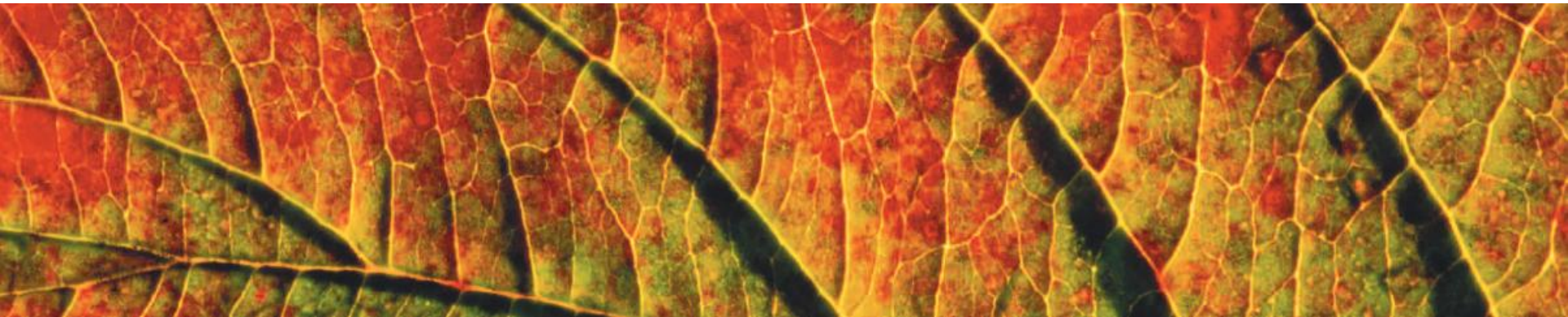


Access Tutorial 3

Maintaining and Querying a Database

Microsoft[®] Office 2010



Objectives

- Find, modify, and delete records in a table
- Learn how to use the Query window in Design view
- Create, run, and save queries
- Update data using a query datasheet
- Create a query based on multiple tables
- Sort data in a query
- Filter data in a query

Objectives

- Specify an exact match condition in a query
- Change the font size and alternate row color in a datasheet
- Use a comparison operator in a query to match a range of values
- Use the And and Or logical operators in queries
- Create and format a calculated field in a query
- Perform calculations in a query using aggregate functions and record group calculations
- Change the display of database objects in the Navigation Pane

Query Window in Design View

When you are constructing a query, you can see the results at any time by clicking the View button or the Run button. In response, Access displays the query datasheet, which contains the set of fields and records that results from answering, or running, the query.

The top portion of the Query window in Design view contains the field list (or lists) for the table(s) used in the query.

The default query name, Query1, is displayed on the tab for the query. You change the default query name to a more meaningful one when you save the query.

The bottom portion of the Query window in Design view contains the **design grid**. In the design grid, you include the fields and record selection criteria for the information you want to see.

In the Query Type group, the active Select button indicates that you are creating a select query, which is the default type of query. A **select query** is one in which you specify the fields and records you want Access to select.

Each **field list** contains the fields for the table(s) you are querying. The table name appears at the top of the field list, and the fields are listed in the order in which they appear in the table. Notice that the primary key for the table is identified by the key symbol.

You can scroll the field list to see more fields, or you can expand the field list box by dragging its borders to display all the fields and the complete field names. When all the field names are displayed, the scroll box disappears.

The Ribbon displays the Query Tools Design tab with options for creating and running queries. Note the Query Type group on the Design tab; it provides buttons you can click to create various types of queries.

In Design view, you specify the data you want to view by constructing a query by example. When you use **query by example (QBE)**, you give Access an example of the information you are requesting. Access then retrieves the information that precisely matches your example.

Each column in the design grid contains specifications about a field you will use in the query. You can choose a single field for your query by double-clicking the field name to place it in the next available design grid column.

The view buttons on the status bar allow you to change to a different view; for example, you can click the Datasheet View button to run the query and display the results in Datasheet view.

Updating a Database

- **Updating, or maintaining,** a database is the process of adding, modifying, and deleting records in database tables to keep them current and accurate
 - Navigation mode
 - Editing mode

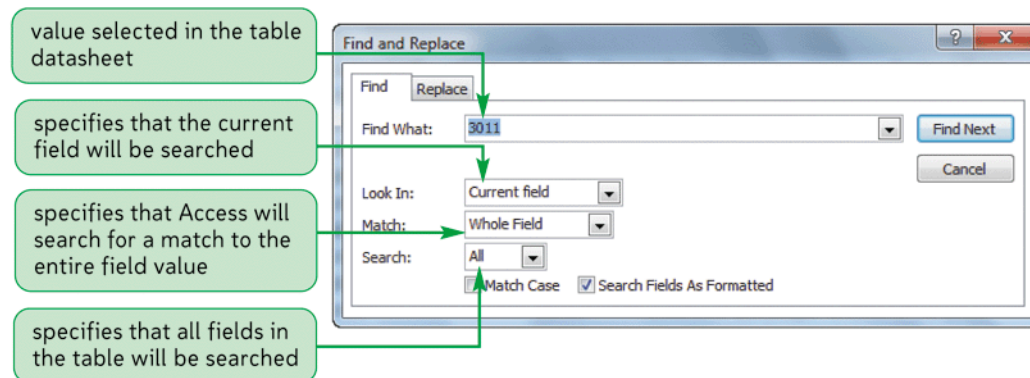
Figure 3-1 Navigation mode and editing mode keystroke techniques

