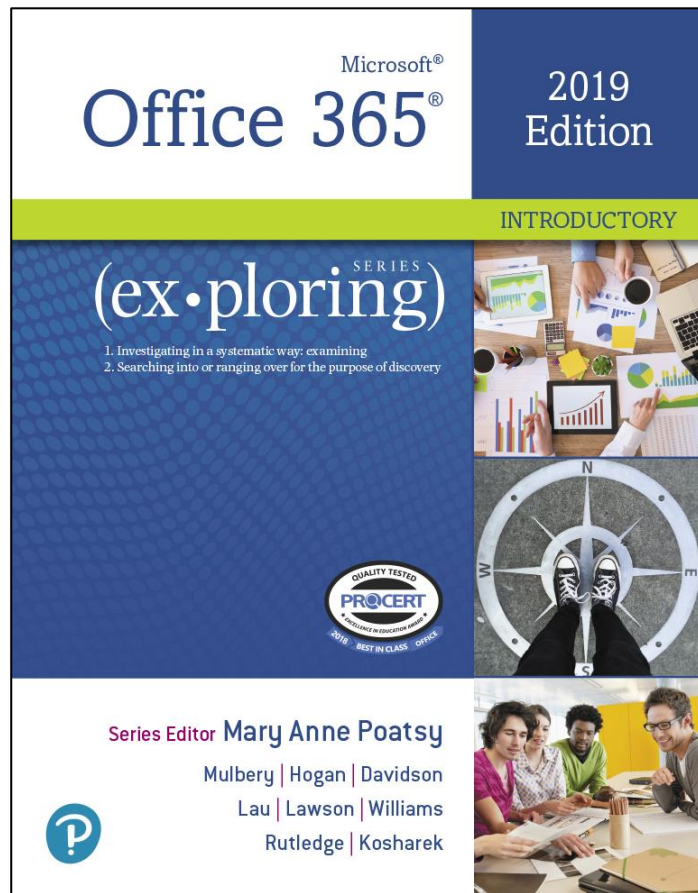


Exploring Microsoft Office 365

Introductory



Chapter 2

Tables and Queries in Relational Databases

Learning Objectives (1 of 2)

2.1 Design a Table

2.2 Create and Modify Tables and Work with Data

2.3 Import Data From External Sources

2.4 Establish Table Relationships

2.5 Create a Single-Table Query

2.6 Use the Query Wizard

Learning Objectives (2 of 2)

2.7 Specify Query Criteria

2.8 Specify Query Sort Order and Run A Query

2.9 Copy and Modify a Query

2.10 Create a Multitable Query

2.11 Modify a Multitable Query

Designing a Table (1 of 3)

Table design guidelines:

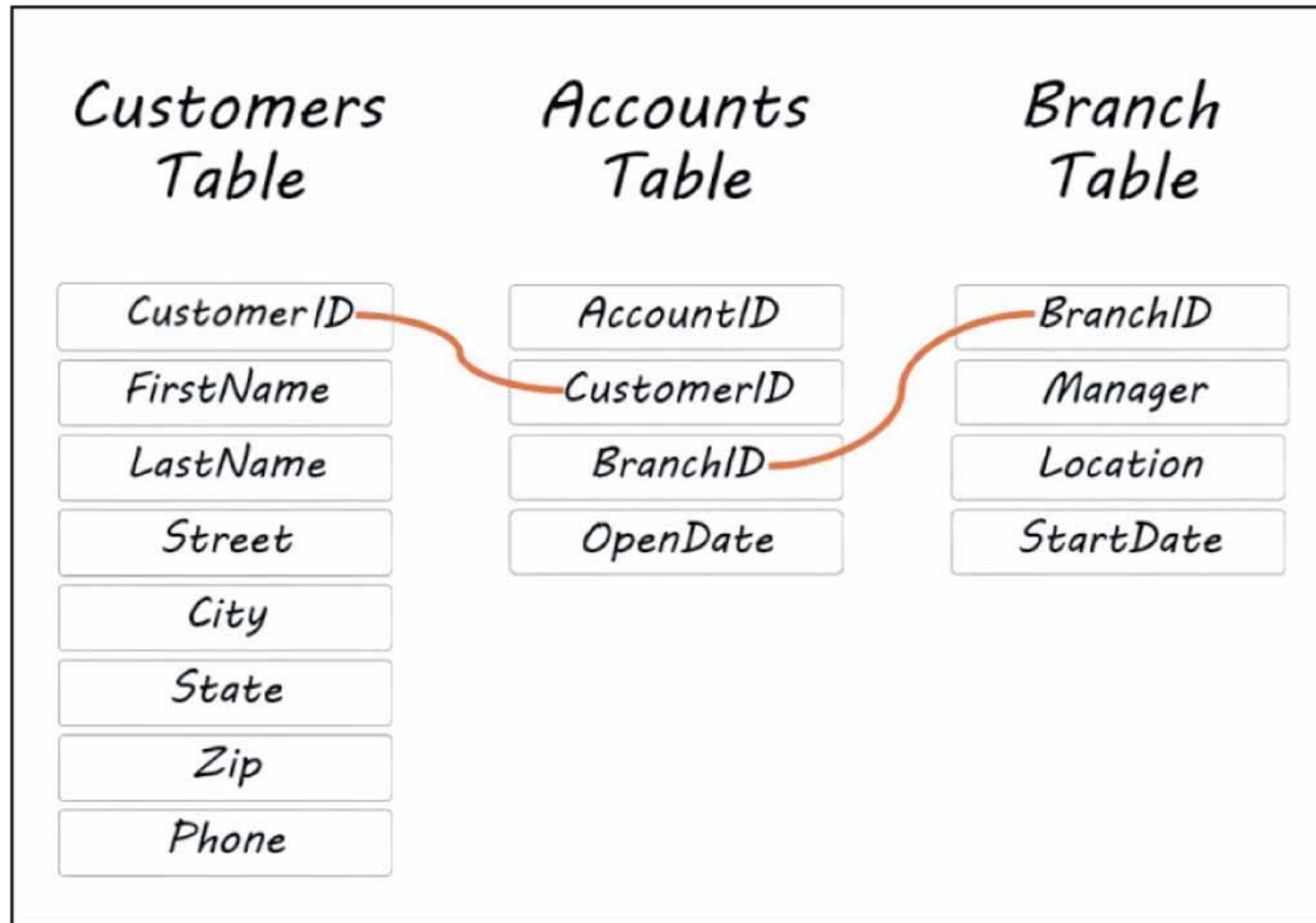
- Include the necessary data
- Design for now and for the future
- Store data in their smallest parts
- Determine primary keys
- Link tables using common fields
- Design to accommodate calculations

Designing a Table (2 of 3)

