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FIT1013 Digital Futures: IT for Business
Week 11 : Database Queries
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On completion of your study this week, you should aim to:

- Create a query based on multiple tables
- 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
- Use the Like, In, Not, and & operators in queries
- Create a parameter query
- Use query wizards to create a crosstab query, a find duplicates query, and a find unmatched query
- Create a top values query

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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
- The answer to a select query is returned in the form of a datasheet
 - The result of a query is also referred to as a recordset because the query produces a set of records that answers your question



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Creating and Running a Query

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Creating and Running a Query (Cont.)

Figure 3-8 Datasheet displayed after running the query

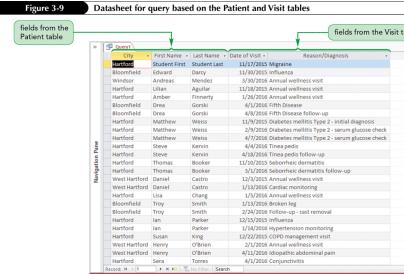
Patient ID	Last Name	First Name	City	Email
22500	Student	First	Hartford	student@example.edu
22501	Danielle	Andrew	Bloomfield	danielle@example.org
22502	Mendez	Andres	Windsor	mendez@example.org
22503	Aguilar	Lillian	Hartford	aguilar@example.com
22504	Finnerty	Amber	Hartford	a.finnerty@example.com
22505	Gorski	Drea	Bloomfield	gorski@example.org
22506	Weiss	Matthew	Hartford	matt.weiss@example.org
22507				



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Creating a Multitable Query

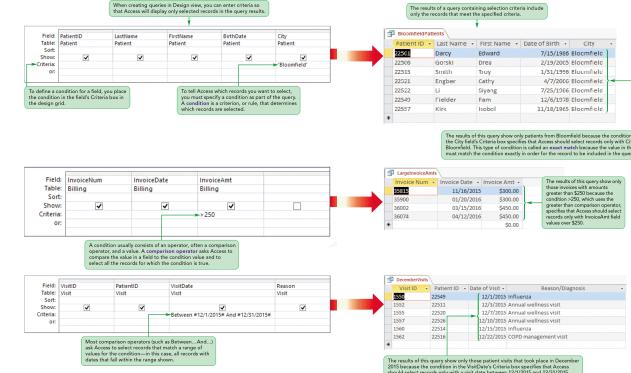
- A multitable query is a query based on more than one table
- If you want to create a query that retrieves data from multiple tables, the tables must have a common field



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Selection Criteria in Queries



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Defining Record Selection Criteria for Queries

- To tell Access which records you want to select, you must specify a condition as part of the query
 - A condition usually includes one of the comparison operators

Figure 3-16 Access comparison operators

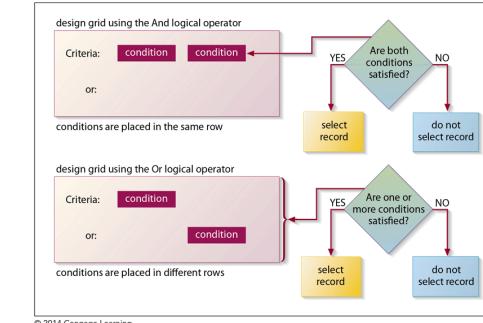
Operator	Meaning	Example
=	equal to (optional; default operator)	= "Hall"
<>	not equal to	<> "Hall"
<	less than	< 1/1/99#
<=	less than or equal to	<= 100
>	greater than	> "C400"
>=	greater than or equal to	>= 18.75
Between ... And ...	between two values (inclusive)	Between 50 And 325
In ()	in a list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

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Defining Multiple Selection Criteria for Queries (Cont.)

