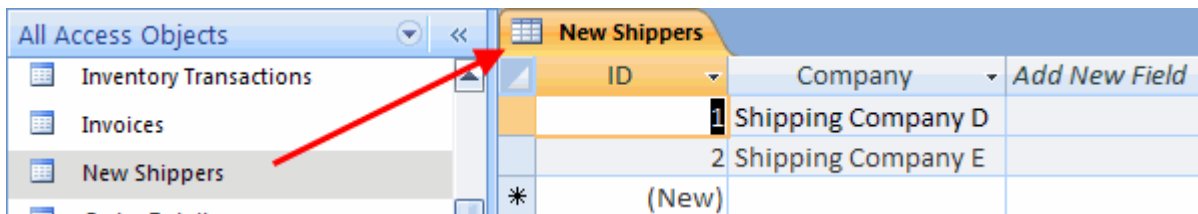
Management (Action) Queries

In this lesson we will explore the other action queries available for use in Access, like the Make Table query in the previous lesson. These queries actively seek out and modify data instead of merely searching for it. In this lesson we will introduce the functionality of each type of query.

Append Queries

As your organization and databases grow, you may need to add large amounts of data to a table quickly. One method of doing this is by using an Append query. For example, if we want to add more shippers to the list of available shippers Northwind uses, we can take the results of a query and add them to the fields of a particular table.

Let's assume that a new table was made in the Northwind database containing the information about two more delivery companies:

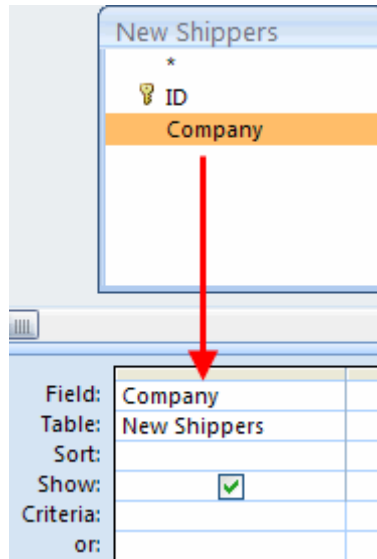


ID	Company	Add New Field
	Shipping Company D	
2	Shipping Company E	
*	(New)	

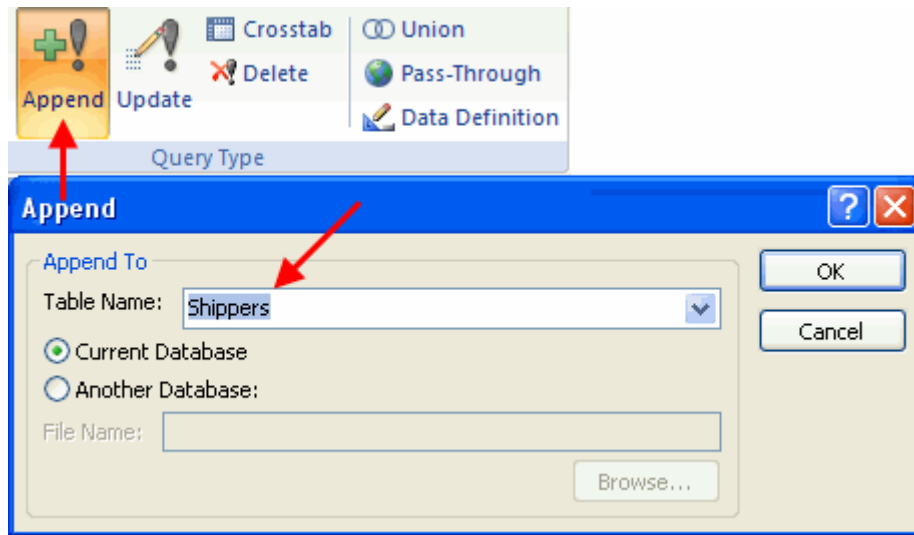
To add the data from this new table into the existing table, open a new query in Design view using New Shippers as the table data source.

Before we proceed with this lesson, it is important to note that both the New Shippers table and the (old) Shippers table have the same design and data types. Both tables have ID as an AutoNumber primary key, and some of the key values are duplicates. Since we cannot have duplicate primary keys, do not add the ID from the New Shippers table to the query. Access will take care of the primary keys itself because any new rows appended to a table with an AutoNumber primary key will be assigned a new unique value.

