Access 2007 - Beginning

103-133

Unit 3 - Queries

Notes	Activity

Quick Links

Editing vs. Navigating Records

tblCustomers

Experiment with all navigation keys

- When you're in datasheet view, two ***modes*** are available
- Navigation mode allows you to move between records and fields
  - Click with the mouse to move to a different field or record
  - Keyboard navigation
    - Arrows move one field or record in the selected direction
    - Home: first field in the current record
    - End: last field in the current record
    - Ctrl-Home: first field in first record
    - Ctrl-End: last field in last record

Notes	Activity

- Edit mode allows you to change the data within a field
  - ➢ Click again, to enter edit mode in a field
  - ➢ Alternatively, press F2 to enter edit mode in the current field
  - ➢ Once in edit mode you can move the insertion point
    - – Mouse: click to move the insertion point, drag to highlight text
    - – Keyboard
      - ▪ Arrows (left, right) move insertion point in the selected direction
        - ♦ Up and down still move to the next record
      - ▪ Home, Ctrl-Home: move insertion point before the left-most character in the field
      - ▪ End, Ctrl-End: move insertion point after the last character in the field
  - ➢ Access saves changes as soon as you move to a new record.
    - – Press the Esc key to cancel changes to a record

Experiment with edit keys

Finding Data

- As database tables get large, finding the appropriate record can become difficult.
- The Find command allows you to locate a record by its data quickly

tblCustomers

Locate records with first name Joe

- Place your cursor (click) anywhere in the field (column) that contains the data you're searching for.
- Press Ctrl-F or click the Find button  in the Find Group of the Home tab. The Find and Replace dialog box will appear.
- Enter the text (all or part) to search for in the Find What box
- If necessary, change Look In to the whole table (normally you search the current field)
- If necessary, change Match to part of the field
  - ➢ Change this if you only entered part of the value to be found.
  - ➢ Tip: you can use the wildcard character (*) to represent *any text* (e.g. *Hopp* finds all records that contain *Hopp* with anything before it and anything after it)
- Change other find options as necessary.

Locate records where address contains Hopp

Use wildcard.

Notes	Activity

Deleting Records

- To delete records, you first have to select the entire record whether you're deleting one or many records
- To select a record, click the *record selector box* to the left of the first field
- To select multiple records, point to the first record selector and drag to the last record selector
- When you point to the record selector, the mouse pointer changes to a black arrow ➡
- The background of selected records turns a dark color

- Once the records are selected, you can delete them by:
  - pressing the Delete key
  - right-clicking a selected record and choosing Delete Record from the popup menu
  - clicking the Delete button in the Records group of the Home tab
- Note, once you choose to delete the records, there is no way to undo the delete. You'll have to enter the records into the table manually again.

tblOrders

Delete the last order

Try to undo

Queries – Overview

- A query is a question. Database queries allow you to ask questions about the data in the database, even if the data encompasses multiple tables.
- To define a query, you first designate which tables contain the data you want to search for
- Then, you select the fields you want included in the query results
- Next, you designate the criteria records must match to be included in the query results
- Finally, you designate the order the result records should be sorted by
- Queries can also allow you to create new data by combining existing data using formulas
- Queries can also create summary statistics (totals, averages, etc)
- Once you've specified the query parameters, you *run* the query to create the query *recordset*—the answer to the query.

Notes	Activity

Creating an Access Query

- In Tutorial 1, you learned to create queries using Access' query wizards. For most queries, you'll want more control than the query wizards provide.
- The Access query design window and its QBE (query by example) grid allow you complete control of the query design process.

- To begin the process, click the Query Design  button in the Other group of the Create tab. The Show Table dialog box appears.
- Select each table that is needed for the query. Click the Add button to include the table in the query
  - If you forget a table, you can add it later by clicking the Show Table  button in the Query Setup group in the Query Tools Design tab .
- If the query accesses more than one table and the table relationships have been defined, the tables will appear linked in the query design screen.

Create a new query based on tblCustomers

Notes	Activity

Selecting Fields to Include in the Query

- When you select fields to include in the query, the field names will appear in separate columns in the QBE grid
- To select **all** the fields of a query (rarely needed)
  - ➢ Double-click the table name in the table window title bar
  - ➢ Drag any of the selected **fields** into the QBE grid
- Normally, you'll want to control the order of the query fields
- There are two common ways to add fields to a query
  - ➢ Double-click the field name in its table box
    - – The field is added to the first available column in the QBE grid
  - ➢ Drag the field into the QBE grid
    - – If you drag the field to an empty column, the field will be placed in that column
    - – If you drag the field to a column that already has a field in it, the new field will be inserted before the existing field. Other columns move over to make room for the new column.
- As long as the tables are related, you can combine fields from as many tables as required, in any order.

