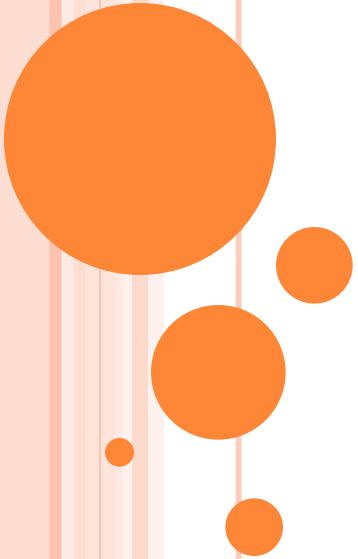
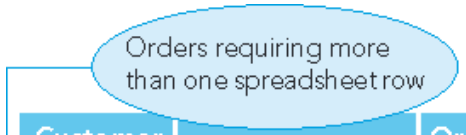
CIS 412
DATABASE MANAGEMENT SYSTEMS



Chapter 1
Introduction to Database Management

Premiere Products Background (1/5)



Customer Number	Customer Name	Order Number	Order Date	Part Number	Part Description	Number Ordered	Quoted Price	Warehouse	Rep Number
148	Al's Appliance and Sport	21608	10/20/2013	AT94	Iron	11	$21.95	3	20
148	Al's Appliance and Sport	21619	10/23/2013	DR93	Gas Range	1	$495.00	2	20
282	Brookings Direct	21614	10/21/2013	KT03	Dishwasher	2	$595.00	3	35
356	Ferguson's	21610	10/20/2013	DR93	Gas Range	1	$495.00	2	65
356	Ferguson's	21610	10/20/2013	DW11	Washer	1	$399.99	3	65
408	The Everything Shop	21613	10/21/2013	KL62	Dryer	4	$329.95	1	35
608	Johnson's Department Store	21617	10/23/2013	BV06	Home Gym	2	$794.95	2	65
608	Johnson's Department Store	21617	10/23/2013	CD52	Microwave Oven	4	$150.00	1	65
608	Johnson's Department Store	21623	10/23/2013	KV29	Treadmill	2	$1,290.00	2	65

FIGURE 1-1: Sample orders spreadsheet

Premiere Products Background (2/5)

- Problems using spreadsheet
  - **Redundancy**
    - Duplication of data or the storing of the same data in more than one place
  - Difficulty accessing related data
  - Limited security
  - Size limitations

Premiere Products Background (3/5)

- Information Premiere Products needs to maintain
  - Sales Reps
    - Sales rep number, last name, first name, address, total commission, commission rate
  - Customers
    - Customer number, name, address, current balance, credit limit, number of customer's sales rep
  - Parts Inventory
    - Part number, description, number units on hand, item class, warehouse number, unit price

PREMIERE PRODUCTS BACKGROUND (4/5)