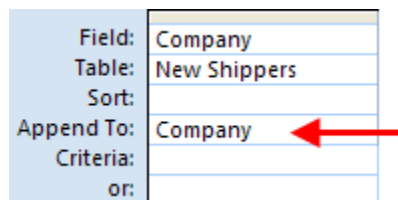
To start, click and drag the Company field to the Field cell of Design view:



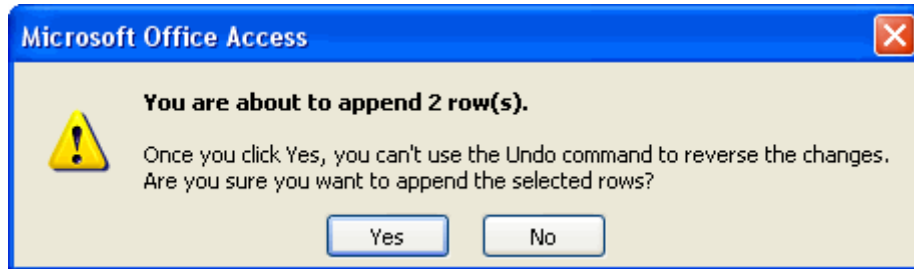
Click the Append command in the Query Type section of the Query Tools - Design ribbon. When the Append dialogue box appears, choose Shippers from the Table Name combo box:



The Show row in Design view will be replaced with the Append To: row, stating which field the query will add the information:



Click the Run button to execute this query, and then click Yes when prompted to confirm that you are about to append a number of rows to a table:



Open the Shippers table in Datasheet view to see the new entries:



A screenshot of the "Shippers" table in Datasheet view. The table has two columns: "ID" and "Company". The data rows are:

ID	Company
1	Shipping Company A
2	Shipping Company B
3	Shipping Company C
4	Shipping Company D
5	Shipping Company E
*	#####

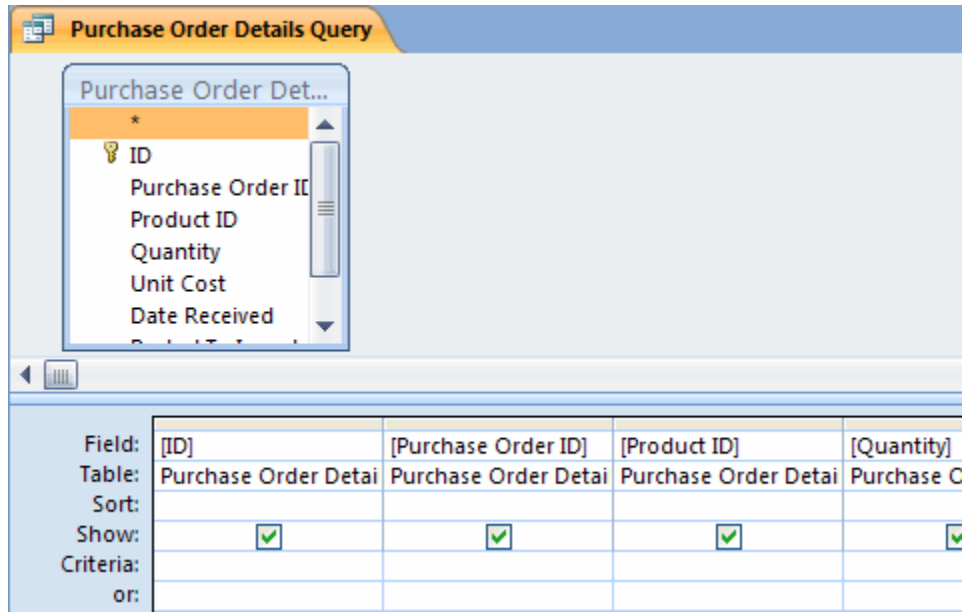
Red arrows point to the "ID" and "Company" columns for rows 4 and 5. A yellow warning icon is visible in the "ID" column for row 4.