Press	To Move the Selection in Navigation Mode	To Move the Insertion Point in Editing Mode
←	Left one field value at a time	Left one character at a time
→	Right one field value at a time	Right one character at a time
Home	Left to the first field value in the record	To the left of the first character in the field value
End	Right to the last field value in the record	To the right of the last character in the field value
↑ or ↓	Up or down one record at a time	Up or down one record at a time and switch to navigation mode
Tab or Enter	Right one field value at a time	Right one field value at a time and switch to navigation mode
Ctrl+Home	To the first field value in the first record	To the left of the first character in the field value
Ctrl+End	To the last field value in the last record	To the right of the last character in the field value

Finding Data in a Table

- The **Find command** allows you to search a table or query datasheet, or a form, to locate a specific field value or part of a field value

Figure 3-3 Find and Replace dialog box



Deleting a Record

- With the table open in Datasheet view, click the row selector for the record you want to delete
- In the Records group on the Home tab, click the Delete button (or right-click the row selector for the record, and then click Delete Record on the shortcut menu)
- In the dialog box asking you to confirm the deletion, click the Yes button

Deleting a Record

Figure 3-4 Related records from the Invoice table in the subdatasheet

plus signs indicate the table is related to another table

minus sign appears when related records are displayed

subdatasheet with related records from the Invoice table

ContractID	InvoiceID	InvoiceAmt	InvoiceDate	InvoiceItem	InvoicePaid	Click to Action
3093	11085	5,000	7/25/2014	Residential landscape plan		
3094	11015	5,000	7/26/2014	Front walk and drive design, residential		
3095	11045	14,500	6/29/2014	Handicap accessibility upgrades to public housing site		
3097	11080	8,500	8/2/2014	Landscape design for renovation of restaurant front en		
3098	11065	35,000	7/15/2014	Design of a small town park		
3099	11067	6,500	7/25/2014	Schematic landscape design for daycare center		
3100	11031	10,500	8/8/2014	Schematic landscape design for daycare center		
3101	11030	9,500	8/24/2014	Landscape design for renovation of a restaurant site		
* Invoice Num Invoice Date Invoice Item Invoice Amt Invoice Paid Click to Action						
	2631		11/28/2014	Schematic Plan	\$2,500.00	
	2632		12/28/2014	Permitting	\$1,500.00	
	2633		03/14/2015	Planting Plan	\$4,000.00	
	2634		05/15/2015	Lighting Plans	\$1,500.00	
3103	11087	252,000	8/17/2014	Landscape plans for large-scale housing development		
3104	11073	6,500	7/28/2014	Front walk and drive design, residential		

Record: 1 of 4 No Filter Search

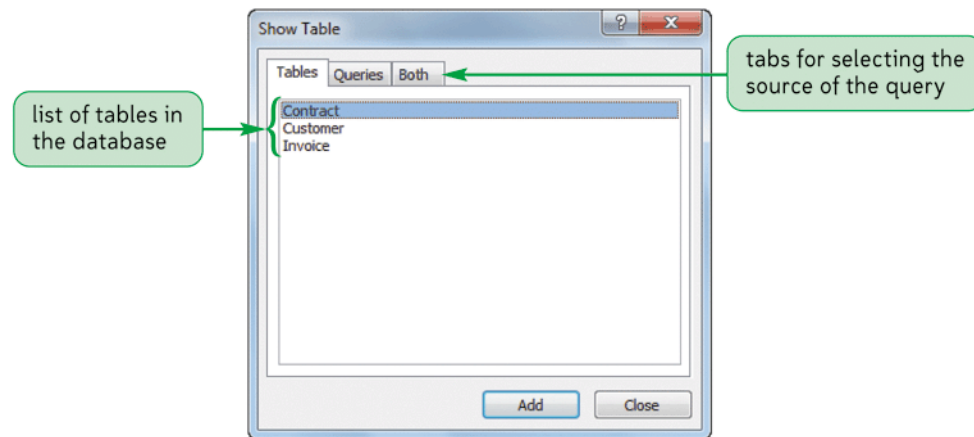
Introduction to Queries

- Access provides powerful query capabilities that allow you to do the following:
 - Display selected fields and records from a table
 - Sort records
 - Perform calculations
 - Generate data for forms, reports, and other queries
 - Update data in the tables in a database
 - Find and display data from two or more tables
- A **Query Wizard** prompts you for information by asking a series of questions and then creates the appropriate query based on your answers