Figure 3-26 Logical operators And and Or for multiple selection criteria



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Creating a Calculated Field

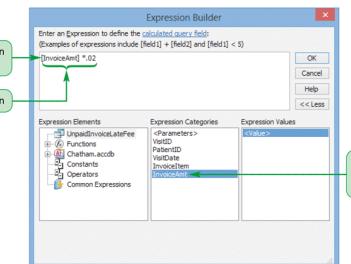
- Queries can perform calculations
 - Must define an **expression** containing a combination of database fields, constants, and operators
 - A **calculated field** is a field that displays the results of an expression but it does not exist in a database
 - The **Zoom box** is a dialog box that you can use to enter text, expressions, or other values
 - **Expression Builder** is an Access tool that makes it easy for you to create an expression
 - It contains a box for entering the expression, an option for displaying and choosing common operators, and one or more lists of expression elements, such as table and field names



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Creating a Calculated Field (Cont.)

Figure 3-33 Completed expression for the calculated field



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Using Aggregate Functions

- You can calculate statistical information, such as totals and averages, on the records displayed in a table datasheet or selected by a query
 - Use the Access **Aggregate functions** which perform arithmetic operations on selected records in a database

Figure 3-36 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, Long Text, Number, OLE Object, Short Text, Yes/No
Maximum	Highest field value for the selected records	AutoNumber, Currency, Date/Time, Number, Short Text
Minimum	Lowest field value for the selected records	AutoNumber, Currency, Date/Time, Number, Short Text
Sum	Total of the field values for the selected records	AutoNumber, Currency, Date/Time, Number

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Reviewing the Clinic Database

- The Navigation Pane displays the objects grouped by object type
 - Each object name has a prefix tag—a *tbl* prefix tag for tables, a *qry* prefix tag for queries, a *frm* prefix tag for forms, and a *rpt* prefix tag for reports
 - All three characters in each prefix tag are lower case. The word immediately after the three-character prefix begins with an upper case letter
 - Using object prefix tags, you can readily identify the object type, even when the objects have the same base name
 - Object names have no spaces, because other database management systems do not permit making it easy during conversions to those systems



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Using Pattern Match in a Query

- A **pattern match** selects records with a value for the designated field that matches the pattern of a simple condition value
- The **Like comparison operator** selects records by matching field values to a specific pattern that includes one or more of these wildcard characters: asterisk (*), question mark (?), and number symbol (#)
 - The asterisk represents any string of characters, the question mark represents any single character, and the number symbol represents any single digit



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Using Pattern Match in a Query (Cont.)

Figure 5-2 Record selection based on matching a specific pattern

Field	Referenced	Last Name	First Name	Parent	Birth Date	Phone
Sort Order	Criteria					
						Like "50%"

pattern match
selection criterion

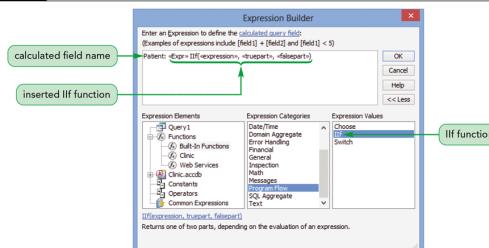
Figure 5-3 tbIPatient table records for area code 860