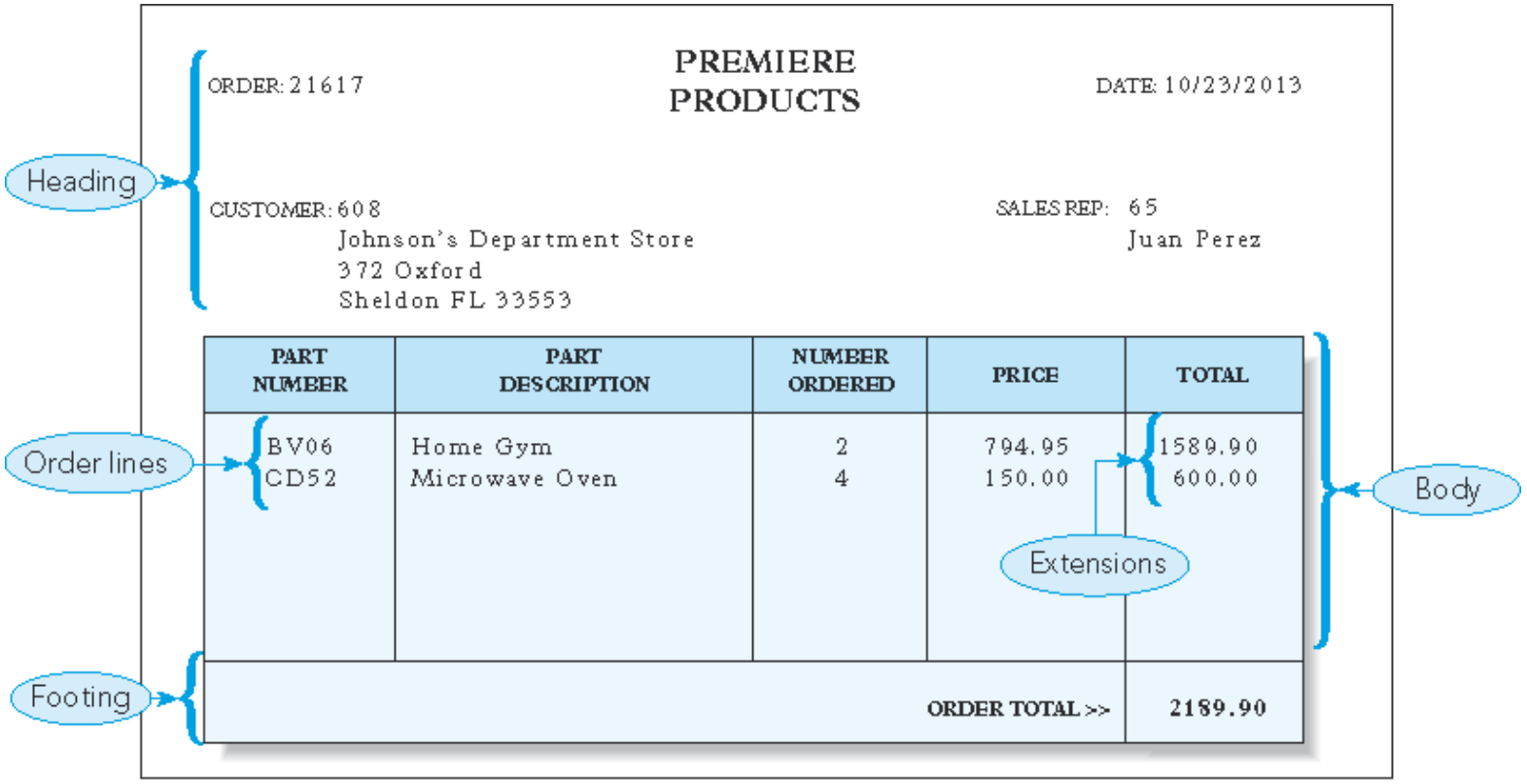


FIGURE 1-2: Sample order

Premiere Products Background (5/5)

- Items for each customer's order
  - Order
    - Order number, order date, customer number
  - Order line
    - Order number, part number, number of units ordered, quoted price
  - Overall order total
    - Not stored because it can be calculated