Introduction to Queries

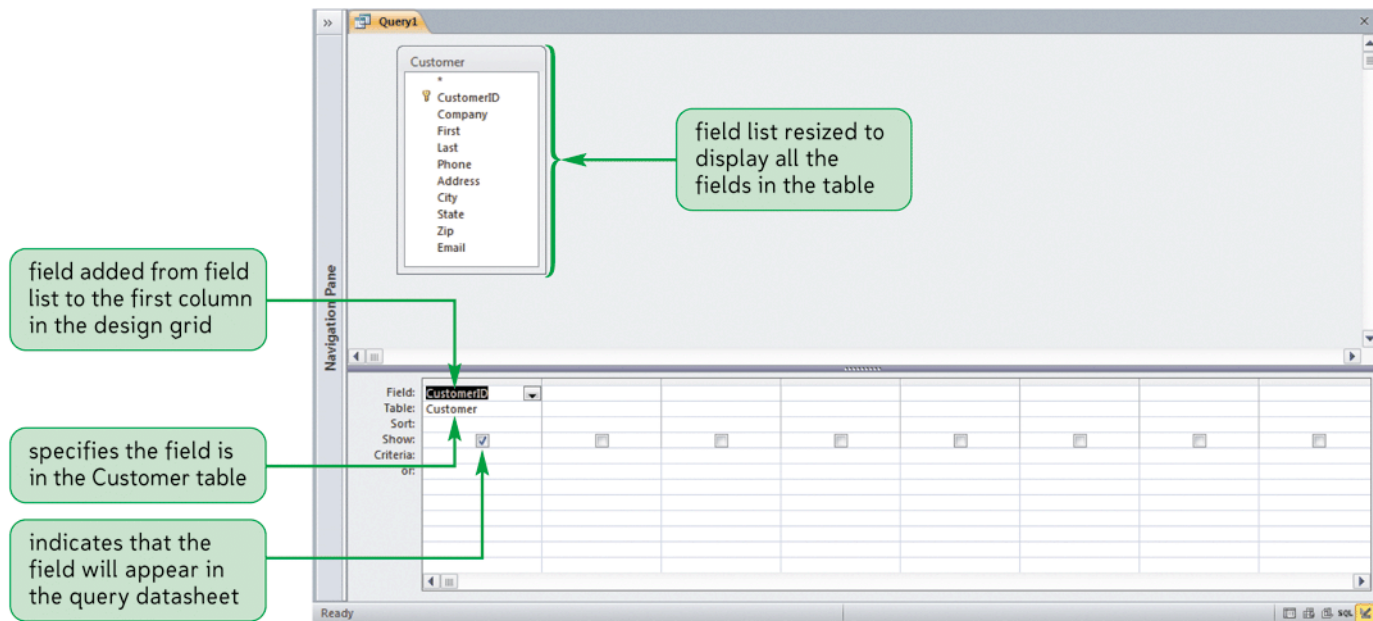
- Click the **Create** tab on the Ribbon
- In the Other group on the Create tab, click the **Query Design** button

Figure 3-5 Show Table dialog box



Introduction to Queries

Figure 3-6 Field added to the design grid



Updating Data Using a Query

- You can update the data in a table using a query datasheet
- After updating the query, close the table

Creating a Multitable Query

- A multitable query is a query based on more than one table
- If you want to create a query that retrieves data from multiple tables, the tables must have a common field

Figure 3-8

Datasheet for query based on the Customer and Contract tables

City	Company	First Name	Last Name	Signing Date	Contract Amt
Rockford		Student First	Student Last	2/9/2013	4,000
Holland		Owen	Hawes	3/1/2013	1,500
Holland		Owen	Hawes	7/8/2013	2,250
Holland		Owen	Hawes	11/30/2013	4,000
Saint Joseph		Melissa	Caputo	4/7/2013	1,250
Grand Rapids	Grand Rapids Engineering Dept.	Anthony	Rodriguez	3/1/2013	2,250
Holland		Amol	Mehta	6/22/2013	6,500
South Haven		John	Weiss	8/27/2013	1,000
South Haven		John	Weiss	1/20/2014	1,750
South Haven		John	Weiss	7/26/2014	5,000
Battle Creek	Battle Creek Dental Partners	Harry	Billings	4/25/2014	13,750
Lansing		Karen	O'Brien	2/18/2013	300
Holland	Finn's on the Waterfront	Devin	Finnerty	9/23/2013	7,500
Holland	Finn's on the Waterfront	Devin	Finnerty	2/24/2014	15,750
Holland	Finn's on the Waterfront	Devin	Finnerty	4/14/2014	22,800
Grand Haven	Happy Haven Day Care	Kathy	Rowe	8/8/2014	10,500
Saugatuck		Pam	Wallner	10/5/2013	18,000
Lansing	M. Grant Investment Company	Alex	Engber	3/11/2013	165,000
Grand Rapids	RiverView Development Company	Susan	Darcy	5/3/2013	28,000
Kalamazoo		Michael	Ingram	6/11/2013	5,250
Grand Rapids	Monroe State College	Rachel	Kirk	4/14/2013	22,000
Kalamazoo	Kalamazoo Neighborhood Development	James	Blackhawk	6/22/2013	68,000
Kalamazoo	Kalamazoo Neighborhood Development	James	Blackhawk	6/22/2013	34,000
Kalamazoo	Kalamazoo Neighborhood Development	James	Blackhawk	6/29/2014	14,500
Kalamazoo	Kalamazoo Neighborhood Development	James	Blackhawk	8/2/2014	50,000

fields from the
Customer table

fields from the
Contract table

Sorting Data in a Query

- **Sorting** is the process of rearranging records in a specified order or sequence
- To sort records, you must select the **sort field**, which is the field used to determine the order of records in the datasheet

