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## Special Notations and Symbols

<table>
<thead>
<tr>
<th>Notation</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keystroke</td>
<td>![Enter]</td>
<td>Press Enter on the keyboard</td>
</tr>
<tr>
<td>Button/Mouse</td>
<td><strong>OK</strong></td>
<td>Click on OK in the current window</td>
</tr>
<tr>
<td>Menu Item</td>
<td><strong>Tools, Options</strong></td>
<td>Go to the Tools menu and select Options.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Notation</th>
<th>Graphic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Saving Shortcut</td>
<td>![Timer]</td>
</tr>
<tr>
<td>Hot Tip!</td>
<td>![Hot Tip]</td>
</tr>
<tr>
<td>Caution!</td>
<td>![Caution]</td>
</tr>
</tbody>
</table>
Chapter One: Starting Simple Queries

In this chapter, learn how to …

- Review creating table relationships
- Create a simple query in Design View
- Add criteria
- Complete a Training Exercise
What is a Query

One of the greatest features of an Access database is the query. A Query is simply another view of the information in a table. However, a query allows you to see only the data you want. You can specify that only certain fields should be displayed, that you want to see only the records that meet a certain criterion, and even add a calculated field. In addition, you can see fields from different tables displayed together. Pulling in fields from different tables requires that the tables have a relationship.

| Hot Tip! | You can create a query using fields from either tables or other queries. For clarity, the rest of this manual will assume you are using tables only. |

Review of Relationships

A Relationship is how you indicate to Access that a piece of information means the same thing in more than one table. For example, Employee #55 in one table is the same Employee #55 in another table. The difference is simply that each table may hold different information about employee #55; one table may hold general information, while another may hold his or her health care data, for example. This may seem obvious to you, but it is not obvious to the program. You must tell it when one #55 matches another #55.
Relationships are created using a **Primary Key** from one table and linking it to a related field in another table (now called a **Foreign Key**). In order for two fields to be linked, they must be the same **Data Type** and **Field Size**.

### Displaying the Relationships Window

Use the **RELATIONSHIPS** button on the toolbar.

**STEPS**

1. Drag the related field from the **Primary Table** (the *one* side) and place it directly on top of the same field in the **Related Table** (the *many* side).

2. A dialog box will appear. Check that the fields selected are correct, enable referential integrity if needed, and click on **CREATE**.

(Referential integrity is discussed in the next section).

*Figure 1.1* Joined Tables (enforcing referential integrity)
What is Referential Integrity?

One of the most critical aspects of any database design is whether or not referential integrity is being enforced within the table relationships. Referential integrity in Access has two functions: 1) it prevents a user from deleting records in a main table if it is referred to in a related table; and/or 2) it can aid the user by making changes in all related records when a change is made to the original.

Here’s a hypothetical example that demonstrates why referential integrity is so important. Suppose you placed an order for merchandise with a catalog you received in the mail. The next day, you decide you want your name and address off their mailing list. They obligingly remove your record from their Customers table. But...there’s still an order in the warehouse, waiting to be packed and shipped, from the Orders table. Now that your name and address are gone from their database, that order has nowhere to go.

Referential integrity prevents this. If the customer service rep in our example had tried to delete your customer info, she might have received an error message like this:
Referential integrity also provides a “cascade” option allowing the user to do the deletion, but warning that related records in other tables will be deleted also. This saves you the time and hassle of wading through all related tables trying to locate the related records. In that situation, the message would be this:

Moreover, if you had simply called to change your mailing address, referential integrity can help in that situation as well. The address would be updated in the related table. This prevents mistakes in entering and reentering the same data over and over, plus it saves the user time.
Creating a Query in Design View

To manually create the design of a query, you create it in the query’s Design View. This view is also called the QBE Grid (Query By Example Grid) because it lays out the selected fields and their settings in a table-like format resembling a grid. The top half of this view is always a representation of the relationships window, which will indicate the relationship between the tables you want to work with.

Setting Up Queries

In order to set up a query, you need to display the table(s) involved and select the fields that should be displayed when the query is run. If you choose more than one table they must have a relationship.

STEPS

1. Go to the Query section if necessary.
2. Click on the NEW button.
3. Double-click on DESIGN VIEW.
4. Select the table(s) containing the desired fields by adding them to the grid from the Show Tables window. You can add a table by double-clicking on it or highlighting it and clicking on ADD.