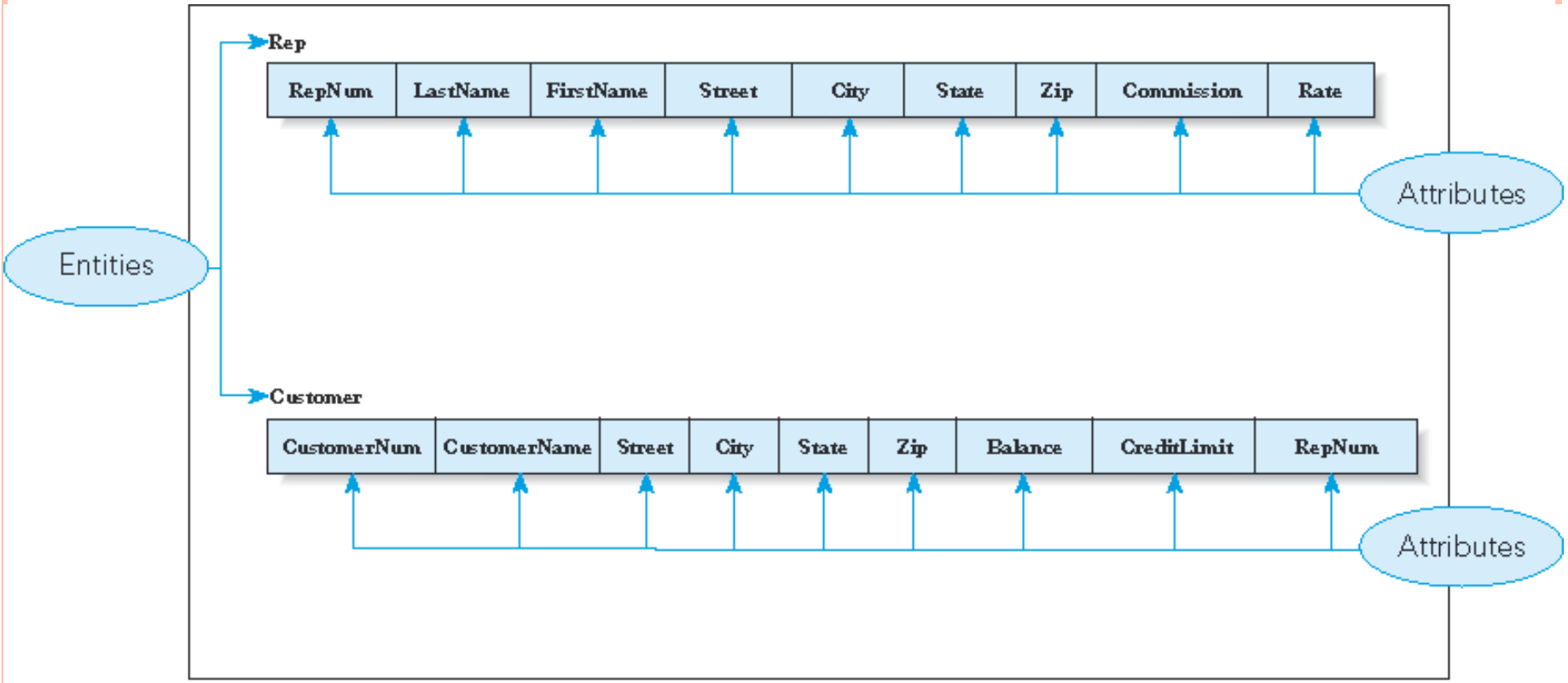
Database Background (1/6)

- Database
  - Structure that can store information about:
    - Different categories of information
    - Relationships between those categories of information
- **Entity**
  - Person, place, object, event, or idea
  - Entities for Premiere Products: sales reps, customers, orders, and parts

Database Background (2/6)

- **Attribute**
  - Characteristic or property of an entity
  - Example: Customer has name, street, city, etc.
  - May also be called a **field** or **column**
- **Relationship**
  - Association between entities
  - **One-to-many relationship**
    - Each rep is associated with many customers
    - Each customer is associated with a single rep

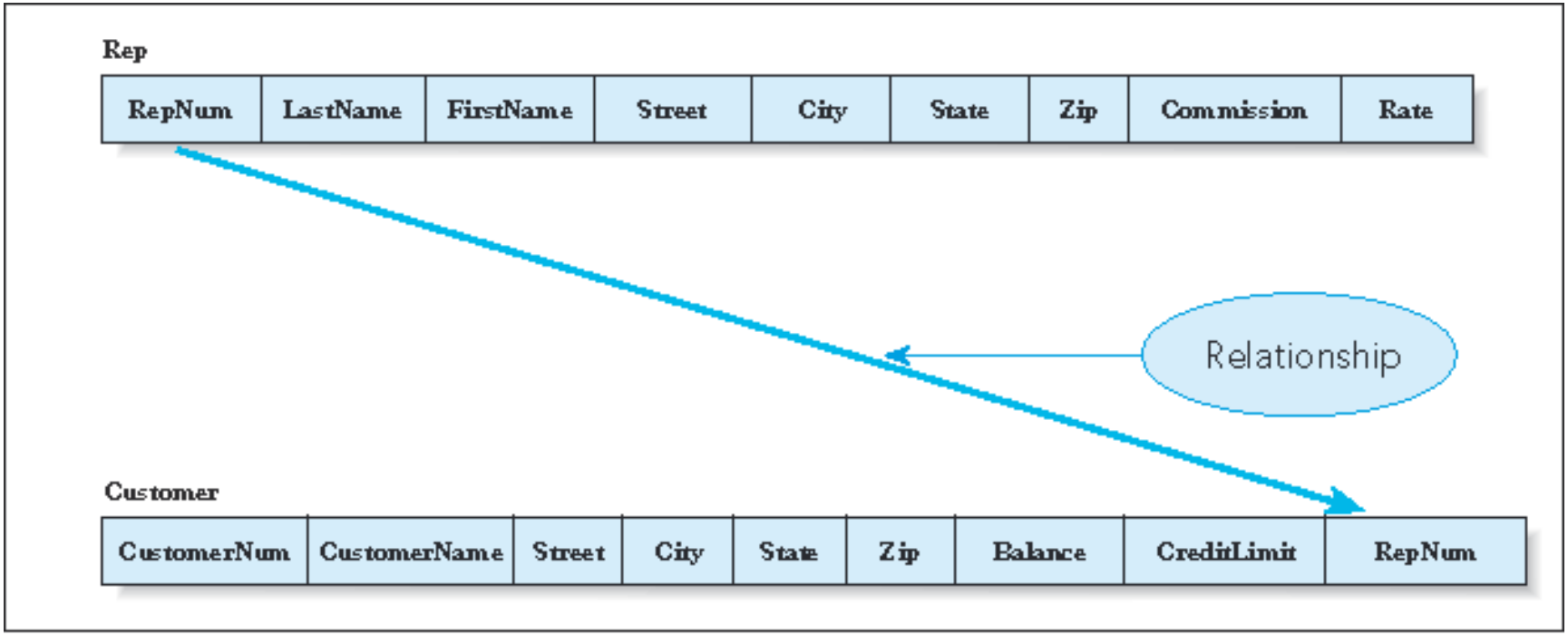
Database Background (3/6)