Figure 3-9

Sorting results for different data types

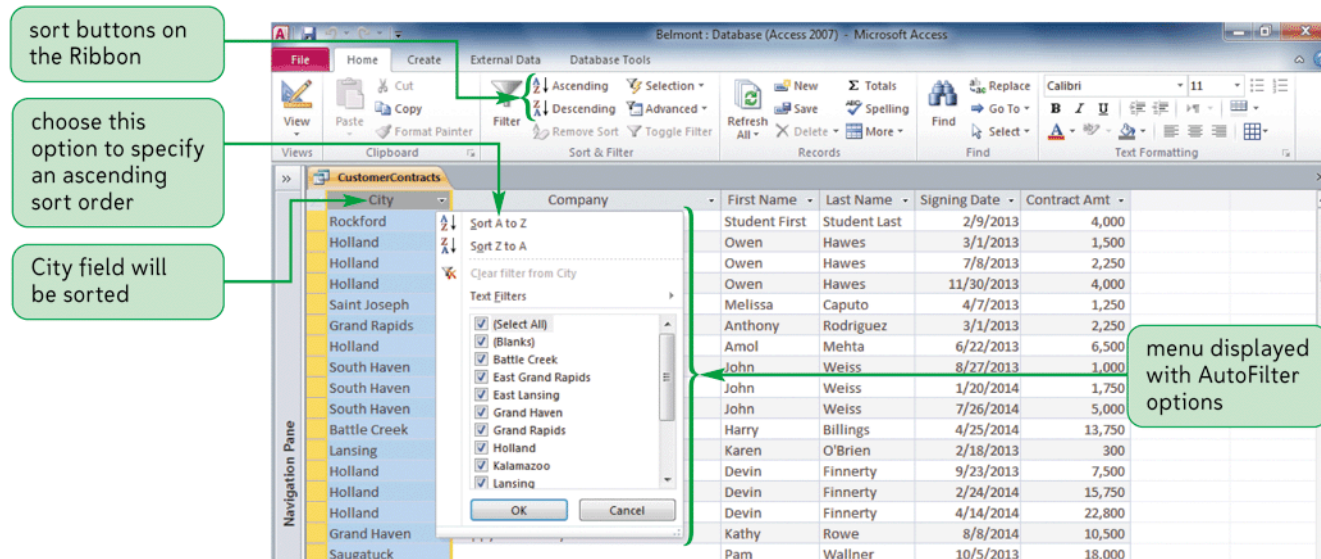
Data Type	Ascending Sort Results	Descending Sort Results
Text	A to Z	Z to A
Number	lowest to highest numeric value	highest to lowest numeric value
Date/Time	oldest to most recent date	most recent to oldest date
Currency	lowest to highest numeric value	highest to lowest numeric value
AutoNumber	lowest to highest numeric value	highest to lowest numeric value
Yes/No	yes (check mark in check box) then no values	no then yes values

Using an AutoFilter to Sort Data

- The **AutoFilter** feature enables you to quickly sort and display field values in various ways
- Clicking the arrow in a column heading displays the AutoFilter menu

Figure 3-10

Using an AutoFilter to sort records in the datasheet



Sorting a Query Datasheet

- In the query datasheet, click the arrow on the column heading for the field you want to sort
- In the menu that opens, click Sort A to Z for an ascending sort, or click Sort Z to A for a descending sort

or

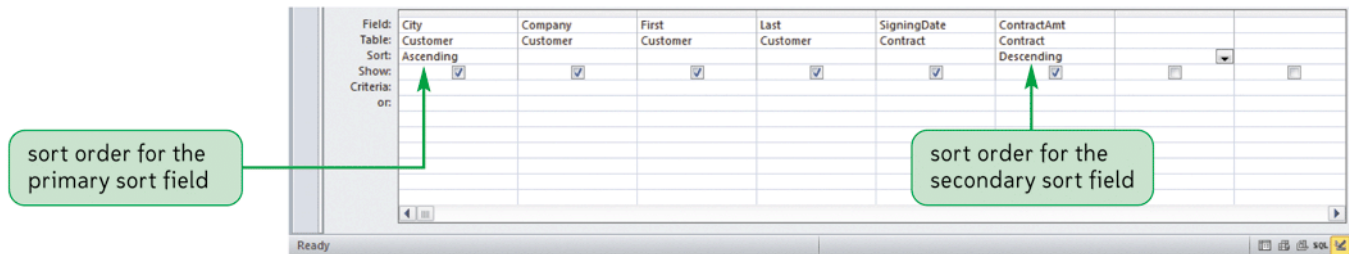
- In the query datasheet, select the column or adjacent columns on which you want to sort
- In the Sort & Filter group on the Home tab, click the Ascending button or the Descending button

or

- In Design view, position the fields serving as sort fields from left to right
- Click the right side of the Sort box for the field you want to sort, and then click Ascending or Descending for the sort order

Sorting a Query Datasheet

Figure 3-11 Selecting two sort fields in Design view



Using Filter By Selection

- A **filter** is a set of restrictions you place on the records in an open datasheet or form to *temporarily* isolate a subset of the records
- In the datasheet or form, select part of the field value that will be the basis for the filter; or, if the filter will be based on the entire field value, click anywhere within the field value
- In the Sort & Filter group on the Home tab, click the Selection button, and then click the type of filter you want to apply