   CAUTION!

   You may not be able to see the tables you have added until you close the window.

5. Close the Show Tables window.
If you added too many, right-click on the table and choose **Remove Table**.

6. Add the fields you want from the table(s) to the grid by double-clicking on them.

7. Save your changes. This will prompt you to name your new query.

This query isolates specific fields from the *Contacts* table. It would be helpful as a phone list for contacts.

### Viewing Results

To see the data as requested from the *Query Design View*, you must tell *Access* to run the query using the **RUN** button.

**Hot Tip!** You will also be prompted to save if you close the query window or switch to *Query View* using either the toolbar or the **View** menu.
Sorting

To apply a set sort order to the data in the query, you must select either “Ascending” or “Descending” in the Sort Row of the query grid for the field you want sorted. If you apply a sort to more than one field, Access applies the sorts in order from left to right.

This query will arrange the contact records alphabetically by the State.

<table>
<thead>
<tr>
<th>Field</th>
<th>CompanyName</th>
<th>State</th>
<th>Contact#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacts</td>
<td>Contacts</td>
<td>Contacts</td>
<td>Ascending</td>
</tr>
<tr>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

Time Saver!

If you need to sort by more than one field, Access gives priority to the field farthest to the left containing sort information, then looks for other sort designations to the right.
Refining Queries

A Query can be used to isolate certain records from the tables it is built from, instead of displaying all of the records.

Adding Criteria

To limit the number of records which appear when running the query, you specify Criteria. Criteria are another way of telling the query “when you display your results, show me only what matches certain characteristics.” This is a logical or mathematical operator, which filters out unwanted information. Operators are entered into the criteria row of the design grid in the same column as the field they apply to. For example, if you needed to find contacts from a specific state, you would type the operator at the intersection of the criteria row and the State column in the grid.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD</td>
<td>Shows only records which contain “MD” in the selected field</td>
</tr>
<tr>
<td>&gt;10</td>
<td>Limits the records to those whose value is greater than 10 in the specified field</td>
</tr>
<tr>
<td>&lt;&gt;10</td>
<td>Limits the records to those whose value is not 10 in the specified field</td>
</tr>
<tr>
<td>&gt;=1/1/98</td>
<td>Shows only those records where a specified date field is greater than or equal to January 1, 1998</td>
</tr>
<tr>
<td>&gt;Georgia</td>
<td>Shows only the records where the specified field has a value which is alphabetically greater than “Georgia”</td>
</tr>
<tr>
<td>Not Georgia</td>
<td>Excludes the records which contain the value “Georgia” in the selected field</td>
</tr>
</tbody>
</table>
This query limits the records to events that start after 5/1/00. This would be a quick way to determine how many events are offered at that time.

<table>
<thead>
<tr>
<th>Field:</th>
<th>Event#</th>
<th>EventName</th>
<th>Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table:</td>
<td>Events</td>
<td>Events</td>
<td>Events</td>
</tr>
<tr>
<td>Sort:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Show:</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Criteria: or:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;5/1/00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CAUTION!

If the query does not find what you need, check to make sure that you spelled the criteria correctly and that they are in the correct column(s).
**Using Wildcards**

A **Wildcard** allows you to specify only part of a criterion and let the program fill in the rest. An asterisk (*) can substitute for anything at all, but a question mark (?) can only be substitute for a single character.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sample Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>*sale</td>
<td>bakesale, yard sale, Annual Sale…</td>
</tr>
<tr>
<td>sale*</td>
<td>salesman, salesmanship, Salem…</td>
</tr>
<tr>
<td>1?</td>
<td>10, 11, 12, 13, … through 19. You <strong>must</strong> use quotes when using a wildcard in a numeric field.</td>
</tr>
<tr>
<td><em>/</em>/9?</td>
<td>Any date in the 1990s.</td>
</tr>
</tbody>
</table>
Hiding Information in a Query

Sometimes, you need to set a criterion for a specific field, but you do not need that field to be displayed when the query is run. To hide a field when in Query View, remove the checkmark in the SHOW row in the query grid.

Since this query will display only records that are not confirmed, there is no reason to display the confirmed field. The purpose of this query is to retrieve the phone numbers for contacts that need to have reservations confirmed.