Record ID	Last Name	First Name	Parent	Date of Birth	Phone	Address	City	State	Email Address
22001	Student	Student		7/29/1984 0000000002	303 Peckins Dr.	Hartford	CT	06102	student@samplepage.com
22002	Darby	Edward		8/1/1988 0000000001	123 Oakleaf Ave	Bloomfield	CT	06010	eddarby@samplepage.com
22003	Wade	Matthew		7/15/1990 0000000004	129 Franklin Ave	Hartford	CT	06110	matthewwade@samplepage.com
22004	Agosto	Lillian		7/20/1989 0000000005	125 Elmwood Ave	Bloomfield	CT	06010	lilagosto@samplepage.com
22005	Georgie	Orla		7/23/2005 0000000006	81 Everett Ln	Bloomfield	CT	06010	orla@samplepage.com
22006	Genie	Orla		7/23/2005 0000000007	81 Everett Ln	Bloomfield	CT	06010	genie@samplepage.com
22007	Carmen	Samson		7/23/2005 0000000008	100 Main St.	Bloomfield	CT	06010	carmensamson@samplepage.com
22008	Karen	Stacey		4/5/1993 0000000009	49 Newmarket St	Hartford	CT	06102	karin.stacey@samplepage.com
22009	Chang	Lisa		10/7/1995 0000000010	701 Beacon Rd	Hartford	CT	06102	lisachang@samplepage.com
22010	Chang	Lisa		10/7/1995 0000000011	701 Beacon Rd	Hartford	CT	06102	lisachang@samplepage.com
22011	Parker	Ian		4/1/1998 0000000012	12 Amherst St	Hartford	CT	06102	ian.parker@samplepage.com
22012	Parker	Ian		4/1/1998 0000000013	12 Amherst St	Hartford	CT	06102	ian.parker@samplepage.com
22013	Thorne	Samuel		4/1/1998 0000000014	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22014	Thorne	Samuel		4/1/1998 0000000015	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22015	Thorne	Samuel		4/1/1998 0000000016	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22016	Thorne	Samuel		4/1/1998 0000000017	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22017	Thorne	Samuel		4/1/1998 0000000018	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22018	Thorne	Samuel		4/1/1998 0000000019	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22019	Thorne	Samuel		4/1/1998 0000000020	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22020	Thorne	Samuel		4/1/1998 0000000021	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22021	Thorne	Samuel		4/1/1998 0000000022	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22022	Thorne	Samuel		4/1/1998 0000000023	27 Remond Dr	Bloomfield	CT	06010	samuel.thorne@samplepage.com
22023	Frederick	Sydney		1/20/1991 0000000024	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22024	Giovanni	Leticia		5/1/1981 0000000025	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22025	Frederick	Sydney		1/20/1991 0000000026	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22026	Giovanni	Leticia		5/1/1981 0000000027	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22027	Frederick	Sydney		1/20/1991 0000000028	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22028	Giovanni	Leticia		5/1/1981 0000000029	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22029	Frederick	Sydney		1/20/1991 0000000030	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22030	Giovanni	Leticia		5/1/1981 0000000031	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22031	Frederick	Sydney		1/20/1991 0000000032	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22032	Giovanni	Leticia		5/1/1981 0000000033	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22033	Frederick	Sydney		1/20/1991 0000000034	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22034	Giovanni	Leticia		5/1/1981 0000000035	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22035	Frederick	Sydney		1/20/1991 0000000036	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22036	Giovanni	Leticia		5/1/1981 0000000037	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22037	Frederick	Sydney		1/20/1991 0000000038	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22038	Giovanni	Leticia		5/1/1981 0000000039	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22039	Frederick	Sydney		1/20/1991 0000000040	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22040	Giovanni	Leticia		5/1/1981 0000000041	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22041	Frederick	Sydney		1/20/1991 0000000042	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22042	Giovanni	Leticia		5/1/1981 0000000043	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22043	Frederick	Sydney		1/20/1991 0000000044	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22044	Giovanni	Leticia		5/1/1981 0000000045	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22045	Frederick	Sydney		1/20/1991 0000000046	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22046	Giovanni	Leticia		5/1/1981 0000000047	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22047	Frederick	Sydney		1/20/1991 0000000048	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
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22049	Frederick	Sydney		1/20/1991 0000000050	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22050	Giovanni	Leticia		5/1/1981 0000000051	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22051	Frederick	Sydney		1/20/1991 0000000052	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22052	Giovanni	Leticia		5/1/1981 0000000053	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22053	Frederick	Sydney		1/20/1991 0000000054	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
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22055	Frederick	Sydney		1/20/1991 0000000056	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22056	Giovanni	Leticia		5/1/1981 0000000057	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22057	Frederick	Sydney		1/20/1991 0000000058	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22058	Giovanni	Leticia		5/1/1981 0000000059	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22059	Frederick	Sydney		1/20/1991 0000000060	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22060	Giovanni	Leticia		5/1/1981 0000000061	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22061	Frederick	Sydney		1/20/1991 0000000062	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22062	Giovanni	Leticia		5/1/1981 0000000063	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22063	Frederick	Sydney		1/20/1991 0000000064	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22064	Giovanni	Leticia		5/1/1981 0000000065	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22065	Frederick	Sydney		1/20/1991 0000000066	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22066	Giovanni	Leticia		5/1/1981 0000000067	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22067	Frederick	Sydney		1/20/1991 0000000068	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22068	Giovanni	Leticia		5/1/1981 0000000069	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22069	Frederick	Sydney		1/20/1991 0000000070	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22070	Giovanni	Leticia		5/1/1981 0000000071	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22071	Frederick	Sydney		1/20/1991 0000000072	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
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22075	Frederick	Sydney		1/20/1991 0000000076	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
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22088	Giovanni	Leticia		5/1/1981 0000000089	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22089	Frederick	Sydney		1/20/1991 0000000090	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
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22091	Frederick	Sydney		1/20/1991 0000000092	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22092	Giovanni	Leticia		5/1/1981 0000000093	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22093	Frederick	Sydney		1/20/1991 0000000094	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
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22095	Frederick	Sydney		1/20/1991 0000000096	81 Orange Ave	Hartford	CT	06102	sydney.frederick@samplepage.org
22096	Giovanni	Leticia		5/1/1981 0000000097	91 Sutton Ave	Windsor	CT	06095	leticia.giovanni@samplepage.net
22097	Frederick	Sydney		1/20/1991 0000000098	81 Orange Ave	Hartford			