Using Filter By Selection

Figure 3-13 Using Filter By Selection

options for the type of filter to apply

current field is the basis for the filter

City	Company	First Name	Last Name	Signing Date	Contract Amt
Battle Creek	Walker Investment Company	Nancy	Belanger	8/17/2014	252,000
Battle Creek	Battle Creek Dental Partners	Harry	Billings	4/25/2014	13,750
Battle Creek	Fox and Hound Grille	Steve	Gorski	2/19/2013	6,500
East Grand Rapids	Dept. of Neighborhood Development	Sarah	Russell	8/25/2014	38,000
East Grand Rapids	Dept. of Neighborhood Development	Sarah	Russell	2/3/2014	38,000
East Grand Rapids	Dept. of Neighborhood Development	Sarah	Russell	3/3/2014	35,000
East Grand Rapids	Dept. of Neighborhood Development	Sarah	Russell	6/14/2014	25,500
East Grand Rapids		Jerome	Smith	6/1/2014	5,000
East Lansing	Hopedale State College	John	Williams	8/11/2013	19,000
East Lansing	Hopedale State College	John	Williams	3/25/2013	15,500
Grand Haven	Happy Haven Day Care	Kathy	Rowe	8/8/2014	10,500
Grand Rapids	Grand Rapids Housing Authority	Jessica	Ropiak	6/23/2014	52,500
Grand Rapids	Legacy Companies, LTD.	Michael	Faraci	6/3/2013	48,500
Grand Rapids	G.R. Neighborhood Development Corp.	Matthew	Fraser	3/11/2014	46,000
Grand Rapids	G.R. Neighborhood Development Corp.	Matthew	Fraser	8/18/2014	41,000

Selection Criteria in Queries

When creating queries in Design view, you can enter criteria so that Access will display only selected records in the query results.

Field:	CustomerID	Company	First	Last	City
Table:	Customer	Customer	Customer	Customer	Customer
Sort:					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:					"Kalamazoo"
or:					

To define a condition for a field, you place the condition in the field's Criteria box in the design grid.

To tell Access which records you want to select, you must specify a condition as part of the query. A **condition** is a criterion, or rule, that determines which records are selected.

The results of a query containing selection criteria include only the records that meet the specified criteria.

Customer ID	Company	First Name	Last Name	City
11042		Michael	Ingram	Kalamazoo
11045	Kalamazoo Neighborhood Development	James	Blackhawk	Kalamazoo
11072	Sierra Investment Company	Rodrigo	Valencia	Kalamazoo

The results of this query show only customers from Kalamazoo because the condition "Kalamazoo" in the City field's Criteria box specifies that Access should select records only with City field values of Kalamazoo. This type of condition is called an **exact match** because the value in the specified field must match the condition exactly in order for the record to be included in the query results.

Field:	InvoiceNum	InvoiceDate	InvoiceAmt	
Table:	Invoice	Invoice	Invoice	
Sort:				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:			> 50000	
or:				

A condition usually consists of an operator, often a comparison operator, and a value. A **comparison operator** asks Access to compare the value in a field to the condition value and to select all the records for which the condition is true.

Invoice Num	Invoice Date	Invoice Amt
2063	07/11/2015	\$70,000.00
2453	05/05/2017	\$85,000.00
2613	12/17/2017	\$105,000.00
2614	09/30/2019	\$77,000.00

The results of this query show only those invoices with amounts greater than \$50,000 because the condition >50000, which uses the greater than comparison operator, specifies that Access should select records only with InvoiceAmt field values over \$50,000.

Field:	ContractNum	ContractAmt	SigningDate	ContractType
Table:	Contract	Contract	Contract	Contract
Sort:				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:			Between #9/1/2013# And #11/30/2013#	
or:				

Most comparison operators, such as Between...And..., ask Access to select records that match a range of values for the condition—in this case, all records with dates that fall within the range shown.

Contract Num	Contract Amt	Signing Date	Contract Type
3046	300	9/2/2013	Consultation for back yard, residential
3048	7,500	9/23/2013	Landscape design for restaurant site
3051	18,000	10/5/2013	Site layout and landscape design for residential site
3053	375	9/15/2013	Consultation for front yard, residential
3056	32,500	9/30/2013	Handicap accessibility upgrades to public housing site
3057	15,500	9/30/2013	Handicap accessibility upgrades to public housing site
3060	4,000	11/30/2013	Front walk and drive design, residential

The results of this query show only those contracts that were signed in the fall of 2013 because the condition in the SigningDate's Criteria box specifies that Access should select records only with a signing date between 9/1/2013 and 11/30/2013.

Defining Record Selection Criteria for Queries

- Just as you can display selected fields from a database in a query datasheet, you can display selected records
- To tell Access which records you want to select, you must specify a condition as part of the query
- A condition usually includes a comparison operator

Defining Record Selection Criteria for Queries

Figure 3-15 Access comparison operators

Operator	Meaning	Example
=	equal to (optional; default operator)	= "Hall"
<>	not equal to	<> "Hall"
<	less than	< #1/1/99#
<=	less than or equal to	<= 100
>	greater than	> "C400"
>=	greater than or equal to	>= 18.75
Between ... And ...	between two values (inclusive)	Between 50 And 325
In ()	in a list of values	In ("Hall", "Seeger")
Like	matches a pattern that includes wildcards	Like "706*"

Specifying an Exact Match

- With an **exact match**, the value in the specified field must match the condition exactly in order for the record to be included in the query results

Figure 3-16 Design grid after adding fields from both tables

The screenshot shows the Microsoft Access Design Grid. The grid has columns for fields from two tables: 'Customer' and 'Contract'. The 'Customer' table fields are Company, First, Last, Phone, Address, City, and Email. The 'Contract' table field is ContractNum. The 'Field' column lists these fields, and the 'Table' column lists the source table. The 'Sort' column has checkboxes for each field. The 'Criteria' and 'or' rows are empty. A green callout box with the text 'enter condition here' and an arrow points to the 'Criteria' row for the 'City' field.