<i>Customers Table</i>	<i>Accounts Table</i>	<i>Branch Table</i>
<i>CustomerID</i>	<i>AccountID</i>	<i>BranchID</i>
<i>FirstName</i>	<i>CustomerID</i>	<i>Manager</i>
<i>LastName</i>	<i>BranchID</i>	<i>Location</i>
<i>Street</i>	<i>OpenDate</i>	<i>StartDate</i>
<i>City</i>		
<i>State</i>		
<i>Zip</i>		
<i>Phone</i>		

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Designing a Table (3 of 3)



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Creating and Modifying Tables and Working with Data (1 of 8)

Tables can be created using the following:

- Enter field names and table data in Datasheet view
- Type field names in rows in Design view and enter the data in Datasheet view
- Import data from another database or application
- Use a template

Creating and Modifying Tables and Working with Data (2 of 8)

Design view of Customers table

Field names

Data types

Field properties

Field Name	Data Type
CustomerID	Number
FirstName	Short Text
LastName	Short Text
Street	Short Text
City	Short Text
State	Short Text
Zip	Short Text
Phone	Short Text

Field Properties	
General	
Field Size	Long Integer
Format	
Decimal Places	Auto
Input Mask	
Caption	Customer ID
Default Value	0
Validation Rule	
Validation Text	
Required	Yes
Indexed	Yes (No Duplicates)
Text Align	General

Design view. F6 = Switch panes. F1 = Help.

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Creating and Modifying Tables and Working with Data (3 of 8)

Data Type	Description	Example
Short Text	Stores alphanumeric data, such as a customer's name or address. A short text field can hold up to 255 characters.	2184 Walnut Street
Long Text	Lengthy text or combinations of text and numbers, such as several sentences or paragraphs; used to hold descriptive data. A long text field can display up to 64,000 characters.	A description of product packaging
Number	Contains a value that can be used in a calculation, such as the number of credits a course is worth. The contents are restricted to numbers, a decimal point, and a plus or minus sign.	12
Large Number	Used for storing very large numeric values in a database, allowing a greater range for calculations.	9,223,372,036,854,775
Date/Time	Stores dates or times that can be used in date or time arithmetic.	10/31/2018 1:30:00 AM
Currency	Used for fields that contain monetary values.	\$1,200
AutoNumber	A special data type used to assign the next consecutive number each time you add a record.	1, 2, 3

Creating and Modifying Tables and Working with Data (4 of 8)

Data Type	Description	Example
Yes/No	Only one of two values can be stored, such as Yes or No, True or False, or On or Off. For example, is a student on the Dean's list.	Yes
OLE Object	Contains an object created by another application. OLE objects include pictures and sounds.	JPG image
Hyperlink	Stores a Web address or the path to a folder or file. Hyperlink fields can be clicked to retrieve a webpage or to launch a file stored locally.	http://www.irs.gov
Attachment	Used to store one or multiple images, spreadsheet files, documents, and other types of supported files in records.	An Excel workbook
Calculated	The results of an expression that references one or more existing fields.	[Price]*.05
Lookup Wizard	Creates a field that enables you to choose a value from another table or from a list of values by using a list box or a combo box.	Accounts table with a CustomerID field that looks up the customer from the records in the Customers table

Creating and Modifying Tables and Working with Data (5 of 8)

SpeakerID (AutoNumber data type) is the primary key

Speakers							
	SpeakerID	First Name	Last Name	Address	City	State	Zip Code
+	1	Jerri	Williams	10000 SW 59 Court	Miami	FL	33146
+	2	Warren	Brasington	9470 SW 25 Street	Philadelphia	PA	19104
+	3	James	Shindell	14088 Malaga Avenue	Miami	FL	33146
+	4	Edward	Wood	400 Roderigo Avenue	Gainesville	FL	32611
+	5	Kristine	Park	9290 NW 59 Steet	Athens	GA	30602
+	6	William	Williamson	108 Los Pinos Place	Tuscaloosa	AL	35487
+	7	Holly	Davis	8009 Riviera Drive	Gainesville	FL	32611
+	8	David	Tannen	50 Main Street	Philadelphia	PA	19104
+	9	Jeffrey	Jacobsen	490 Bell Drive	Athens	GA	30602
+	10	Jerry	Masters	2000 Main Highway	Miami	FL	33146
+	11	Kevin	Kline	2980 SW 89 Street	Gainesville	FL	32611
+	12	Jessica	Withers	110 Center Highway	Athens	GA	30602
+	13	Betsy	Allman	2987 SW 14 Avenue	Philadelphia	PA	19104
+	14	Mary	Miller	1008 West Marine Road	Miami	FL	33146
+	15	Nancy	Vance	1878 W. 6 Street	Gainesville	FL	32611
+	16	George	Jensen	42-15 81 Street	Elmhurst	NY	11373
*	(New)						

Next record will be assigned SpeakerID 17

Creating and Modifying Tables and Working with Data (6 of 8)

Primary key in Customers table

Customers							
Customer ID	FirstName	LastName	Street	City	State	Zip	Phone
30001	Allison	Millward	2732 Baker Blvd.	Greensboro	NC	27492	(555) 334-5678
30002	Bernett	Fox	12 Orchestra Terrace	High Point	NC	27494	(555) 358-5554
30003	Clay	Hayes	P.O. Box 555	Greensboro	NC	27492	(555) 998-4457
30004	Cordle	Collins	2743 Bering St.	Winston-Salem	NC	27492	(555) 447-2283
30005	Eaton	Wagner	2743 Bering St.	Greensboro	NC	27492	(555) 988-3346
30006	Kwasi	Williams	89 Jefferson Way	High Point	NC	27494	(555) 447-5565
30007	Natasha	Simpson	187 Suffolk Ln.	Greensboro	NC	27493	(555) 775-3389
30008	Joy	Jones	305 - 14th Ave. S.	Winston-Salem	NC	27493	(555) 258-7655
30009	John	Nunn	89 Chiaroscuro Rd.	Greensboro	NC	27494	(555) 998-5557
30010	Laura	Peterson	120 Hanover Sq.	Winston-Salem	NC	27492	(555) 334-6654
30011	YourName	YourName	800 University Ave.	High Point	NC	27494	(555) 447-1235
0							

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Foreign key in Accounts table

Accounts					
Account ID	Customer ID	Branch ID	Balance	Open Date	
1001	30010	850	\$5,600.00	4/28/2012	
1002	30001	810	\$1,200.00	4/13/2010	
1003	30004	820	\$15,490.00	5/28/2009	
1004	30003	830	\$630.00	9/21/2008	
1005	30009	850	\$1,300.00	7/22/2010	
1006	30003	810	\$550.00	7/3/2008	
1007	30007	820	\$1,620.00	6/7/2011	
1008	30004	840	\$2,100.00	9/30/2012	
1009	30005	850	\$1,500.00	2/7/2011	
1010	30001	820	\$3,000.00	3/18/2015	
1011	30005	810	\$290.00	10/16/2016	
1012	30002	830	\$1,900.00	3/14/2012	
1013	30001	820	\$10,000.00	5/15/2014	
1014	30009	810	\$16,700.00	9/17/2012	
1015	30004	830	\$460.00	4/4/2008	
1016	30001	830	\$18,700.00	3/13/2008	
1017	30010	830	\$980.00	9/5/2009	
1018	30005	840	\$7,800.00	5/6/2008	
1019	30004	830	\$14,250.00	1/4/2016	
1020	30001	850	\$12,000.00	4/13/2010	

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Creating and Modifying Tables and Working with Data (7 of 8)

Property	Description
Field Size	Determines the maximum number of characters of a text field or the format of a number field.
Format	Changes the way a field is displayed or printed but does not affect the stored value.
Input Mask	Simplifies data entry by providing literal characters that are typed for every entry, such as hyphens in a Social Security number or slashes in a date.
Caption	Enables an alternate name to be displayed other than the field name.
Default Value	Enters automatically a predetermined value for a field each time a new record is added to the table.
Validation Rule	Requires data entered to conform to a specified rule.
Validation Text	Specifies the error message that is displayed when the validation rule is violated.