Assigning a Conditional Value to a Calculated Field

(Cont.)

Figure 5-8 If function inserted for the calculated field

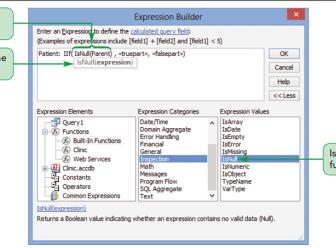


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Assigning a Conditional Value to a Calculated Field

(Cont.)

Figure 5-9 After entering the condition for the calculated field's If function

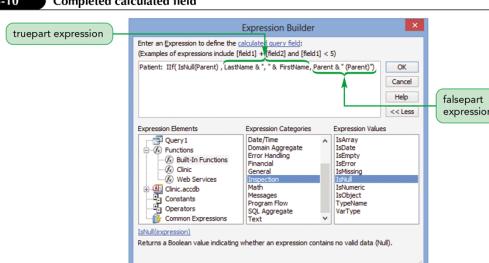


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Assigning a Conditional Value to a Calculated Field

(Cont.)

Figure 5-10 Completed calculated field



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Creating a Parameter Query

- A **parameter query** displays a dialog box that prompts the user to enter one or more criteria values when the query is run

- The value entered into the prompt causes the query to select only those records with field value from the table

Figure 5-13 Specifying the prompt for the parameter query



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Creating a Parameter Query (Cont.)

Figure 5-14 Enter Parameter Value dialog box



Figure 5-15 Results of the parameter query

Clic Database - E:\Access\Tutorial\Clinic.accdb [Access 2007 - 2013 for Windows] - Access									
Patient	Patient ID	Last Name	First Name	Parent	Date of Birth	Phone	Address	City	State / Zip
Waterbury	2205	Santay	Ashley		3/20/1989 07:05:33AM	475532823	372 Highline Ct	Waterbury	06006

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Advanced Query Wizards

The screenshot displays four different query wizards in Microsoft Access:

- Find Unmatched Query Wizard:** Shows how to find records in one table that don't have matches in another.
- Crosstab Query Wizard:** Shows how to create a crosstab query from scratch.
- Find Duplicate Query Wizard:** Shows how to identify records with duplicate information.
- Find Unmatched Query Wizard:** Shows how to find records in both tables that don't have matches in the other.

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Creating a Crosstab Query

Figure 5-17 Aggregate functions used in crosstab queries

Aggregate Function	Definition
Avg	Average of the field values
Count	Number of the nonnull field values
First	First field value
Last	Last field value
Max	Highest field value
Min	Lowest field value
StDev	Standard deviation of the field values
Sum	Total of the field values
Var	Variance of the field values

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Creating a Crosstab Query (Cont.)