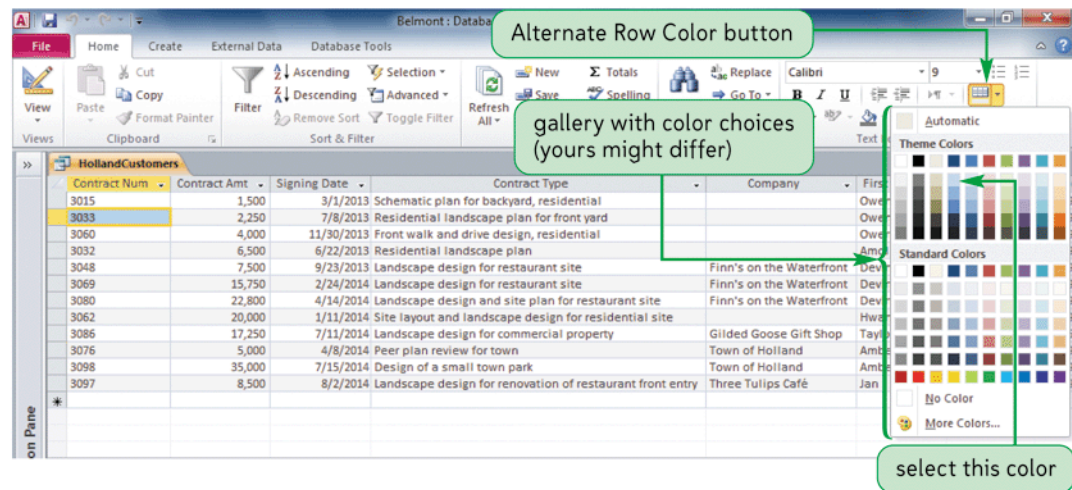
Field:	Company	First	Last	Phone	Address	City	Email	ContractNum
Table:	Customer	Customer	Customer	Customer	Customer	Customer	Customer	Contract
Sort:								
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:								
or:								

Changing a Datasheet's Appearance

- You can change the characteristics of a datasheet, including the font type and size of text in the datasheet, to improve its appearance or readability
- A **theme** is a predefined set of formats including colors, fonts, and other effects that enhance an object's appearance and usability

Changing a Datasheet's Appearance

Figure 3-22 Gallery of color choices for alternate row color



Using a Comparison Operator to Match a Range of Values

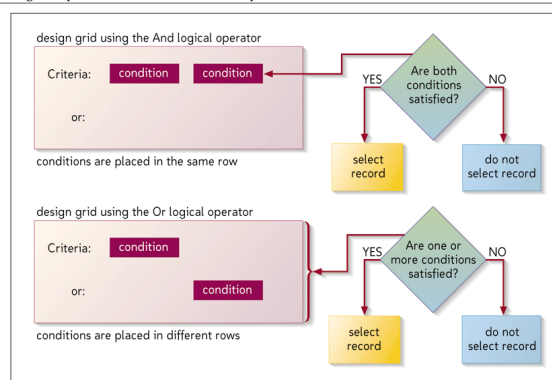
Figure 3-24 Criteria entered for the ContractAmt field

[illegible]

Defining Multiple Selection Criteria for Queries

- Multiple conditions require you to use **logical operators** to combine two or more conditions
 - Use the **And logical operator** when you want a record selected only if two or more conditions are met
 - Use the **Or logical operator** when you place conditions in different Criteria rows

Figure 3-27 Logical operators And and Or for multiple selection criteria



Defining Multiple Selection Criteria for Queries

Figure 3-28 Query to find customers in Lansing with large contracts

The screenshot shows the Query Design view in Microsoft Access. The design grid has columns for 'Company Customer', 'First Customer', 'Last Customer', 'Phone Customer', 'City Customer', 'ContractAmt Contract', and 'SigningDate Contract'. The 'Criteria' row contains the following values: a checkmark for 'Company Customer', a checkmark for 'First Customer', a checkmark for 'Last Customer', a checkmark for 'Phone Customer', the text '"Lansing"' for 'City Customer', the text '>25000' for 'ContractAmt Contract', and a checkmark for 'SigningDate Contract'. A green callout box with the text 'And logical operator; conditions entered in the same row' has two green arrows pointing to the '"Lansing"' and '>25000' entries in the 'Criteria' row. The status bar at the bottom left says 'Ready'.