Closing Queries

To close a query, click on the CLOSE button or choose Close from the File menu.
Opening Queries

Datasheet View

Opening a query to see the resulting data is called either Opening or Running a query because it must first filter out unwanted information before displaying it for you, and secondly must take into account any additions, changes and/or deletions that may have been made to the tables used in the query. (This is why Access queries are sometimes referred to as dynasets, or dynamic data sets that change when their associated tables change.) You can open a query by either double-clicking on the query from the QUERY tab or highlighting it and clicking on the OPEN button.

Design View

If you need to make a change to the layout of the query you should open it directly in Design View. You can accomplish this by simply selecting the query and clicking on the DESIGN button.
Training Exercise #1

Continue to use the Conference Information Queries database.

You are in charge of tracking which employees have taken reservations. As a company we are interested in which departments are taking reservations and how many reservations each person is taking.

1. Before you can see information from the Employees table and the Reservations table at the same time, there must be a relationship between the tables. Create a relationship between the tables. What is the common field? (Page 3)

2. Create a query in Design View that contains the following information: (Page 6)

<table>
<thead>
<tr>
<th>Table</th>
<th>Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservations</td>
<td>Reservation#</td>
</tr>
<tr>
<td></td>
<td>ReservationDate</td>
</tr>
<tr>
<td></td>
<td>Quantity Reserved</td>
</tr>
<tr>
<td>Employees</td>
<td>Employee</td>
</tr>
<tr>
<td></td>
<td>Department</td>
</tr>
</tbody>
</table>

3. Save the query and name it Practice Reservations by Employee. (Page 7)

4. Set up a criterion that will help you find out how many reservations have been made by the Sales Department (don’t worry about adding up the quantity for each reservation, just determine how many records). Run the query. How many reservations? (Page 9, 7) ________________

5. Clear the criteria.

6. Set up a wild card criterion to find only those reservations taken by Victor Smith. He is the only Victor working for the company. How many reservations did he take? (Page 11, 7)

7. Clear the criteria.

8. Close the query. (Page 12)
Chapter Two: Modifying Queries

In this chapter, learn how to …

- Rearrange, add, and delete query fields
- Use logical operators when specifying multiple criteria
- Add a calculated field
- Complete a Training Exercise
Modifying the Design

If you need to use a query to answer a different question (change criteria), or display different fields, you must first open the query in Design View.

Adding Fields

There are two main ways to add another field to a query.

- Double-click on the field from its Table in the top pane to add it to the end of the grid.
- Drag the field from the table in the top pane to its new location in the query grid. The rest of the fields will be pushed to the right to accommodate the new one.

Rearranging Fields

To change the order of the columns in the design grid:

STEPS

1. Move the cursor above the column until it changes to a solid arrow pointing down. Click once and release the mouse to select the entire column. (Dragging the mouse will select multiple columns.)

2. Keeping the pointer at the top of the column, click and drag the column to its new position and release the mouse.
Deleting Fields

To delete a field from a query, you must delete the column from the design grid. This does not delete it from the underlying table.

**STEPS**

1. Move the cursor above the column until it changes to a solid arrow pointing down. Click once and release the mouse to select the entire column.

2. Press Del on the keyboard.

| Hot Tip! | If you delete a field accidentally, you can reinsert it as stated above, but you will have to recreate any criteria already set for the field.

Multiple Criteria

From time to time one criterion will not be enough to isolate the records you need. There are a few special ways to add multiple criteria.
**Specifying a Range**

You can have a query look for values that fall within a range. Type “between (what) and (what)” as the criteria.

This query will find all reservations with reservations ranging from 4/1/99 to 6/18/99.

**Using the “And” Operator**

When you use the word “And” between multiple criteria, then both criteria must be met simultaneously for the record to be included in the query results. When you want to apply two or more criteria simultaneously between different fields, you type out the criteria on the same criteria row:

This query looks for reservations with a quantity more than 7 where the contact has paid less than $500. This is a quick way of determining which contacts should be targeted in the next billing cycle.
Using the “Or” Operator

When you use the word “Or” between multiple criteria in the same field, the query results will display any records that match at least one of the criteria. When you want to apply multiple criteria between different fields, you must type out the criteria on a different criteria row for each field:

This query looks for reservations with quantities greater than 7, while at the same time including any records where the contact has paid less than $500. It will find any reservation that has a quantity of more than 7 or where the contact has paid less than $500.