Rep is an Entity with the listed Attributes.

Customer is an entity with a different set of attributes.

Database Background (4/6)



The Rep Number in Customer points to the RepNum in the Rep entity, so there is a relationship between those values.

Database Background (5/6)

- **Database**
  - Structure that can store information about:
    - Multiple types of entities
    - Attributes of those entities
    - Relationships between the entities
- **Entity-relationship (E-R) diagram**
  - Visual way to represent a database
  - Rectangles represent entities
  - Lines represent relationships between connected entities

Database Background (6/6)

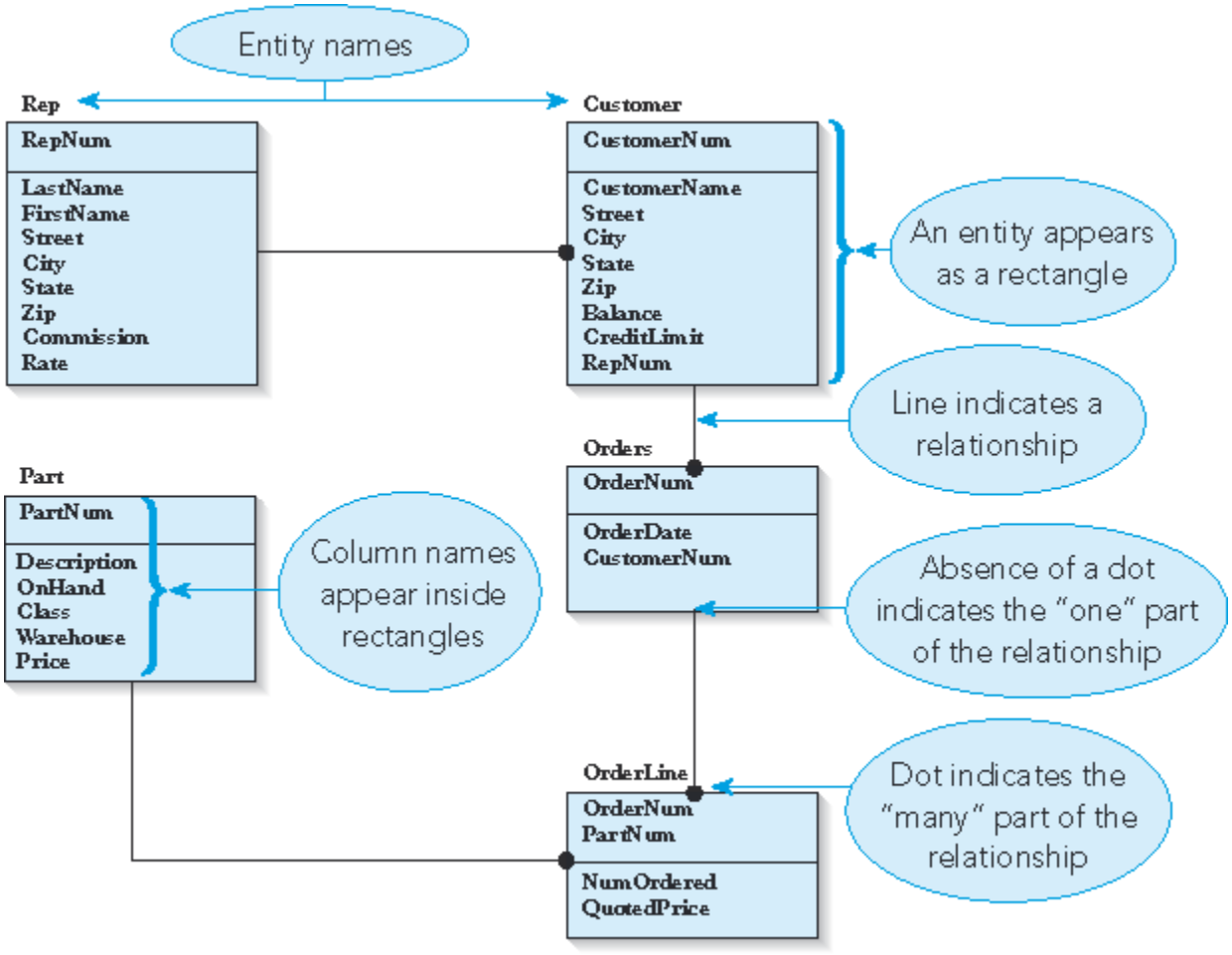


FIGURE 1-7: E-R diagram for the Premiere Products database

Database Management Systems

- **Database management system (DBMS)**
  - Program, or collection of programs, through which users interact with a database
- Popular DBMSs: Access, Oracle, DB2, MySQL, and SQL Server
- **Database design**
- Determining the structure of the required database
- **Forms**
  - Screen objects used to maintain, view, and print data from a database
  - DBMS creates forms that Premiere Products needs
- Reports
  - DBMS creates reports for Premiere Products based on user's answers about the desired content and appearance of each report

Advantages of Database Processing (1/2)

1. Getting more information from the same amount of data
2. Sharing data
3. Balancing conflicting requirements
   - **Database administrator** or **database administration (DBA)**: person or group in charge of the database
4. Controlling redundancy
5. Facilitating consistency

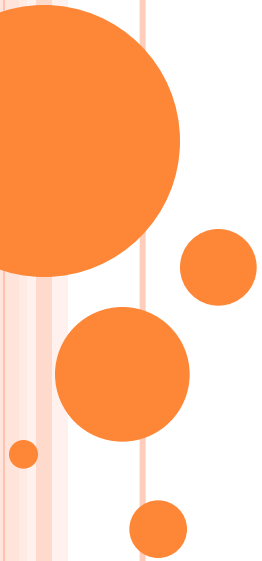
Advantages of Database Processing (2/2)

6. Improving integrity
   - **Integrity constraint**: a rule that data must follow in the database
7. Expanding security