Figure 5-18 Comparing a select query to a crosstab query

The screenshot compares two types of queries in Microsoft Access:

- Top Grid (Select Query):** Labeled "Individual West Hartford records". It shows a list of patients with their names, first names, cities, and invoice amounts.
- Bottom Grid (Crosstab Query):** Labeled "West Hartford record with unpaid invoice" and "West Hartford records with paid invoices". It shows a summary of invoice amounts for West Hartford, categorized by payment status.

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Creating a Crosstab Query (Cont.)

- The quickest way to create a crosstab query is to use the **Crosstab Query Wizard**

Figure 5-19 Choosing the query for the crosstab query

Figure 5-20 Completed crosstab query design

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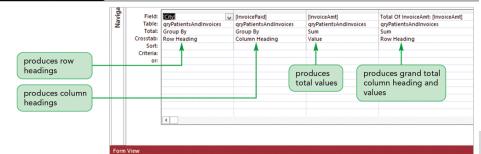
25

Creating a Crosstab Query (Cont.)

Figure 5-21 Crosstab query recordset

City	Total Of InvoiceAmt
Bloomfield	\$4,730.00
Hartford	\$9,040.00
Meriden	\$1,136.00
Waterbury	\$528.00
West Hartford	\$2,153.00
Windsor	\$4,693.00
	\$3,591.00
	\$1,102.00

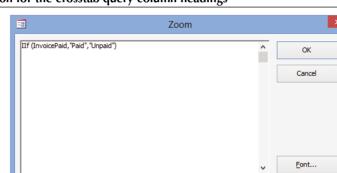
Figure 5-22 Crosstab query in the design grid



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Creating a Crosstab Query (Cont.)

Figure 5-23 IIf function for the crosstab query column headings



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Creating a Top Values Query

- Users might want to limit the number to a more manageable size by displaying, for example, just the first 10 records
- The **Top Values** property for a query lets you limit the number of records in the query results

Figure 5-27 Creating the top values query

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Creating a Top Values Query (Cont.)

Figure 5-28 Top values query recordset

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Lookup Fields and Input Masks

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Creating a Lookup Field (Cont.)

Figure 5-32 List of InvoiceItem and InvoiceItemID field values

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Using the Input Mask Wizard (Cont.)

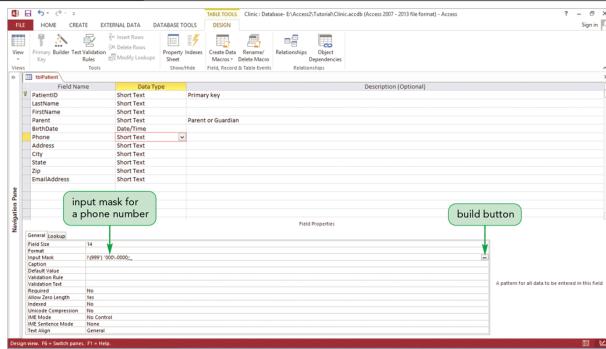
Figure 5-33 Input Mask Wizard dialog box

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Using the Input Mask Wizard (Cont.)

Figure 5-34 Phone number input mask created by the Input Mask Wizard

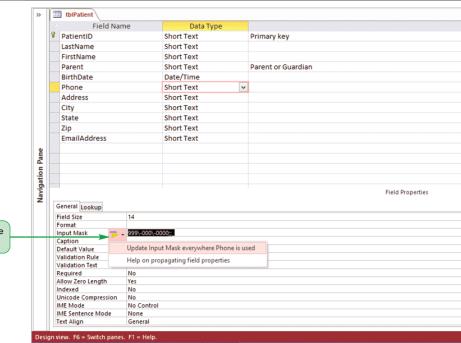


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Using the Input Mask Wizard (Cont.)