This query will find reservations as long as they are for either for E-mail Etiquette or Business Writing events.
Adding Calculated Fields

In Access, calculations are not created in tables, but rather in queries, forms or reports. To create a calculation in a query, you will need to create an entirely new field. Every time the query is run, the values are calculated again. The results of the calculation are not stored in a table.

Rules

- Do not include spaces unless they are part of the name of a field.
- Always surround the name of a field with straight brackets, not parentheses.

STEPS

1. Select an empty column and click where the field name should go to start typing.
2. Type in a name for the field followed by a colon (:) 
3. Type in the calculation.

Use the following symbols for mathematical operators:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Addition</td>
</tr>
<tr>
<td>-</td>
<td>Subtraction</td>
</tr>
<tr>
<td>*</td>
<td>Multiplication</td>
</tr>
<tr>
<td>/</td>
<td>Division</td>
</tr>
</tbody>
</table>
Example

For the purpose of modifying queries, if you want to change the format of a field, you must change the Field Properties. To retrieve the field properties from the query grid, right-click on the name of the field in the bottom pane and select Properties from the menu. Make any changes needed and close the properties box.

Formatting Fields

<table>
<thead>
<tr>
<th>Field</th>
<th>CostPerPerson</th>
<th>QuantityReserved</th>
<th>TotalCost QuantityReserved CostPerPerson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table</td>
<td>Events</td>
<td>Reservations</td>
<td></td>
</tr>
<tr>
<td>Sort</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Show</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Training Exercise #2

As you work with the Practice Reservations query, you realize that it would be more effective if you included additional fields and had Access perform a calculation that you have been doing manually for your monthly report.

1. Open the Practice Reservations query in Design View. (Page 13)
2. Add the CostPerPerson field since it will be necessary for the calculation that you need. (Page 16)
3. Move the QuantityReserved field after CostperPerson. (Page 16)
4. Create a calculated field to display the total cost per reservation. (Total cost is equal to the Costperperson multiplied by the Quantityreserved.) (Page 20)
5. Use multiple criteria to find reservations taken for event 42 between 1/1/99 and 5/1/99. Run the query, then clear the criteria. (Page 17)
Chapter Three: Specialized Queries

In this chapter, learn how to …

- Create a Parameter Query
- Perform Action Queries
- Create a Totals Query
- Complete a Training Exercise
Parameter Queries

A **Parameter** query prompts the user for the criteria to be applied. This allows you to create one query that can be run many different ways. For example, you could create a query that only returns records from one state at a time. When run, Access would prompt the user for the state desired.

**Steps**

1. From the query design view, move into the criteria row for the field to be queried.

2. Surrounded by straight brackets, type a message you would like to be used as a prompt to the user. This message will appear when the query is run asking the user for information. What the user types becomes the criterion for the query this time around.

This parameter query is designed to prompt the user to indicate a specific region each time the query is run. This will save a lot of time if you frequently need to change a certain criterion for a query.
This is the prompt that the parameter query above will display when run.
Action Queries

An Action Query is a query which actually modifies the design of your data or your database. There are 4 types of Action Queries.

<table>
<thead>
<tr>
<th>Action Query</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make Table</td>
<td></td>
<td>Creates a static table from the results of a select query.</td>
</tr>
<tr>
<td>Update</td>
<td></td>
<td>Changes the data in a table from one value to another.</td>
</tr>
<tr>
<td>Append</td>
<td></td>
<td>Copies specific records from one table to another.</td>
</tr>
<tr>
<td>Delete</td>
<td></td>
<td>Deletes specific records from a table.</td>
</tr>
</tbody>
</table>
Creating Action Queries

Steps

1. Open the query in Design View.
2. Click on the Query Type drop-down (▼) button.
3. Select the type of query you want to create.
Running Action Queries

When you are viewing the results of a select query, you are simply changing the view with the VIEW button. This button becomes a PREVIEW button for an action query because it does not initiate a change to your database. It does not Run the query.

To perform the action associated with an action query, you must run the query.