   - **Security**: prevention of unauthorized access
8. Increasing productivity
9. Providing data independence
   - **Data independence**: can change structure of a database without changing the programs that access the database

Disadvantages of Database Processing

1. Larger file size
2. Increased complexity
3. Greater impact of failure
4. More difficult recovery

CIS 372
DATABASE MANAGEMENT SYSTEMS



Chapter 2a

The Relational Model 1: Introduction, QBE

pp. 32 through through 44 (before Functions)

Relational Databases (1/4)

- A relational database is a collection of tables
- Each entity is stored in its own table
- Attributes of an entity become the fields or columns in the table
- Relationships are implemented through common columns in two or more tables
- Should not permit multiple entries (**repeating groups**) in a table

Relational Databases (2/4)

- **Relation**: two-dimensional table in which:
  - Entries are single-valued
  - Each column has a distinct name (called the attribute name)
  - All values in a column are values of the same attribute
  - Order of columns is immaterial
  - Each row is distinct
  - Order of rows is immaterial

Relational Databases (3/4)

- **Relational database**: collection of relations
- **Unnormalized relation**
  - A structure that satisfies all properties of a relation except for the first item
  - Entries contain repeating groups; they are not single-valued

Relational Databases (4/4)

- Database structure representation
  - Write name of the table followed by a list of all columns within parentheses
  - Each table should appear on its own line
  - Notation to be used with duplicate column names within a database: Tablename.Columnname
    - You **qualify** the column names
- **Primary key**: column or collection of columns of a table (relation) that uniquely identifies a given row in that table