Delete Queries

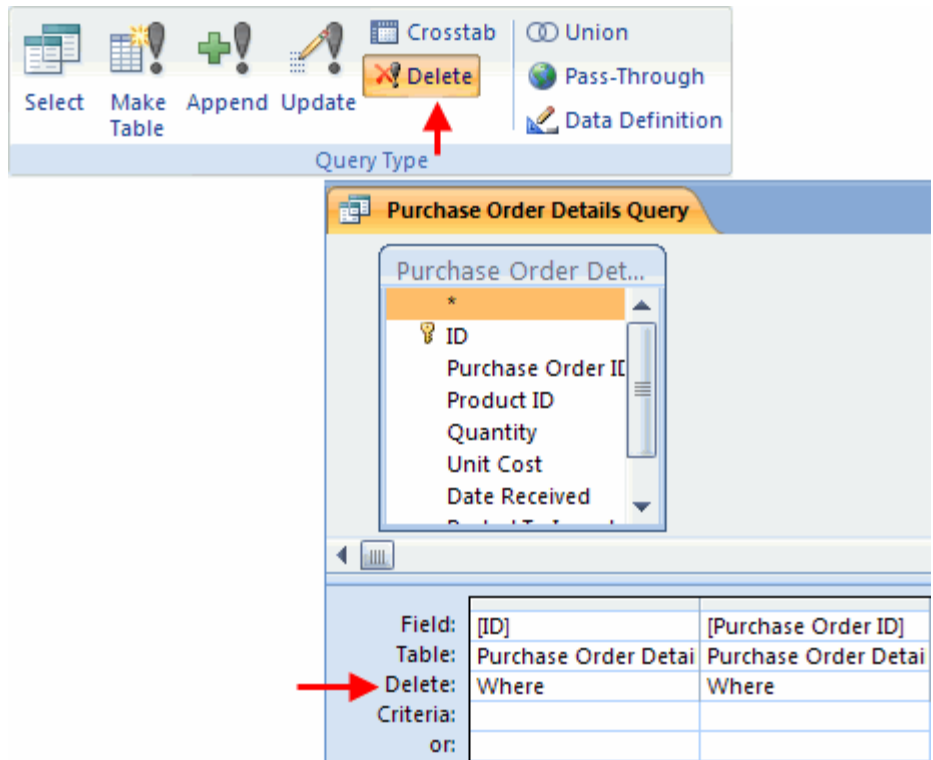
You guessed it – delete queries are used to remove useless or obsolete data from a table or tables. For example, if you want to decrease the size of your database and remove old records, use a delete query to remove a certain portion of the data from the database.

For example, imagine you want to remove all purchase order data from the month of January from the Northwind sample database. If we want to perform the deletion of old records, it is necessary in Access to create a query containing all fields from the source table. The easiest way to do this is to use the query Wizard, select the Purchase Order Details table from the combo box, click the (>>) button to include all table fields, and then click Finish.

First, open the query in Design view:

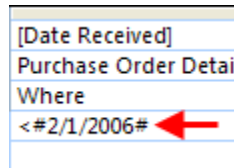


Click the Delete command in the ribbon to replace the Sort row with the Delete row:

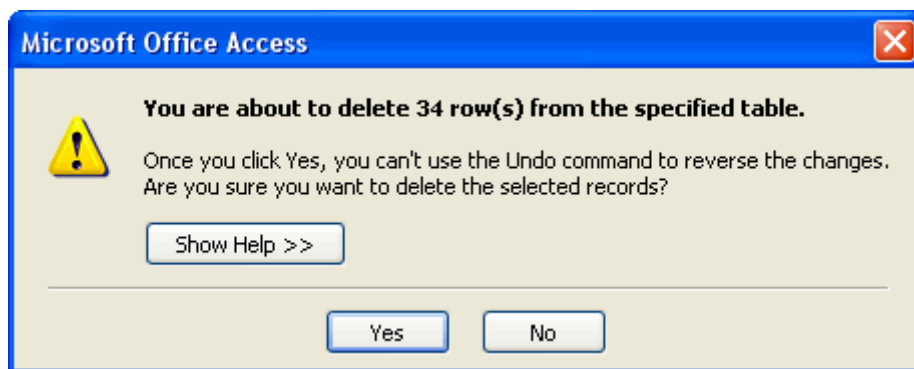


The Delete row contains two options, Where and From. The Where option (called a where clause) means “delete the current field from this table based on the criteria I enter.” The From clause is only usable when you are constructing a Delete query based on the information from two or more tables. The From clause states “delete this field from this other table based on the criteria I enter.”