Creating and Modifying Tables and Working with Data (8 of 8)

Property	Description
Required	Indicates that a value for this field must be entered. Primary key fields always require data entry.
Allow Zero Length	Allows entry of zero length text strings in a Hyperlink, or Short or Long Text fields.
Indexed	Increases the efficiency of a search on the designated field.
Expression	Used for calculated fields only. Specifies the expression you want Access to evaluate and store.
Result Type	Used for calculated fields only. Specifies the format for the calculated field results.

Importing Data From External Sources (1 of 3)

Get External Data - Excel Spreadsheet

Select the source and destination of the data

Specify the source of the definition of the objects.

File name: C:\Users\mpoat\Documents\

Browse...

Specify how and where you want to store the data in the current database.

☒ **Import the source data into a new table in the current database.**
If the specified table does not exist, Access will create it. If the specified table already exists, Access might overwrite its contents with the imported data. Changes made to the source data will not be reflected in the database.

☐ **Append a copy of the records to the table:** Branch
If the specified table exists, Access will add the records to the table. If the table does not exist, Access will create it. Changes made to the source data will not be reflected in the database.

☐ **Link to the data source by creating a linked table.**
Access will create a table that will maintain a link to the source data in Excel. Changes made to the source data in Excel will be reflected in the linked table. However, the source data cannot be changed from within Access.

OK Cancel

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Importing Data From External Sources (2 of 3)

Select the worksheet to import

Preview of the worksheet data

Import Spreadsheet Wizard

Your spreadsheet file contains more than one worksheet or range. Which worksheet or range would you like?

☒ Show Worksheets ☐ Show Named Ranges

Customers
Accounts

Sample data for worksheet 'Accounts'.

	AID	CID	BID	Balance
1	1001	30010	B50	5600
2	1002	30001	B10	1200
3	1003	30004	B20	15490
4	1004	30003	B30	630
5	1005	30009	B50	1300
6	1006	30003	B10	550
7	1007	30007	B20	1620

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Check if spreadsheet contains column headings

Column headings

Import Spreadsheet Wizard

Microsoft Access can use your column headings as field names for your table. Does the first row specified contain column headings?

☒ First Row Contains Column Headings

	AID	CID	BID	Balance
1	1001	30010	B50	5600
2	1002	30001	B10	1200
3	1003	30004	B20	15490
4	1004	30003	B30	630
5	1005	30009	B50	1300

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Importing Data From External Sources (3 of 3)

Import Spreadsheet Wizard

Microsoft Access recommends that you define a primary key for your new table. A primary key is used to uniquely identify each record in your table. It allows you to retrieve data more quickly.

☐ Let Access add primary key.

☒ Choose my own primary key. AID

☐ No primary key.

AID becomes the primary key

	AID	CID	BID	Balance
1	1001	30010	B50	5600
2	1002	30001	B10	1200
3	1003	30004	B20	15490
4	1004	30003	B30	630
5	1005	30009	B50	1300

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Import Spreadsheet Wizard

That's all the information the wizard needs to import your data.

Import to Table:
Accounts

Type the table name

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Establishing Table Relationships

(1 of 3)

Accounts					
Account ID	Customer ID	Branch ID	Balance	Open Date	Click to Add
1004	30003	B30	\$630.00	9/21/2008	
1005	30009	B50	\$1,300.00	7/22/2010	
1006	30003	B10	\$550.00	7/3/2008	
1007	30007	B20	\$1,620.00	6/7/2011	
1008	30004	B40	\$2,100.00	9/30/2012	
1009	30005	B50	\$1,500.00	2/7/2011	
1010	30001	B20	\$3,000.00	3/18/2015	
1011	30005	B10	\$290.00	10/16/2016	
1012	30002	B30	\$1,900.00	3/14/2012	
1013	30001	B20	\$10,000.00	5/15/2014	
1014	30009	B10	\$16,700.00	9/17/2012	
1015	30004	B30	\$460.00	4/4/2008	
1016	30001	B30	\$18,700.00	3/13/2008	
a02h2Bank					
You cannot add or change a record because a related record is required in table 'Customers'.					
OK Help					
1023	30011	B50	\$1,000.00	1/4/2016	
1024	30011	B50	\$14,005.00	8/7/2018	
1025	30006	B40	\$11,010.00	3/13/2018	
1026	30007	B20	\$7,400.00	5/1/2018	
1027	30003	B50	\$4,000.00	4/13/2018	
1028	99999	B50	\$4,000.00	9/5/2015	
*			\$0.00		
Record: 28 of 28 No Filter Search					