Query-by-Example (QBE) (1/2)

- **Query**: question represented in a way the DBMS can recognize and process
- **Query-By-Example (QBE)**
  - Visual approach to writing queries
  - Users ask their questions using an on-screen grid
  - Data appears on the screen in tabular form

Query-by-Example (QBE) (2/2)

- Query window in Access has two panes
  - Upper portion contains a field list for each table you want to query
  - Lower pane contains the **design grid**, where you specify:
    - Format of output
    - Fields to be included in the query results
    - Sort order for query results
    - Any criteria the records must satisfy

Simple Queries (1/3)

- To include a field in an Access query, double-click the field in the field list to place it in the design grid
- Clicking Run button in Results group on the Query Tools Design tab runs query and displays query results
- Add all fields from a table to the design grid by double-clicking the asterisk in the table's field list

Simple Queries (2/3)

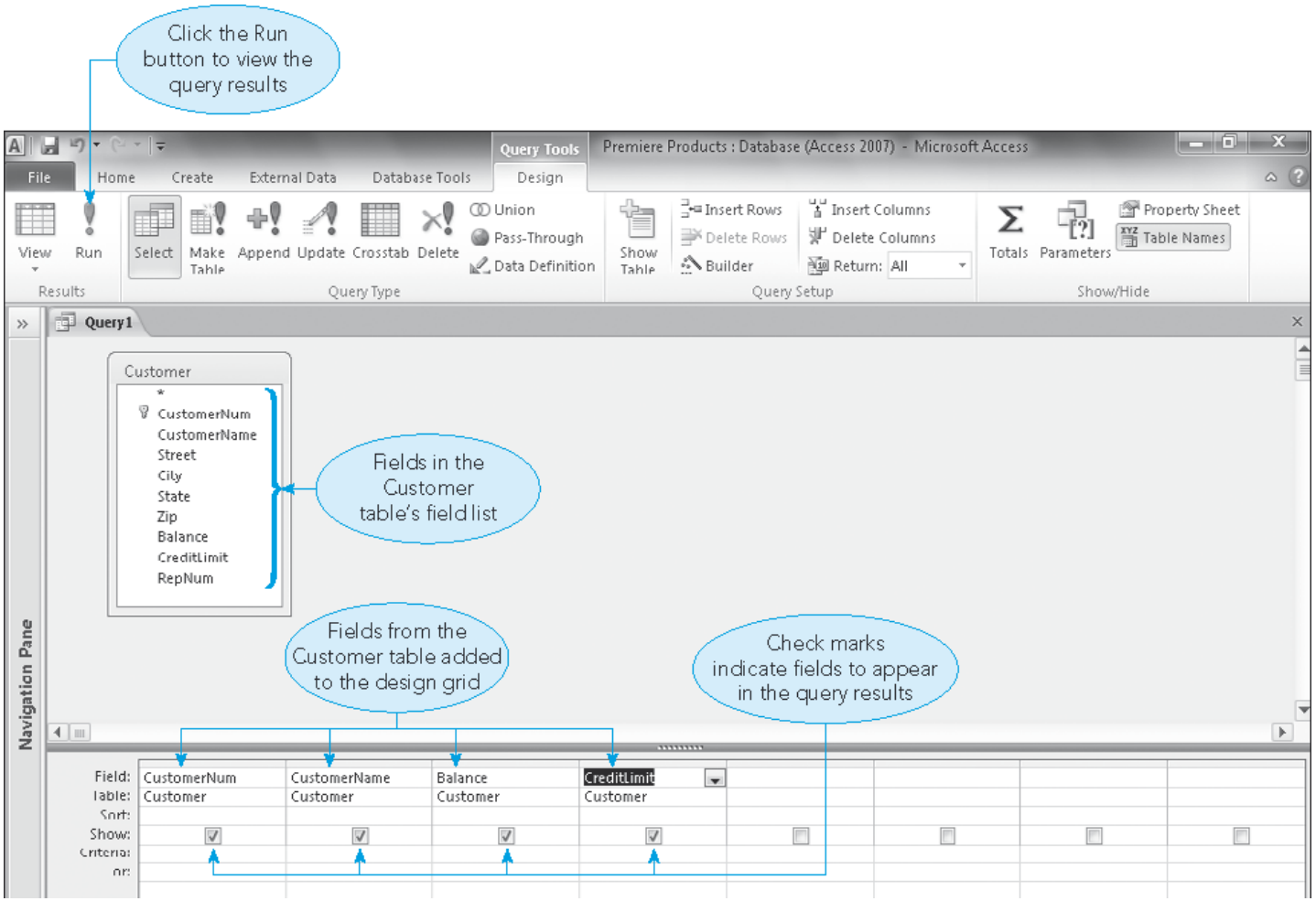


FIGURE 2-3: Fields added to the design grid

Simple Queries (3/3)

