Access Queries

What is a Query?
A query is an Access object used to view, analyze, or modify data. The query design determines the fields and records you see and the sort order. Additionally, queries allow you to join two or more related tables, concatenate text fields, summarize data, create calculated fields, and append, update, or delete records based on specified criteria. Only a query's design is stored in the database. When the query is run, it retrieves data as specified by the query design and returns it in the form of a dynaset or recordset which is a real-time representation of the underlying tables. Query results are often used as the basis for reports, displayed in forms, or used to create other queries.

There are two main categories of query types in Access -- Select and Action queries. A select query allows you to join related tables and choose the fields and records to display. Select queries choose records from one or more tables in the database (or attached tables from other database files) according to criteria you specify. A select query can later be converted to an action query, if desired.

Queries
- display records/fields from 1 or more tables or queries in a dynaset (real-time representation of the data); changes made to the dynaset will also change the underlying data source
- can be used to select a subset of records according to your criteria
- are a permanent object in the database
- allow you to choose the fields you wish to view, select, or sort by
- can be used to join related tables together and display the results in a single datasheet, e.g., employees and orders.
- allow calculations to be performed; e.g., you can create a new field to display the result of multiplying two fields together or concatenate one or more text fields.
- result set may be used as the data source for forms, reports, or additional queries.
- allow “mass” actions to multiple records at once through an Action Query; these include Update, Append and Make Table queries.
- can be used to find and display duplicate records (Find Duplicates), records that do not have a match in a related table (Find Unmatched) or Crosstab Queries (cross tabulations that correlate data with two types of information, e.g., sales by date and country).

Query Views
There are different query views as indicated above. **Design View** displays the query grid where you can create and modify your query. **Datasheet View** shows the record set that is a result of your query design and in most cases data may be modified through this view. When you create a query, Access constructs the equivalent SQL (Structured Query Language) statements. If you are familiar with SQL, you can edit or create your query directly using the **SQL view**.

Query Design
As with other Access objects, you can either create the query in Design View or use the Simple Query Wizard. Note: The Simple Query Wizard only allows you to choose a table and fields. If you wish to add criteria or sort, you will need to go to the **Design View**.

To create a query in Design View using the query grid:
1. Select the Create tab, Select Query Design
2. Select the table(s) and/or query(s) that contain the data you wish to use.
3. Choose the Close button in the Show Table dialog box.

Using the Query Wizard
You can use the Query Wizard to help you build several types of queries, such as Crosstab, Find Duplicates, and Find Unmatched Query.

A Crosstab query calculates sum, average, count, or other type of total for data that you wish to group by more than one field. The data result can be grouped by columns and rows. The wizard will help you decide which columns to use for row headings and which to use for column headings and also the type of calculations you wish to perform.

Find Duplicates Query enables you to determine if there are duplicate records in a table, or determine which records in a table share the same value.

Using the Find Unmatched Query Wizard, you can find records in one table that don't have related records in another table. Note: the default join type selects only those records from the joined tables or queries that have the same values in the joined fields. For example, if you have an employee table and an orders table and create a query to select fields from both, the resulting dynaset will display only records that match. In other words, there could be employees with no matching orders or vice versa that would not display. This type of join is called an inner join. For more information on changing the type of join in a query, see the last section.

Selecting Fields
All the fields contained in the table are displayed in the field list. To add a field to a query, drag the field name from the list to a cell in the Field row of the query grid. To add more than one field at a time, hold down the CTRL key and click the fields you want to add, then drag the group to a cell in the Field row. To add all fields at once, double-click on the "*".

Sort/Show
Records in a query can be sorted in ascending or descending order. To sort, place the field name in a cell, click on the Sort row then choose Ascending or Descending. If you specify a sort for more than one field, the sort order will be from left to right as the columns are listed.

The Show checkbox allows you to add fields to the grid that you wish to sort or select by, but not display them in the query's output.

Saving your Query
When you save a query it becomes a part of the database. You can use the default name or give it one of your own. Note: A query can't have the same name as that of an existing table. To use the query again, simply click on the Query button in the Database window, and double click on the name of the query.
Selection Criteria
To limit the results of your query to certain records, you must specify selection criteria by creating an expression. An expression is a way to limit the records that are placed in the query result. Expressions can range from very simple such as “=Colorado” to compound criteria statements that join more than 1 criterion statement with the operators, And, Or or Not.

Valid Access expressions can use the following:
>  <  >=  <=  =  <>  NOT  LIKE  BETWEEN

<table>
<thead>
<tr>
<th>EXAMPLES OF CRITERIA STATEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>“CA”</td>
</tr>
<tr>
<td>&gt;=“T”</td>
</tr>
<tr>
<td>&lt;D</td>
</tr>
<tr>
<td>Null</td>
</tr>
<tr>
<td>&lt;&gt;CA   or Not CA</td>
</tr>
<tr>
<td>&gt;=1/1/91</td>
</tr>
<tr>
<td>Between 01-Mar-97 and 31-Mar-97</td>
</tr>
<tr>
<td>Like “G*”</td>
</tr>
</tbody>
</table>

To see a list of operators that can be used in an expression, open the Expression Builder or search Access Help for “Expressions”.