- Double-click on the query from the Query tab.
- Select the query from the Query tab and click the OPEN button.
- Use the RUN button while in Design View of the query.

| CAUTION! | When saving an action query, always try to predict what the result would be if the query were run again accidentally. If the results would cause a problem, you may want to delete the query and recreate it when it is needed. |
Example 1: Make Table Query

This Make Table Query will create a table called European Contacts, which will contain the ContactName, Region, and Country fields for records in the Contacts table who are from Europe. Once the copy is made, it is not updated if changes are made to the records in the original Contacts table.

When you first create a Make Table Query, you will be prompted to provide a name for the resulting table.
Every time you run a make table query you will be prompted to confirm that you really want to do it.
Example 2: Update Query

This **Update Query** will change the CostperPerson field in the Events table so that an increase in cost is updated. The updated CostperPerson field is determined by the calculation \([\text{CostperPerson}] \times 1.5\) which will make the cost increase by 50%.

Every time you run an Update Query you will be prompted to confirm that you really want to do it.
<table>
<thead>
<tr>
<th>CostperPerson</th>
<th>CostperPerson</th>
</tr>
</thead>
<tbody>
<tr>
<td>$250</td>
<td>$375</td>
</tr>
<tr>
<td>$175</td>
<td>$263</td>
</tr>
<tr>
<td>$450</td>
<td>$675</td>
</tr>
<tr>
<td>$100</td>
<td>$150</td>
</tr>
<tr>
<td>$250</td>
<td>$375</td>
</tr>
<tr>
<td>$150</td>
<td>$225</td>
</tr>
</tbody>
</table>

Before Update  →  After Update
Example 3: Append Query

This Append Query will copy the fields Reservation#, Contact#, Event#, and ReservationDate into another table (in this case we’ll be using Old Reservations) if the ReservationDate is prior to 1/1/99.

When you first create an Append Query, you will be prompted to provide the name of the table that the records should be copied into.

Every time you run an Append Query you will be prompted to confirm that you really want to do it.
Example 4: Delete Query

This is a **Delete Query** that will remove all of the reservation records that have a *ReservationDate* prior to 1/1/99.

Every time you run a Delete Query, you will be prompted to confirm that you really want to do it.
Totals Queries

A Totals query is another way to perform a summary calculation in a query.

**STEPS**

1. Click on the **TOTALS** button.
2. Click in the **Totals** row underneath the field you want to calculate.
3. Click on the drop-down list and select the type of calculation you want to perform.

This is a **Totals Query** that will show for each event how many people will be attending.
<table>
<thead>
<tr>
<th>Function</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group By</td>
<td>Group similar field values.</td>
</tr>
<tr>
<td>Sum</td>
<td>Totals the values.</td>
</tr>
<tr>
<td>Avg</td>
<td>Calculates the average of the values.</td>
</tr>
<tr>
<td>Min</td>
<td>Returns the minimum value.</td>
</tr>
<tr>
<td>Max</td>
<td>Returns the maximum value.</td>
</tr>
<tr>
<td>Count</td>
<td>Counts the values in a field except null values.</td>
</tr>
<tr>
<td>Stdev</td>
<td>Returns the standard deviation of the values.</td>
</tr>
<tr>
<td>Var</td>
<td>Returns the variance of field values.</td>
</tr>
<tr>
<td>First</td>
<td>Returns the value in the first record of a table or query.</td>
</tr>
<tr>
<td>Last</td>
<td>Returns the value in the last record of a table or query.</td>
</tr>
<tr>
<td>Expression</td>
<td>Allows an expression to be used as a criterion for a calculation.</td>
</tr>
<tr>
<td>Where</td>
<td>Allows criteria to be established for queries performing calculations.</td>
</tr>
</tbody>
</table>
Training Exercise 3

Continue to use the Conference Information Queries database.

1. Open the Practice Reservations query and put in criteria to make it prompt you for EventName. (Page 13, 24)

2. Run the query for the E-mail Etiquette event. How many reservations are there? (Page 7) ________________________________

3. Open Practice Confirmations query in Design View. Set up criteria so that the query will find only confirmed reservations (Hint: criterion in the Confirmed field is Yes). Make this query into an append query so that all of the confirmed reservations will be copied into the Old Reservations table. (Page 13, 9, 27)

4. Create a new totals query that will give you the total AmountPaid for each contact. The new query should include the ContactName field from the Contacts table and the AmountPaid field from the Reservations table. (Page 6, 35)