Referential integrity violation

Account record added for a Customer ID that does not exist in Customers table

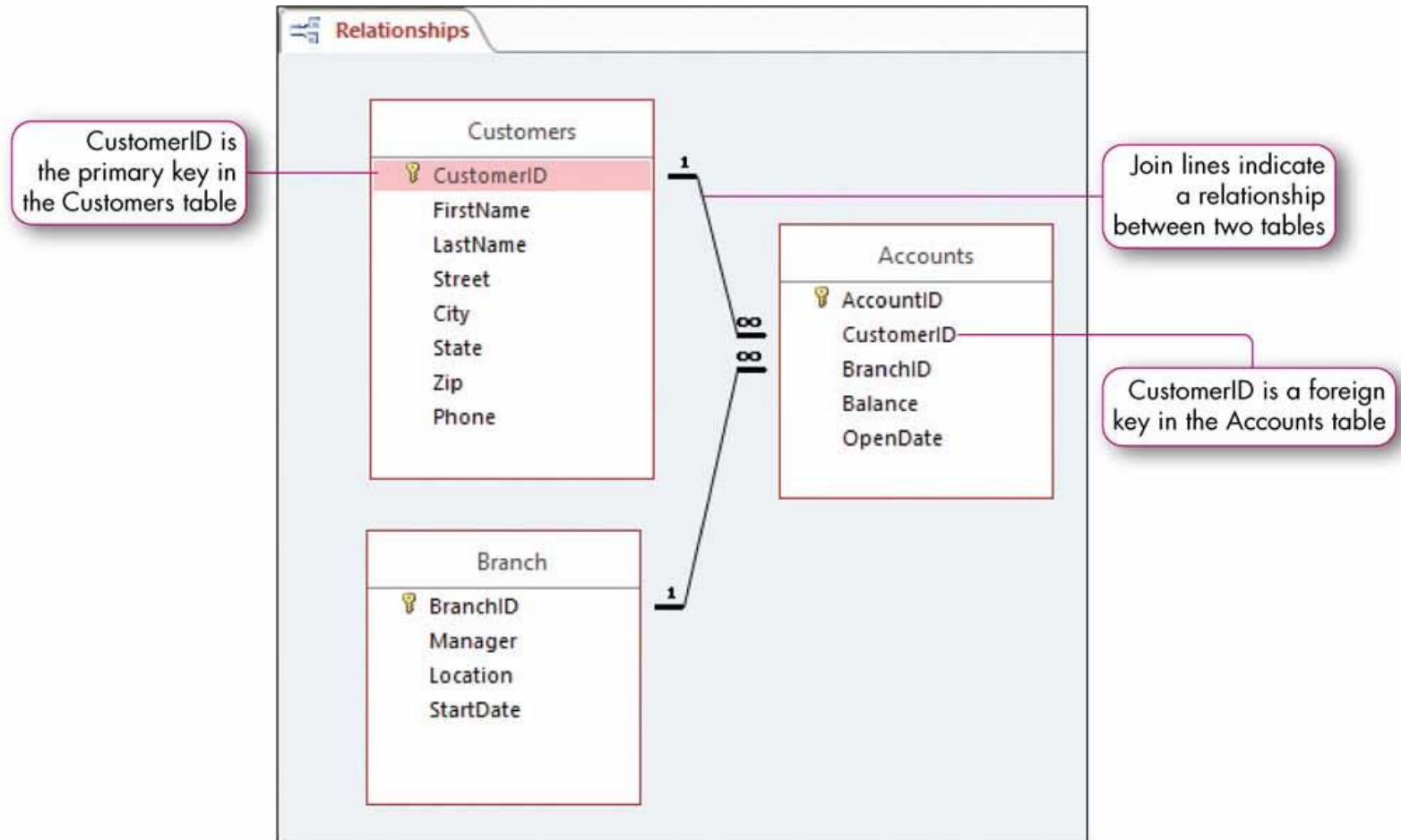
Establishing Table Relationships

(2 of 3)

Relationship Type	Description
One-to-Many	The primary key table must have only one occurrence of each value. The foreign key field in the related table may have repeating values
One-to-One	Two different tables use the same primary key. Exactly one record exists in the second table for each record in the first table.
Many-to-Many	This is an artificially constructed relationship allowing many matching records in each direction between tables. It requires construction of a third table called a junction table.

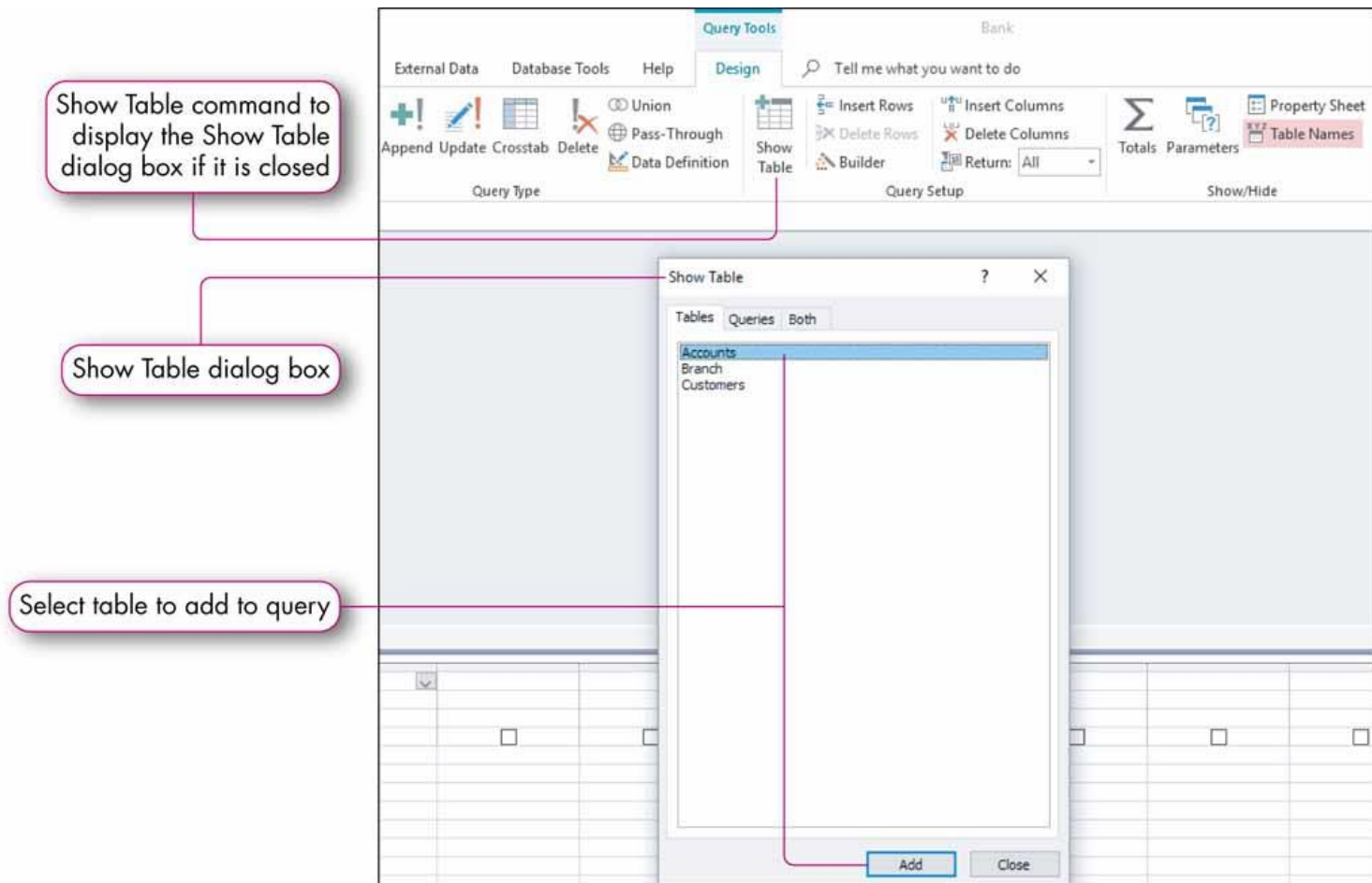
Establishing Table Relationships

(3 of 3)