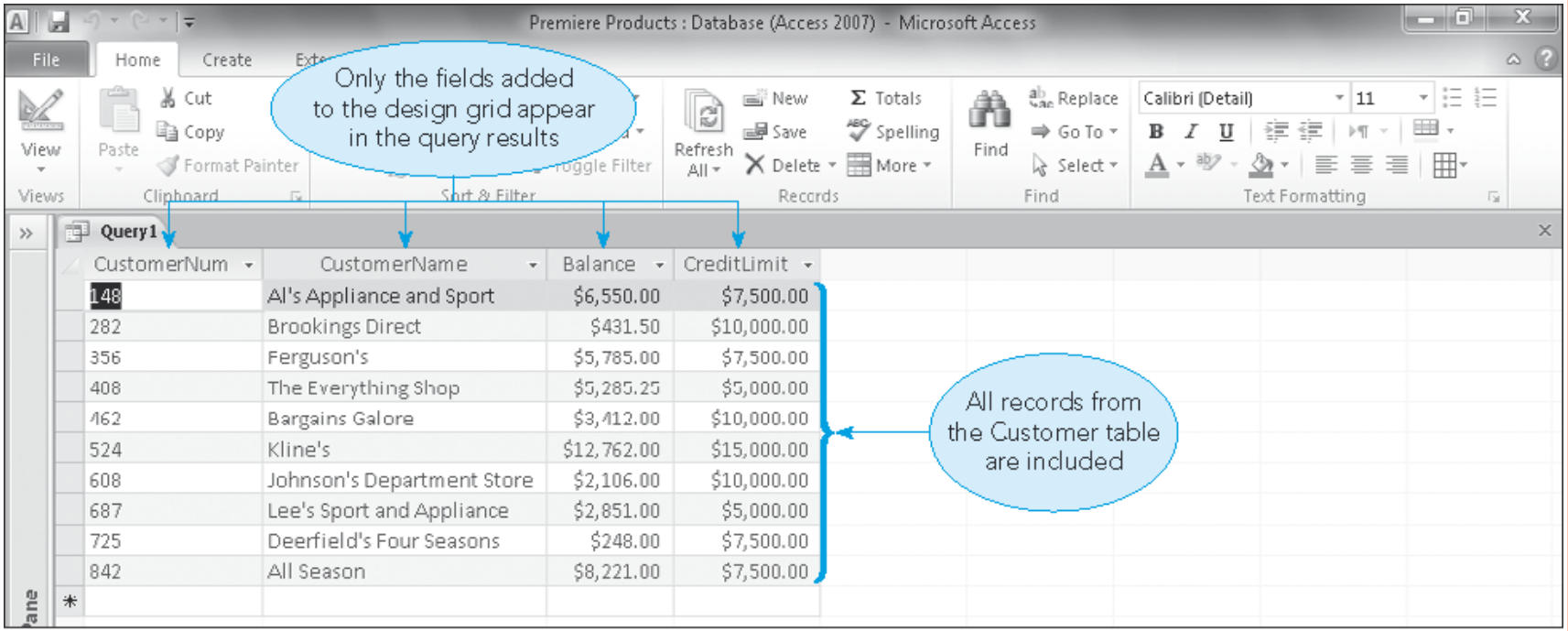


FIGURE 2-4: Query results

Simple Criteria

- **Criteria**: conditions that data must satisfy
- **Criterion**: single condition that data must satisfy
- To enter a criterion for a field:
  - Include field in the design grid
- Enter criterion in Criteria row for that field
- **Comparison operator**
  - Also called a **relational operator**
  - Used to find something other than an exact match

= (equal to)

> (greater than)

< (less than)

>= (greater than or equal to)

<= (less than or equal to)

NOT (not equal to)

Compound Criteria (1/3)