Select Last Name, First Name, Phone, City, State in that order

Modifying Selected Fields

- To modify the selected fields in the QBE grid, you first need to select the column
  - ➢ Point to the small bar at the top of the column—the *column selector*. The mouse pointer changes shape to a dark arrow ⬇
- To move a column, drag the column selector to the correct position. The dragged column will be inserted **before** the column where it is dropped.
- To delete the selected column, simply press the Delete key on the keyboard.

Move City before Phone

Delete the State column

Add Area Code before Phone

Notes	Activity

Running a Query

- To see the results of the query, you need to *run* the query
- To run the query you can click either the Run button or the (datasheet) View button

Run the query.

  - For the purposes of this class, the buttons have the same results. When you create different kinds of queries, the (datasheet) View button is more like a *preview* button and the Run button actually executes the query.
- The queries record set appears—the results of the query
  - The record set is a temporary display of records that meet the query requirements.
  - Remember from Tutorial 1, that some database programs call queries *views*, implying they display a different view of the actual table data.
  - You can return to Design view, modify the query and run it again as often as necessary by clicking the (design) View button.
- Though the record set (view) is temporary, you can change the data that appears. The data is actually changed in the underlying database table.

Change Gaul's phone to end with 6666

  - Change the data the same way you do in table datasheet view
  - Some queries are so complex, Access cannot tell where the original data is. Data in these queries cannot be changed.
  - If you're not sure, try to change the data. If it can't be changed, Access will let you know.

Sorting and Filtering Results using the Datasheet

- Access provides techniques to quickly sort and filter the data displayed in datasheet view

Sort by Last Name in Datasheet View

  - These techniques can also be used to sort and filter the contents when viewing a table in datasheet view
- To sort the data, click the small triangle next to the field name you want to sort by

Clear the sort

  - Select Sort A to Z to sort in ascending order or Sort Z to A to sort in descending order
  - You can only sort by one field. If you need to sort on more than one field, you must sort using design view
- To clear datasheet sorts, click the Clear All Sorts button (returns to primary key sort or QBE sort)

Notes	Activity
• Filtering means hiding records that don't meet a specified criteria • The easiest way to filter the data is to *filter by selection* ➢ Locate a record that contains the data you wish to filter by ➢ Right-click in the field that contains the data ➢ Click the appropriate filter option that appears in the popup menu (most likely *Equals…*). All records that **do not** contain the filter value will be hidden	Filter to only show Plover records
➢ Alternatively, you can click the small arrow to the right of the field name you wish to filter by. ➢ Access will display all the values that occur in that field. Click the Select All button to deselect all the values. Click the value you wish to filter by, then click the OK button ➢ Using this method, You can filter by more than one field. Click the small arrow next to another field and choose another filter value to narrow the selected records down even more.	Show Plover AND Stevens Point Show only those whose area code is NOT 715
➢ To restore all the hidden records, click the Toggle Filter  button in the Sort & Filter group of the Home tab.	Remove the filter

Sorting Query Results using Design View

• Datasheet sorting only allows one sort field • Often, you'll want to use more than one sort field ➢ When records in the primary sort field have the same value, the secondary sort field(s) values are used to *break the tie* • To designate a sort field in design view, click the box in the sort row in the column that contains the field to be sorted • From the drop down list that appears, select whether the field should be sorted in ascending or descending order.	Sort the query by City using QBE grid. Note QBE sort overrides Datasheet sort

Notes	Activity
• If multiple records have the same values in the sort field, you'll probably want to break the tie using the values in a different field. • To specify a secondary sort field, simply select the sort method (ascending or descending) for that field. Whenever the primary sort fields are identical, Access will use the secondary sort field values to sort the records **within the group with the same primary sort field values**. ➢ The secondary sort fields do not need to be sorted in the same manner (ascending, descending) as the primary sort field. • Note, Access determines the primary sort field and secondary sort field(s) based on their position in the QBE grid, **not by the order you specify their sort method**. ➢ The primary sort field must appear to the left of the second sort field(s). ➢ There can be fields between them—the primary sort field just needs to be positioned to the left of the other sort fields. ➢ If desired, you can rearrange the fields in **datasheet** view to display the query results with the fields in any order.	Sort by City, then Last Name Rearrange columns in QBE to get correct results Move City after First Name in data sheet Create 3 table query: CustName, ProductName, qty, price, purchaseDate Sort

Specifying (Filtering) Criteria in Design View

• In addition to sorting using the QBE grid, you can also specify filtering criteria using the QBE grid. • Some queries' criteria are complicated enough that they should be specified at design time. • I only use filtering in datasheet view to temporarily filter data. If the criteria are part of the query definition (requirements), I specify them in design view. • Use the Criteria rows of the QBE grid to specify conditions a record must meet to be included in the query results	New query based on tblProducts All fields Delete ID
• The easiest type of criteria to specify is *equality* or *exact match* criteria. ➢ In the criteria row of the appropriate field, enter the value the records must have in that field to be included in the query results.	Show only products who color is *various*