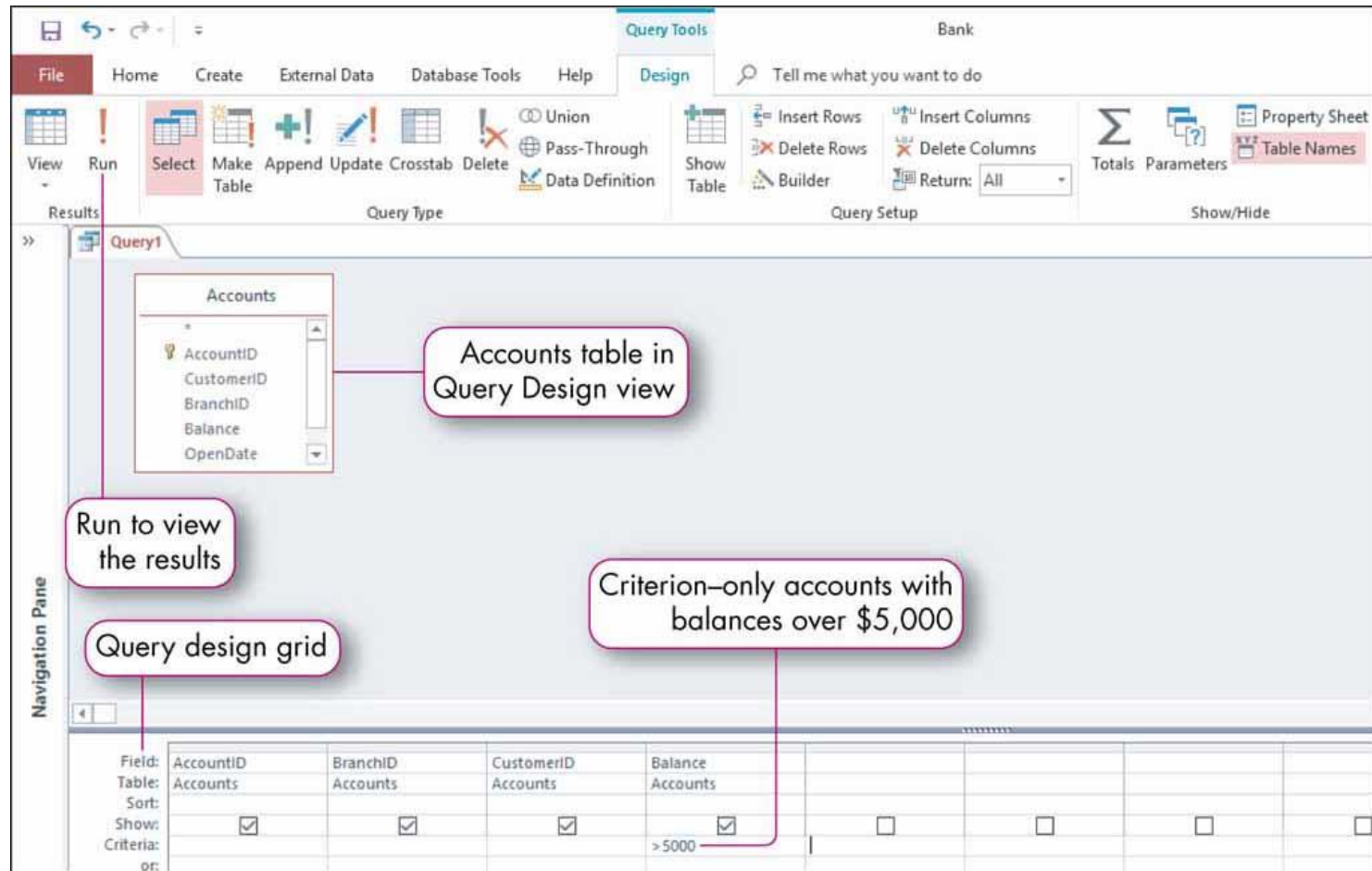
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Creating a Single-Table Query (1 of 6)



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Creating a Single-Table Query (2 of 6)



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Creating a Single-Table Query (3 of 6)

Query1

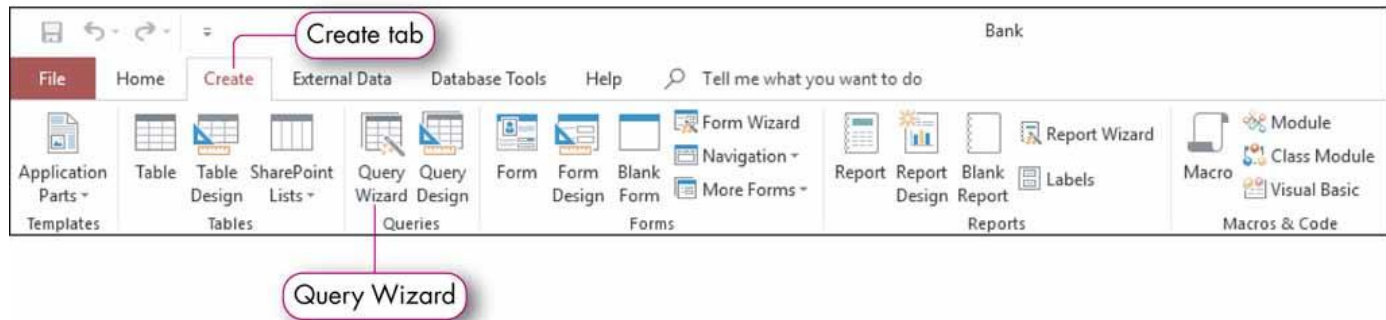
Account ID	Branch ID	Customer ID	Balance
1014	B10	30009	\$16,700.00
1026	B20	30007	\$7,400.00
1013	B20	30001	\$10,000.00
1003	B20	30004	\$15,490.00
1019	B30	30004	\$14,250.00
1016	B30	30001	\$18,700.00
1025	B40	30006	\$11,010.00
1018	B40	30005	\$7,800.00
1028	B50	30005	\$8,000.00
1024	B50	30011	\$14,005.00
1021	B50	30011	\$21,004.00
1020	B50	30001	\$12,000.00
1001	B50	30010	\$5,600.00
*			\$0.00

Query results in Datasheet view

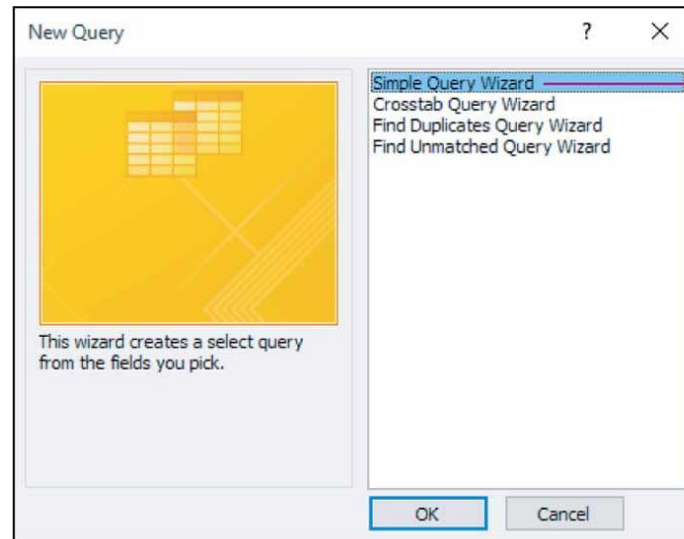
Only accounts with a balance over \$5,000