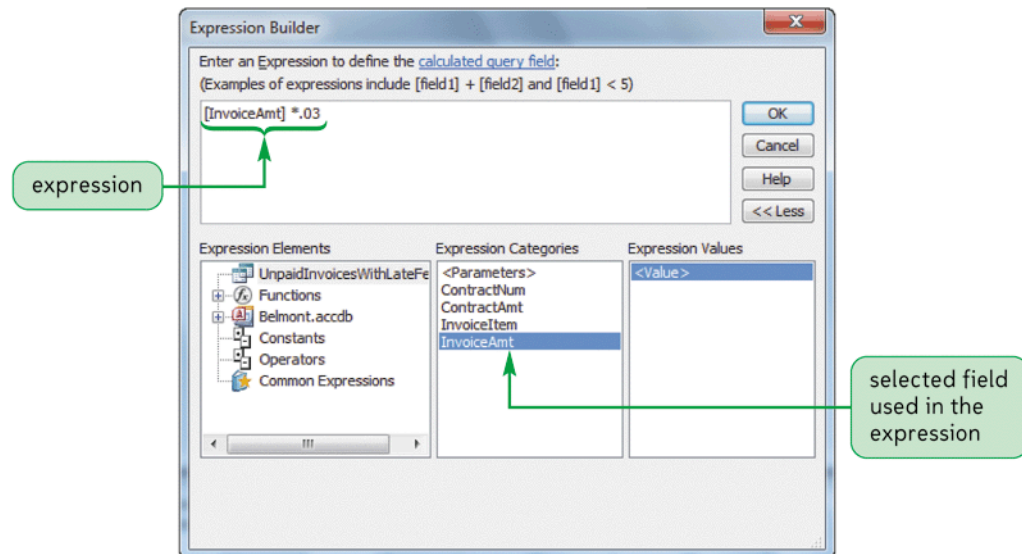
Field:	Company Customer	First Customer	Last Customer	Phone Customer	City Customer	ContractAmt Contract	SigningDate Contract
Table:	Customer	Customer	Customer	Customer	Customer	Contract	Contract
Sort:							
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:					"Lansing"	>25000	
or:							

Creating a Calculated Field

- In addition to using queries to retrieve, sort, and filter data in a database, you can use a query to perform calculations
- To perform a calculation, you define an **expression** containing a combination of database fields, constants, and operators
 - **Expression Builder** is an Access tool that makes it easy for you to create an expression
- Open the query in Design view
- In the design grid, click the Field box in which you want to create an expression
- In the Query Setup group on the Design tab, click the Builder button
- Use the expression elements and common operators to build the expression, or type the expression directly in the expression box
- Click the OK button

Creating a Calculated Field

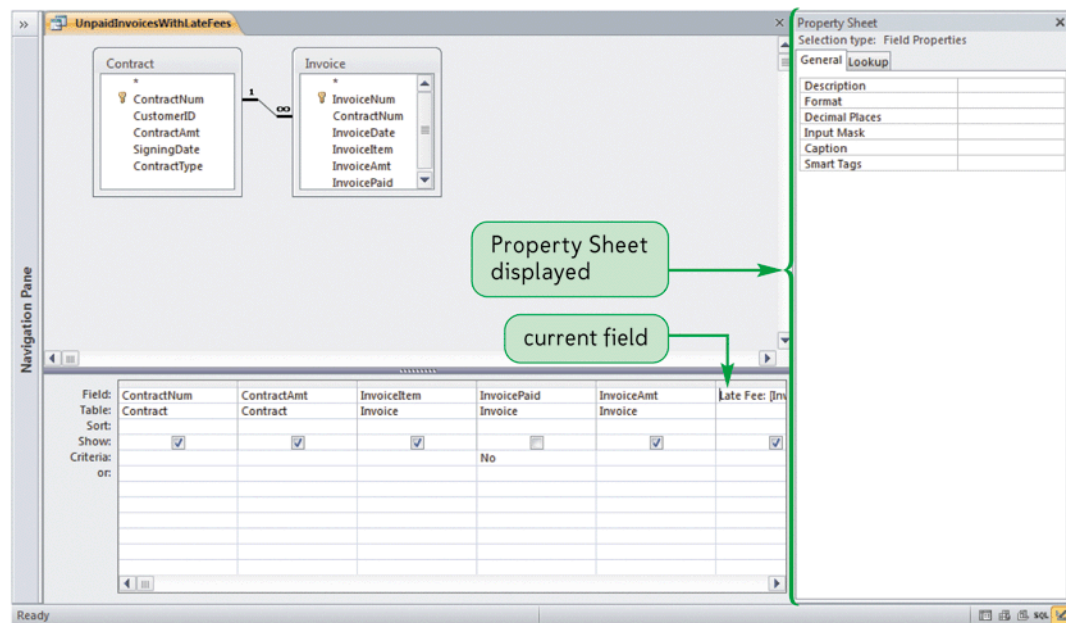
Figure 3-32 Completed expression for the calculated field



Formatting a Calculated Field

- You can specify a particular format for a calculated field, just as you can for any field, by modifying its properties

Figure 3-34 Property Sheet for the calculated field



Using Aggregate Functions

- **Aggregate functions** perform arithmetic operations on selected records in a database
- If you want to quickly perform a calculation using an aggregate function in a table or query datasheet, you can use the Totals button in the Records group on the Home tab

Figure 3-35 Frequently used aggregate functions

Aggregate Function	Determines	Data Types Supported
Average	Average of the field values for the selected records	AutoNumber, Currency, Date/Time, Number
Count	Number of records selected	AutoNumber, Currency, Date/Time, Memo, Number, OLE Object, Text, Yes/No
Maximum	Highest field value for the selected records	AutoNumber, Currency, Date/Time, Number, Text
Minimum	Lowest field value for the selected records	AutoNumber, Currency, Date/Time, Number, Text
Sum	Total of the field values for the selected records	AutoNumber, Currency, Date/Time, Number