To remove the old PO information from this table prior to February, enter < 02/01/2006 in the Date Received criteria:



Click the Run button to execute the query:



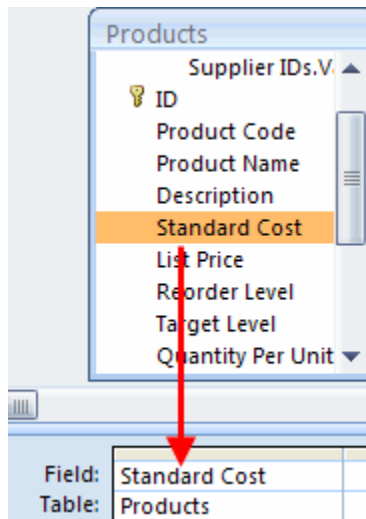
Access confirms that you are about to permanently delete information from a table; click Yes to confirm.

Update Queries

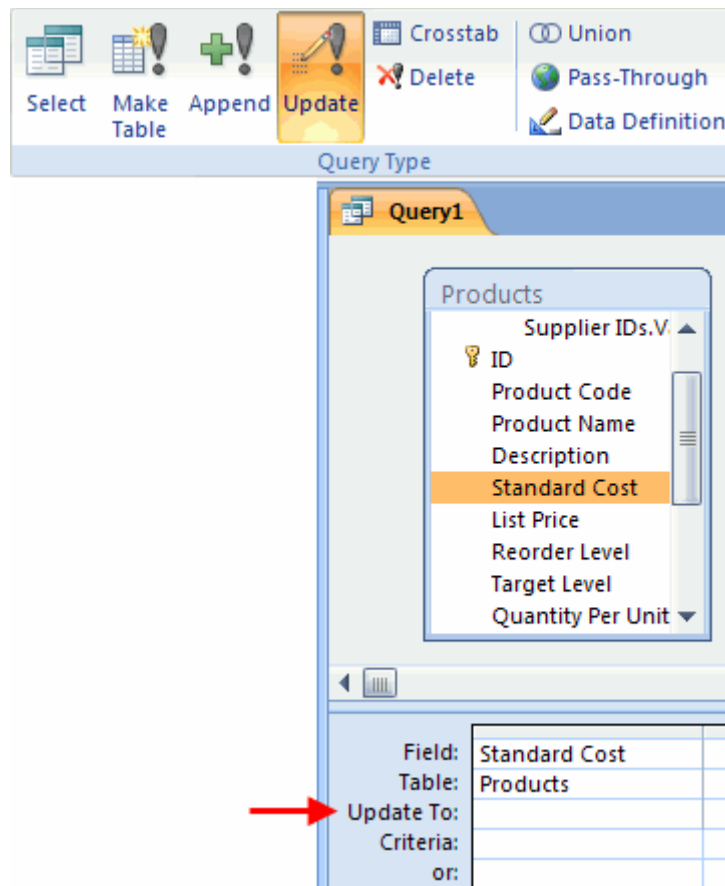
If you recall the calculated field from earlier in this manual, you know that you can enter some expression into a field of a query thusly creating a new field and a calculated value. An update query is similar in design, but instead of making a whole new column of calculated data, the query will perform the calculation directly on the table data.

To demonstrate this, we will perform a price increase of 5% to all products in the Products table.

Open a new query containing the Standard Cost field from the Products table in Design view:



Click the Update command in the ribbon. The Sort row listed above will change to the Update To: row:



Enter the criteria [Standard Cost] * 1.05 and then click the Run button. Access will warn you that you are about to update the data permanently to new values, click Yes to confirm. Open the Products table in Datasheet view to see the new prices:

Standard Cost ▾
\$14.18
\$7.88
\$17.33
\$16.81
\$19.69
\$23.63
\$31.50
\$18.31

You can see that the prices have all been updated by five percent.

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