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Creating a Single-Table Query (4 of 6)

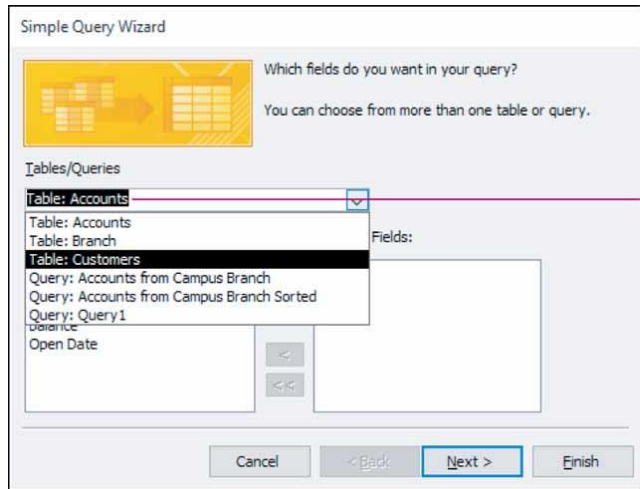


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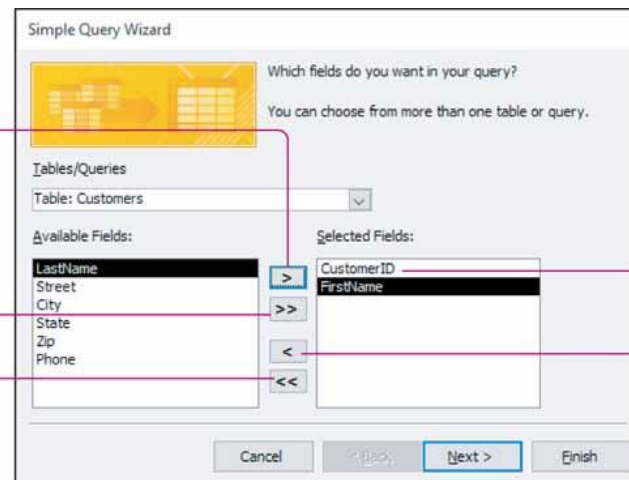
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Creating a Single-Table Query (5 of 6)



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Select a Table or Query



Add one field to the Selected Fields list

Add all fields to the Selected Fields list

Remove all fields from the Selected Fields list

Fields already moved to the Selected Fields list

Remove one field from the Selected Fields list

Creating a Single-Table Query (6 of 6)

Select detail or summary data

Simple Query Wizard

Would you like a detail or summary query?

☒ Detail (shows every field of every record)

☐ Summary

Summary Options ...

Cancel < Back Next > Finish

The dialog box shows three data tables. The first table has 3 rows (1, 2, 3) and 2 columns (aa, cc). The second table has 3 rows (1, 2, 3) and 2 columns (bb, dd). The third table has 6 rows (1, 2, 3, 4, 5, 6) and 2 columns (aa, dd). Arrows indicate that the first two tables are being combined into the third table.

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Type the query name

Simple Query Wizard

What title do you want for your query?

Customers Query

That's all the information the wizard needs to create your query.

Do you want to open the query or modify the query's design?

☒ Open the query to view information.

☐ Modify the query design.

Cancel < Back Next > Finish

The dialog box shows a checkmark in a box on the left. The text 'Customers Query' is entered in the title field. The 'Open the query to view information' radio button is selected.

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Specifying Query Criteria (1 of 7)

Data Type	Criteria	Example
Text	"Harry"	For a FirstName field, displays only text that matches Harry specifically. The quotation marks can be typed, or Access will add them automatically.
Numeric	5000	For a Quantity field, displays only numbers that match 5000 exactly (do not specify commas, currency symbols, etc.).
Date	#2/2/2019#	For a ShippedDate field, shows orders shipped on February 2, 2019.
Yes/No	Yes	For a Discontinued field, returns records where the check box in the table is selected, denoting Yes.

Specifying Query Criteria (2 of 7)

Character	Description	Example	Result
*	Matches any number of characters in the same position as the asterisk	Sm*	Small, Smiley, Smith, Smithson
?	Matches a single character in the same position as the question mark	H?ll	Hall, Hill, Hull
[]	Matches any single character within the brackets	F[ar]ll	Fall and Fell, but not Fill or Full
[!]	Matches any character not in the brackets	F[!ae]ll	Fill and Full, but not Fall or Fell

Specifying Query Criteria (3 of 7)

Expression	Example
=10	Equals 10
<>10	Not equal to 10
>10	Greater than 10
>=10	Greater than or equal to 10
<10	Less than 10
<=10	Less than or equal to 10

Specifying Query Criteria (4 of 7)

Expression	Description	Example
Is Null	Used to find blank fields	For a SalesRepID field in the Customers table when the customer has not been assigned to a sales representative.
Is Not Null	Used to find fields with data	For a ShipDate field; a value has been entered to indicate that the order was shipped to the customer.

Specifying Query Criteria (5 of 7)

Logical operators

- AND operator—query results will display only records that match all criteria
- OR operator—query results will display records that match any of the specified criteria
- NOT operator—query returns all records except the specified criteria

Specifying Query Criteria (6 of 7)

AND condition—criteria are in the same row

Field:	AccountID	CustomerID	BranchID	Balance
Table:	Accounts	Accounts	Accounts	Accounts
Sort:	Ascending			
Show:	☒	☒	☒	☒
Criteria:			"B50"	< 5000
or:				

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OR condition—criteria are in different rows

Field:	AccountID	CustomerID	BranchID	Balance
Table:	Accounts	Accounts	Accounts	Accounts
Sort:	Ascending			
Show:	☒	☒	☒	☒
Criteria:			"B50"	
or:				< 5000

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Use NOT to exclude specific records

Field:	AccountID	CustomerID	BranchID	Balance
Table:	Accounts	Accounts	Accounts	Accounts
Sort:		Ascending		Ascending
Show:	☒	☒	☒	☒
Criteria:			Not "B50"	< 5000
or:				

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Specifying Query Criteria (7 of 7)

Logical Operator	Example	Result
AND	>5000 AND <1000	For a Balance field, returns all accounts with a balance greater than \$5,000 and less than \$10,000.
OR	“Eastern” OR “Campus”	For a Location field, returns all accounts that are at the Eastern or the Campus branch.
NOT	NOT “Campus”	For a Location field, returns all records except those in the Campus branch.