Notes	Activity
• You can also specify criteria that selects a *range* of values ➢ < <= > >= – Can be used for text, numeric or date data ➢ < > (used together) – Select all records that do **not** have the specified value in this field. ➢ Between value1 and value2 – Replace value1 and value2 with text, numbers or dates. – All values that fall between value1 and value2 will be included in the query results AND the records that are exactly value1 and value2 are included as well (*between* includes the end points). ➢ In ( ) – Select records whose data matches any of the values listed in parenthesis – For text values, surround each value with quotation marks. ➢ Like – Use the * *wildcard character* to designate a general pattern the field data must match to be included in the query results. – Actually, you don't need to include the keyword *like*. When Access finds the wildcard character in the criteria, it automatically adds the keyword *Like* – Example: Like "Mid-State*" matches any values that start with the specified characters. – The wildcard (*) can be placed anywhere amongst the characters: beginning, end or middle.	Price > 49.50 Price >= 49.50 QOH between 5 and 10 (note 5 and 10 included) December 2007 Color black or silver Ends with *book* Starts with *pen* Includes *ing* Reorder in 2008 Redo *month of December 2007* from above

Notes	Activity

Creating Multi-Criteria Queries

- Often your queries will contain multiple criteria (multiple conditions).
- In programming (behind the scenes in Access), multiple criteria must be linked using a *logical operator*
- There are two logical operators: AND and OR
- We use these logical operators in our everyday life
- When you use the AND operator, all the designated conditions must be true for end result to be true (record included in query results)
  - ActiveCustomer=Yes AND State="WI"
  - Only customers who are active and who live in Wisconsin are included in the query results

- When you use the OR operator, one (or both) of the conditions must be true for the end result to be true (record included in query results)
  - PreferredCustomer = True OR OrderAmt > 5000
  - All preferred customers are included in the query results along with the customers whose order amount was over $5,000. Preferred customers whose orders are over $5,000 are (definitely) included.

- Though you can use them, the Access QBE grid doesn't use the words AND nor OR
- In Access, you use the rows of the QBE to designate whether multiple conditions are connected using AND or OR
  - Criteria in the same row of the grid are connected using AND
  - Criteria in different rows are connected using OR

- The easiest way to think about how Access treats multiple criteria is: a record must match <u>all</u> the criteria **in any row** of the QBE grid to be included in the query results.

- Be extra careful when you mix OR and AND in the same query. Check the results to ensure they are what you expect.

New query (all product fields)

Color missing (null) and QOH <10

And price <100

Save qryAndExample
Copy as qryOrExample

Book OR color *various*

Copy to qryOrExample2
Show all books whose price is less than $50 or greater than $100

Book and price >100 or <50

Note: numerous items that are not books.

Merge the OR criteria into one row

Repeat the book criteria in each row

Notes	Activity

Creating Calculated Fields

- With the power of today's computers, Access can quickly combine data from multiple fields into equations that calculate new values that are not stored in the data but only appear in the results of a query.
  - Calculated fields can also be included in forms and reports
  - Because of this fact, most database designers remove all fields from the database that can be calculated and use queries to calculate the values only when needed.
- The true power comes from Access' ability to combine fields from multiple tables in one equation

- The easiest way to create calculated fields in Access is to use the Expression Builder
  - The Expression Builder allows you to select fields from a list and operators from a list to create complicated (or simple) equations.
  - The alternative is to type the field names and operators manual, which is more susceptible to errors.

Notes	Activity

- Create a query in design view
- Add non-calculated fields to the query
  - Optional. A query can be comprised of just calculated fields, or the calculated fields can precede the non-calculated fields.
  - Often, the support data used in the calculation is included in the query as well.
- Click in the next available QBE column Field row
- Click the Expression Builder button Builder in the Query Tools Design tab, Query Setup group.
- Double-click the + symbol next to the Tables folder to expand the list of tables
- Click the table that contains the field you wish to insert into the equation. The field names for the table will appear in the second column of the Expression Builder dialog box.
- Double-click the field name to insert it into the expression
  - Access includes both the table name and field with all appropriate designation characters (! [ ])
- Select an operator by clicking its button or typing it into the equation
- Repeat for all fields to be included in the equation
- Use regular editing techniques (delete, highlighting, etc) to change the expression if necessary