AND vs OR
Use of And allows you to specify two or more criteria for selection. By using And, you are able to specify that any record returned in the query dataset meets all criteria specified. For example, if you specify criteria for state as “Virginia” and specify “Jones” in the last name field, the records that are returned will be for those persons whose last name is Jones and who also live in Virginia.

To enter criteria statements for multiple fields, place all criteria statements on the same line. And may be used in a single field in conjunction with a range of values, e.g., >=2 and <=6, or in conjunction with Not, e.g., Not CA and Not TX which would return records containing any state except those two.

If you're looking for records that meet one criterion and another criterion, place both criteria on the same line.

OR (Multiple Values In A Single Field)
In the above example, placing either “Jones” or “VA” on a second criteria line would return the following result: all records with the last name Jones regardless of the state and all employees residing in Virginia, regardless of the last name.

Note: Access assumes that each criteria row under the first is an Or statement. Therefore, if you're looking for records that meet one criterion or another criterion, either 1) place the criteria on different lines or 2) enter multiple values on the same line and separate them by “or”.

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Expressions/Calculated Fields
When creating queries, you are not limited to the fields from the underlying table or query. You can also use expressions to create expressions which perform mathematical calculations or manipulate text strings. Additionally, built-in functions exist that can manipulate text, dates, and other types of fields.

For more examples, click on Help in Access and search for Expressions.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[First Name] &amp;&quot; &quot; &amp; [Last Name]</td>
<td>Jane Doe</td>
</tr>
<tr>
<td>[Last Name] &amp;&quot;&quot;, '&quot; &amp; [First Name]</td>
<td>Doe, Jane</td>
</tr>
<tr>
<td>[Unit Price] * [Quantity]</td>
<td>Multiples the values in the Unit Price field times the values in the Quantity field</td>
</tr>
<tr>
<td>Ordered in: DatePart(&quot;q&quot;,[Order Date])</td>
<td>In a field captioned &quot;Ordered in&quot;, the DatePart function is used to categorize orders by quarter, using the Order Date field.</td>
</tr>
</tbody>
</table>

Adding Field Captions
You can add captions (text used instead of the field name or default expression name). The caption will be displayed in the query datasheet column heading and also in any forms or reports that are based on that query.

To rename a field in Design View:
1. Open the query in Design view.
2. Click to the left of the first letter in the field name in the QBE grid.
3. Enter the new name followed by a colon.
4. Or, add a Caption in the Field Properties list.

Field Properties
To modify a field's properties, right-click the field name and select Properties. You can add a Description, Format, Input Mask, or Caption. These properties work the same as field properties in a table.

Updating Data through Queries
Normally you can update data in your underlying tables directly from a query. There are circumstances that do not allow you to update, however. For a complete list of rules on updating through a query, go to Access Help and search for “Updating data in a query”. Below are a few of the more commonly used instances where you cannot update your data through a query:
1) Any field in a total or crosstab query;
2) Autonumber fields;
3) Any field which is the result of a calculation;
4) Any field in a Unique Values or Unique Records query;
5) A primary key participating in a relationship unless Cascade Update is specified.
**Parameter Query**

If you frequently run the same query but find yourself changing the criteria each time, then you may want to change it to a parameter query. A parameter query prompts for new criteria through a dialog box each time you run it. You may have more than 1 parameter such as you would in a normal criteria statement.

To create a parameter query, simply design your query as usual including all the necessary fields. Under the criteria cell for each field you want to use as a parameter, enter a prompt enclosed in square brackets, e.g, `[Enter the beginning date]` or `[Enter the last name]`, etc. This prompt will appear on the screen each time the query is run. The person running the query must supply the criteria in response to the prompt.

**Joining Tables**

If you created a relationship between the tables when you designed your database, join lines between the related fields appear automatically. If no relationships have been created, then you can create the join in the query grid by dragging the related field from one table and dropping it on top of the same field in the other table. *Note: joining tables in the query grid will create a relationship for that query only.*

**Cross-Product or Cartesian Product Joins**

If tables in a query aren't joined to one another, either directly or indirectly, Microsoft Access doesn't know which records are associated with which, so it displays every combination of records between the two tables. Therefore, if each table had 10 records in it, the query's results will contain 100 records (10X10). This result set of every possible combination is called a cross product or Cartesian product. These queries may take a long time to run and ultimately will not give you the data you were seeking.

**Aggregate Functions in Queries**

You can perform calculations on groups of records using aggregate functions found under the Totals button. This includes Sum, Avg, Min, Max, Count, StDev, Var, etc. Totals provides summary information for all records in a table.

When you click on the Totals button, Access displays Group By in the Total row for any fields in the design grid. You create totals by replacing Group By with a function. Note: you must group the records by at least one field in order to apply an aggregate function.

To calculate totals in a query:
1. Create a query, then from the Query Tools, Design tab, choose Totals. The Total row appears in the query grid.
2. In the Total cell under each field, select a function (such as Sum, Avg, Count, etc.) from the drop down list.
3. Click the Datasheet View button on the Toolbar to see the results.

**Top Values**

To view only the top values by either percent or number of values, click on the Return button on the Query Tools, Design tab. The Top Values property is used in conjunction with a sorted field. For example, you might want to return the top 10 values or the top 25 percent of all values in a field. *Note: if you sort a field in descending value and apply this property, the values at the top of the list will actually be the lowest values.*