Specifying Query Sort Order and Running a Query (1 of 2)

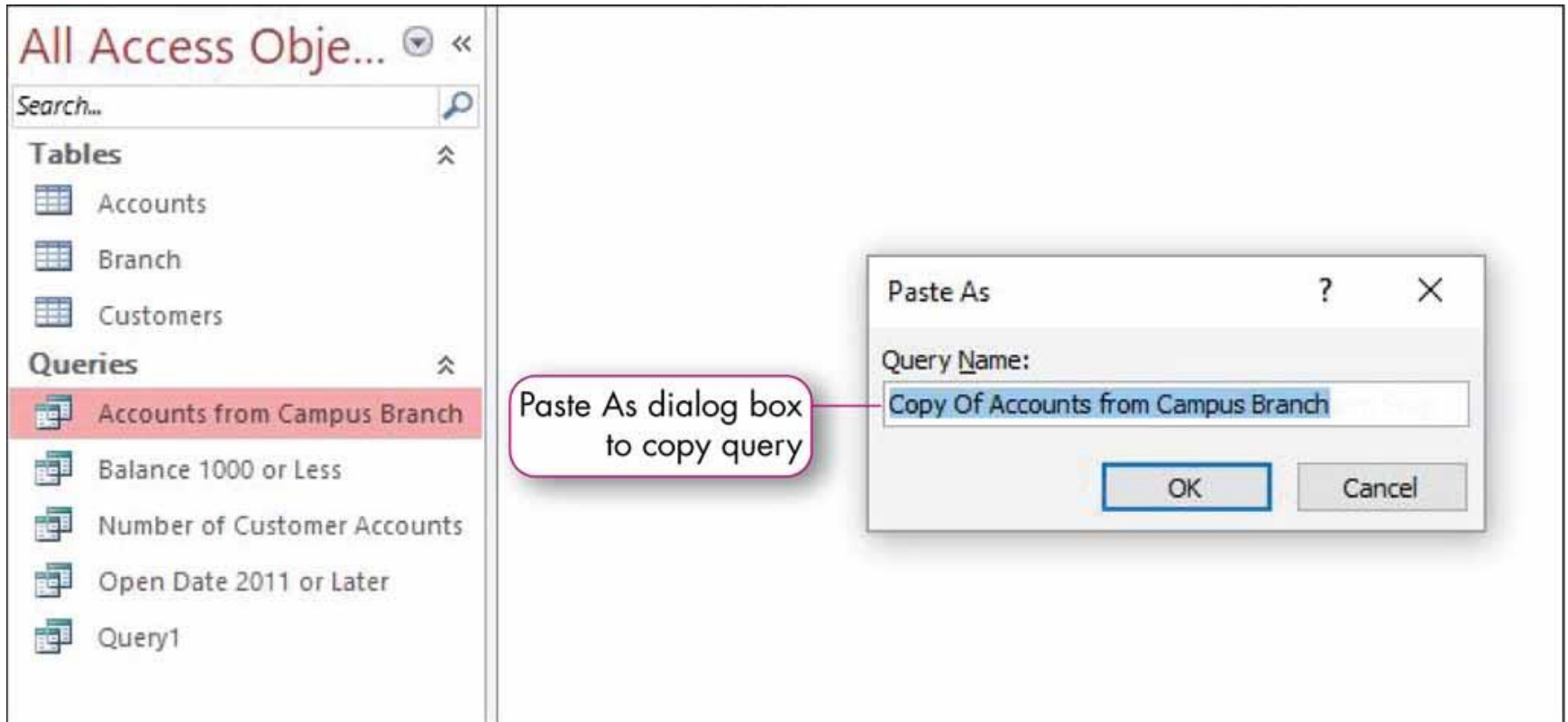
- Query sort order—determines the order of records in Datasheet view
- Sort order—can be changed in Design view
- When sorting more than one field—sort order is determined from left to right.

Specifying Query Sort Order and Running a Query (2 of 2)

Running a query

- Design view—click Run in the Results group on the Design tab
- Navigation Pane—locate the query
 - Double-click it or
 - Press Enter

Copying and Modifying a Query



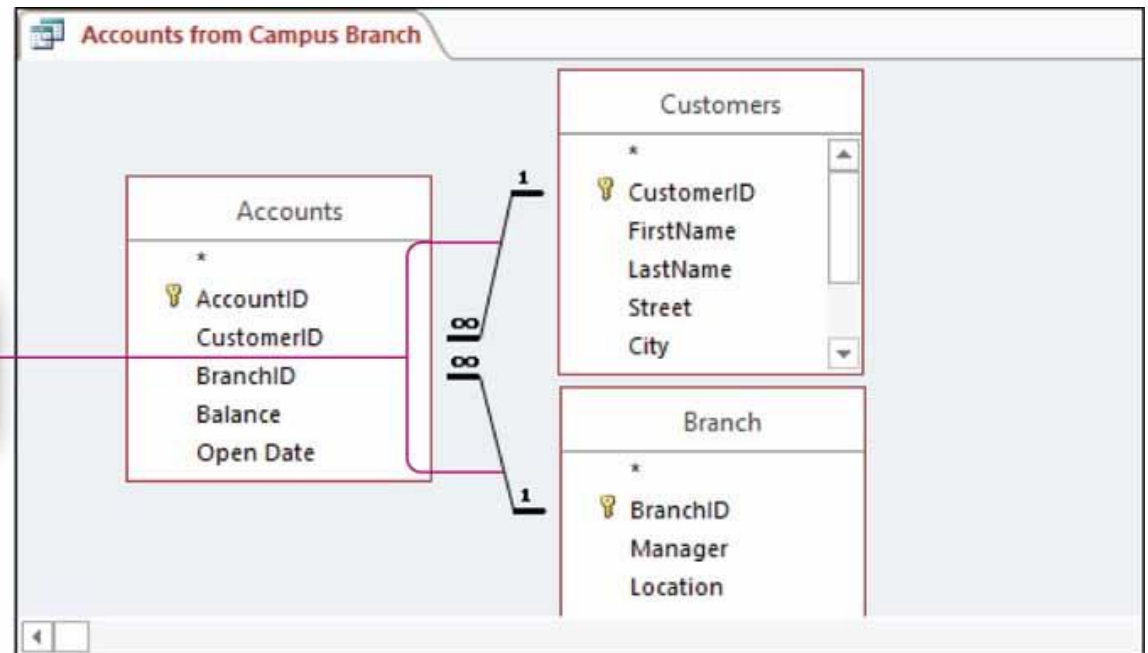
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Creating a Multitable Query (1 of 2)

- Multitable query—contains two or more tables
- Ways to create multitable queries:
 - Add tables to an existing query
 - Copy an existing query and add to it
 - Create from scratch using:
 - The Query Wizard or
 - The Query Design tool

Creating a Multitable Query (2 of 2)

Join lines indicate Customers and Branch tables are related to the Accounts table



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Modifying a Multitable Query (1 of 4)

Accounts from Campus Branch

Accounts

- * AccountID
- CustomerID
- BranchID
- Balance
- Open Date

Customers

- * CustomerID
- FirstName
- LastName
- Street
- City

Branch

- * BranchID
- Manager
- Location
- StartDate

LastName replaced CustomerID

Location replaced BranchID

Criterion was changed from "B50" to "campus."