Figure 5-36 Property Update Options button menu



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Identifying Object Dependencies

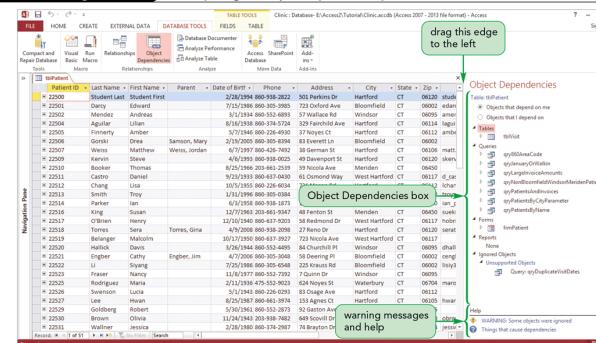
- An **object dependency** exists between two objects when a change to the properties of data in one object affects the properties of data in the other object
 - Dependencies between Access objects, such as tables, queries, and forms, can occur as relationships or using a query to obtain values from more than one table.
 - Any form or report that uses fields from a query is directly dependent on the query and is indirectly dependent on the tables that provide the data to the query
- The **Object Dependencies** pane displays a collapsible list of the dependencies among the objects in an Access database

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Identifying Object Dependencies (Cont.)

Figure 5-39 After opening the Object Dependencies pane



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Defining Data Validation Rules (Cont.)

Defining Table Validation Rules

- To make sure that the value a user enters is not larger than the maximum field value, you can create a **table validation rule**
- Use the Validation Rule and Validation Text properties and set these properties for the table instead of for an individual field
- Use a table validation rule because this validation involves multiple fields
- A field validation rule is used when the validation involves a restriction for only the selected field, and does not depend on other fields



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Defining Data Validation Rules

Figure 5-40 Validation properties for the InvoiceAmt field

Field Name	Data Type	Primary key
InvoiceNum	Short Text	
VisitID	Short Text	
InvoiceDate	Date/Time	
InvoiceAmt	Currency	
InvoiceItemID	Short Text	
InvoicePaid	Yes/No	
Insurance	Currency	

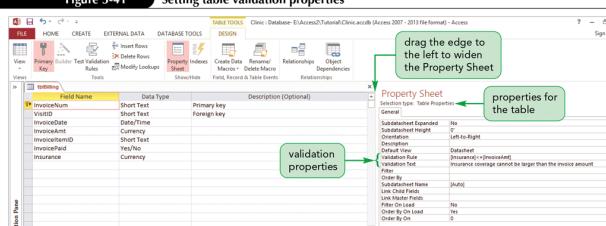
General	
Format	Currency
Decimal Places	2
Input Mask	
Caption	Invoice Amt
Default Value	>10
Validation Rule	[InvoiceAmt]>10
Validation Text	Invoice amounts must be greater than 10.
Enabled	No
Indexed	No
Text Align	General



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Defining Data Validation Rules (Cont.)

Figure 5-41 Setting table validation properties



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Working with Long Text Fields

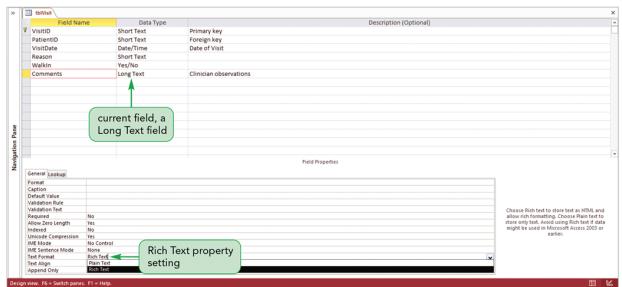
- Use a Long Text field to store long comments and explanations
- Short Text fields are limited to 255 characters, but Long Text fields can hold up to 65,535 characters
 - Short Text fields limit you to plain text with no special formatting
 - Long Text fields store plain text similar to Short Text fields or to store rich text, which you can selectively format with options such as bold, italic, and different fonts and colors



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Working with Long Text Fields (Cont.)

Figure 5-43 Viewing the properties for a Long Text field



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Summary

- Create different types of queries based on multiple tables
- Use operators in queries
- Create and format a calculated field in a query
- Perform calculations in a query

Homework

- Go through Access Tutorials 3 and 5
- Read Resources in Moodle