Using Aggregate Functions

Figure 3-36 Using aggregate functions in the Total row

The screenshot displays a Microsoft Access datasheet view for a table named 'Contract'. The table has columns: Contract Num, Customer ID, Contract Amt, Signing Date, Contract Type, and Click to Add. The data rows are as follows:

Contract Num	Customer ID	Contract Amt	Signing Date	Contract Type	Click to Add
3094	11015	5,000	7/26/2014	Front walk and drive design, residential	
3095	11045	14,500	6/29/2014	Handicap accessibility upgrades to public housing site	
3097	11080	8,500	8/2/2014	Landscape design for renovation of restaurant front en	
3098	11065	35,000	7/15/2014	Design of a small town park	
3099	11067	6,500	7/25/2014	Schematic landscape design for daycare center	
3100	11031	10,500	8/8/2014	Schematic landscape design for daycare center	
3103	11087	252,000	8/17/2014	Landscape plans for large-scale housing development	
3104	11073	6,500	7/28/2014	Front walk and drive design, residential	
3105	11084	5,000	8/24/2014	Residential landscape plan	
3108	11045	50,000	8/2/2014	Design of a small city park	
3109	11059	41,000	8/18/2014	Landscape design for affordable housing site	
3110	11079	38,000	8/25/2014	Renovation of playground at elementary school	
Total					

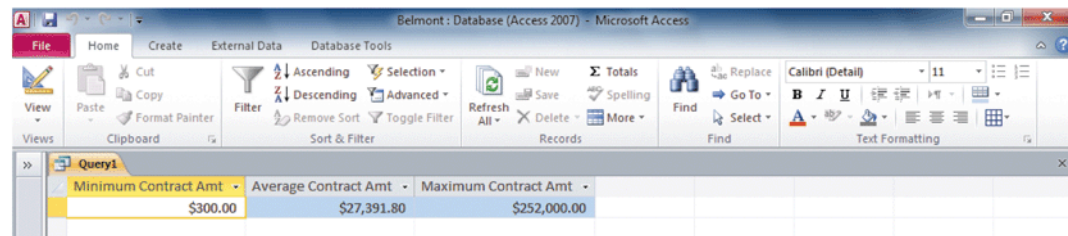
Annotations in the image:

- A green box labeled 'current field' points to the 'Contract Amt' column header.
- A green box labeled 'Total row in the datasheet' points to the 'Total' row.
- A green box labeled 'menu of aggregate functions for a Currency field' points to the dropdown menu that appears when the 'Total' row is selected, showing options: None, Sum, Average, Count, Maximum, Minimum, Standard Deviation, and Variance.

Creating Queries with Aggregate Functions

- Aggregate functions operate on the records that meet a query's selection criteria

Figure 3-38 Result of the query using aggregate functions



The screenshot shows the Microsoft Access interface for a database named 'Belmont: Database (Access 2007)'. The 'Query1' window is open, displaying a table with three columns: 'Minimum Contract Amt', 'Average Contract Amt', and 'Maximum Contract Amt'. The values are \$300.00, \$27,391.80, and \$252,000.00 respectively. The table is displayed in a grid view with a light blue header row and a white data row.

Minimum Contract Amt	Average Contract Amt	Maximum Contract Amt
\$300.00	\$27,391.80	\$252,000.00

Using Record Group Calculations

- The **Group By** operator divides the selected records into groups based on the values in the specified field

Figure 3-39 Aggregate functions grouped by City

The screenshot shows the Microsoft Access interface with a query named 'ContractAmtStatisticsByCity'. The query results are displayed in a table with the following data:

City	Minimum Contract Amt	Average Contract Amt	Maximum Contract Amt
Battle Creek	\$6,500.00	\$90,750.00	\$252,000.00
East Grand Rapids	\$5,000.00	\$28,300.00	\$38,000.00
East Lansing	\$15,500.00	\$17,250.00	\$19,000.00
Grand Haven	\$10,500.00	\$10,500.00	\$10,500.00
Grand Rapids	\$2,250.00	\$31,119.23	\$52,500.00
Holland	\$1,500.00	\$12,170.83	\$35,000.00
Kalamazoo	\$5,250.00	\$62,791.67	\$205,000.00
Lansing	\$300.00	\$43,966.67	\$165,000.00
Rockford	\$4,000.00	\$4,500.00	\$5,000.00
Saint Joseph	\$375.00	\$5,937.50	\$16,500.00
Saugatuck	\$6,500.00	\$15,166.67	\$21,000.00
South Haven	\$300.00	\$2,610.00	\$5,000.00

Annotations in the image:

- A green box labeled 'record groups' points to the 'City' column.
- A green box labeled 'aggregate function results' points to the 'Minimum Contract Amt', 'Average Contract Amt', and 'Maximum Contract Amt' columns.

Working with the Navigation Pane

- The Navigation Pane is the main area for working with the objects in a database
- The Navigation Pane divides database objects into categories, and each category contains groups
 - **Object Type**
 - **All Access Objects**

Figure 3-40 Navigation Pane menu