Field:	AccountID	LastName	Balance	Location
Table:	Accounts	Customers	Accounts	Branch
Sort:			Descending	
Show:	☒	☒	☒	☒
Criteria:				"Campus"
or:				

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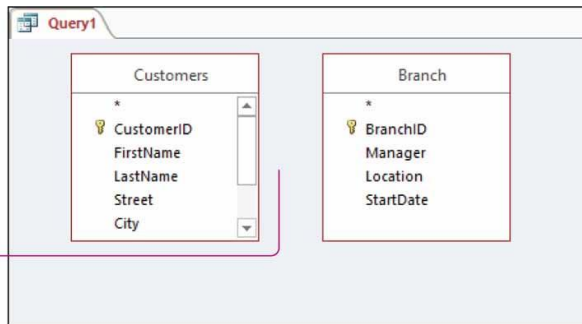
Modifying a Multitable Query (2 of 4)

Accounts from Campus Branch				
Account ID	LastName	Balance	Branch Location	
1021	YourName	\$21,004.00	Campus	
1024	YourName	\$14,005.00	Campus	
1020	Millward	\$12,000.00	Campus	
1028	Wagner	\$8,000.00	Campus	
1001	Peterson	\$5,600.00	Campus	
1027	Hayes	\$4,000.00	Campus	
1022	Hayes	\$4,000.00	Campus	
1009	Wagner	\$1,500.00	Campus	
1005	Nunn	\$1,300.00	Campus	
1023	YourName	\$1,000.00	Campus	
*				

Accounts are from the "Campus" branch

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Modifying a Multitable Query (3 of 4)



Tables are not joined
(and not related)

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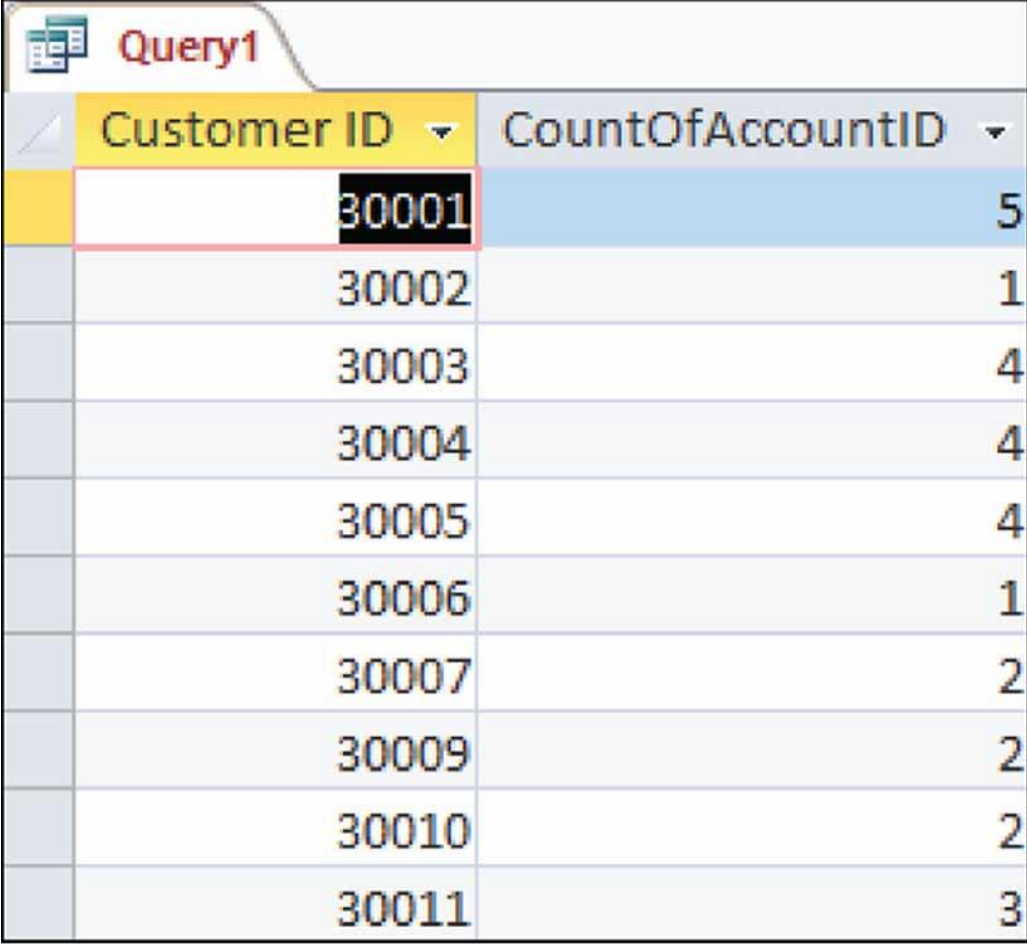
Access shows one
record for every Branch
for each Customer

The screenshot shows the results of a query named 'Query1'. The table has four columns: LastName, Branch ID, Branch Location, and Manager's Start Date. The data shows a Cartesian product of the Customers and Branch tables, with 55 records in total. The first five records all have the last name 'Millward', corresponding to the five branches (B10, B20, B30, B40, B50). This pattern repeats for all other customers.

LastName	Branch ID	Branch Location	Manager's Start Date
Millward	B10	Uptown	12/3/2014
Millward	B20	Eastern	6/18/2013
Millward	B30	Western	3/13/2011
Millward	B40	Southern	9/15/2014
Millward	B50	Campus	10/11/2016
Fox	B10	Uptown	12/3/2014
Fox	B20	Eastern	6/18/2013
Fox	B30	Western	3/13/2011
Fox	B40	Southern	9/15/2014
Fox	B50	Campus	10/11/2016
Hayes	B10	Uptown	12/3/2014
Hayes	B20	Eastern	6/18/2013
Hayes	B30	Western	3/13/2011
Hayes	B40	Southern	9/15/2014
Hayes	B50	Campus	10/11/2016
Collins	B10	Uptown	12/3/2014
Collins	B20	Eastern	6/18/2013
Collins	B30	Western	3/13/2011
Collins	B40	Southern	9/15/2014
Collins	B50	Campus	10/11/2016
Wagner	B10	Uptown	12/3/2014
Wagner	B20	Eastern	6/18/2013
Wagner	B30	Western	3/13/2011
Wagner	B40	Southern	9/15/2014
Wagner	B50	Campus	10/11/2016
Williams	B10	Uptown	12/3/2014
Williams	B20	Eastern	6/18/2013

Result show 55 records

Modifying a Multitable Query (4 of 4)



Customer ID	CountOfAccountID
30001	5
30002	1
30003	4
30004	4
30005	4
30006	1
30007	2
30009	2
30010	2
30011	3

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