- Access will not verify the validity of your equation until you try to run the query.
  - Error messages often don't help determine what's wrong.
  - Proofread your equation to uncover the error.
  - If you get the *Enter Parameter Value* dialog box, you inserted a field in the equation that Access doesn't recognize.
  - To correct the error, click the calculated field in the QBE and launch the Expression Builder again. The Expression Builder will already include the equation you entered previously.

tblProducts

Product Name, price, QOH

Calculate *stock value*

Notes	Activity

- Naming the Calculated field
  - By default, Access names the calculated field Expr#
  - This name is not very handy if you need to refer to the field at a later time (form, report or another query)
  - One technique you could use is to change the field's Caption using its properties (see Formatting Calculated Fields below)
  - I prefer to add the name of the field in the QBE grid itself.
    - Point to Expr# at the beginning of the equation in the QBE grid
    - Double-click Expr# to select it.
    - Type a new name for the field.
    - CAUTION: don't delete the colon (:) that follows the field name. It must be there to separate the field name from the equation.
    - Tip: You can enter the field name in the Expression Builder. Precede the expression with your field name **followed by a colon**.

- Formatting Calculated Fields
  - Normal fields have their formatting designated in the query's design structure, but calculated fields are not included in the structure.
  - To change the formatting of a calculated field, you must access it's properties
    - Right-click the field and select Properties from the popup menu
    - Or, click the Property Sheet button  in the Query Tools Design tab, Show/Hide group
  - In the Properties dialog box, designate the format for the field and if appropriate the number of decimal places.
  - Tip: You can leave the Properties dialog box open and format multiple fields.
  - Tip: Select multiple fields (see above) to change all their properties to the same values at once.

Format Stock Value for standard, 2

Notes	Activity
• You can use a calculated field as a sort field in a query • You can include criteria in calculated fields. • To use a calculated field to create another calculated field, you must first save the query. When you then reopen the Expression Builder, the calculated field will be included in the list of fields included in the query (folder above Tables).	Sort by Stock value descending tblCustomer concatenate last and first names, area code and phone

Aggregate Queries

- *Aggregate* means *combined*. Access aggregate queries combine data from multiple records to create statistics.
  - Note this differs from calculated fields which combine the values of multiple *fields*.
- An aggregate query is a separate kind of query, it doesn't just list matching records it combines them.

- To create an aggregate query
  - Create a new query in Design view and select the table(s) to be included
  - Click the Totals button Σ in the Show/Hide group of the Query Tools Design tab
  - Access will add a new row to the QBE grid: the Total row.
    - I believe this row is misnamed. The Total row has the ability to calculate more than just sums (totals)
  - Select the fields (most often numeric) to calculate statistics for and add them to the grid
    - Tip: to calculate more than one statistic for a field, add the same field to the grid multiple times
  - In the Totals row for each field, replace Group By with the statistic to be calculated
    - We'll be using Sum, Avg (average), Min (minimum), Max (maximum) and Count

tblOrders, tblCustomers, tblProducts

Count the total number of orders

Calculate total quantity

Calculate maximum quantity

Calculate average price

Notes	Activity
• Naming Aggregate Fields ➢ Access assigns default names to aggregate fields. To designate your own name for a field: – Access the field properties and change the Caption property. – Or, I prefer to include the field name in the QBE grid. ▪ Click at the beginning of the field name ▪ Enter your preferred field name ▪ End the field name with a colon (:) **required**	Name each value appropriately
• Formatting Aggregate Fields ➢ You format aggregate fields in the same way as calculated fields (see above), using the Properties dialog box.	
• Generating Group Statistics ➢ By default, when you use an aggregate query to generate statistics, Access generates the statistics using all the records in the database, giving the *grand total*, grand average, etc. ➢ You can easily have Access generate subtotals for different groups of data. – Add the field that contains the group names to the QBE grid, but DO NOT change the Total row from Group By ➢ Grouped statistics generally look best with the Group By field listed first	Group by Customer (first field) Group by Product
➢ When using Grouped statistics, you can designate how the results should be sorted ➢ When using Grouped statistics, you can designate criteria a group must meet to be included in the query results. ➢ You can create calculated fields and generate aggregate query statistics on them as well.	Only include items where total quantity >=5 Calculate total income (quantity * price) total Group by Customer

Notes	Activity
• Creating Aggregate Values in Datasheet View ➢ Access 2007 provides a new feature that allows you to add statistics in a separate row of any datasheet view (table or query). ➢ While in datasheet view click the Totals Σ button in the Home tab, Records group. This will add a Totals row after the new record row at the bottom of the datasheet ➢ Click in the column you want statistics for. ➢ Use the dropdown arrow to select the desired statistic. – Note there is no way to add multiple statistics for one field using this technique. ➢ Tip: To add grand totals to aggregate queries, add the totals (using this technique) to the datasheet view.	Add total income to query that groups by Customer