- **Compound criteria**, or **compound conditions**
  - **AND criterion**: both criteria must be true for the compound criterion to be true
  - **OR criterion**: either criteria must be true for the compound criterion to be true
- To create an AND criterion in QBE:
  - Place the criteria for multiple fields on the same Criteria row in the design grid
- To create an OR criterion in QBE:
  - Place the criteria for multiple fields on different Criteria rows in the design grid

Compound Criteria (2/3)

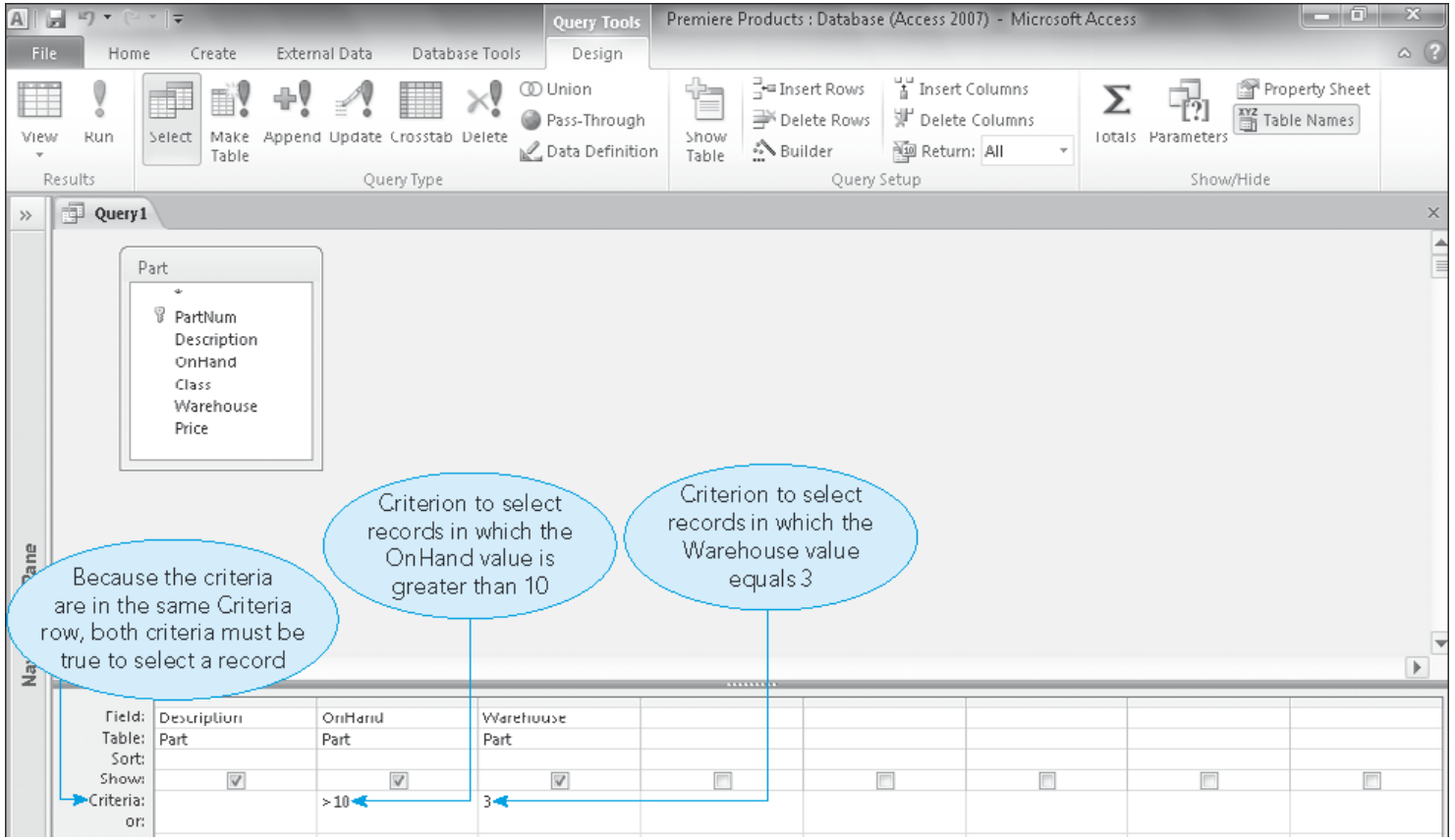


FIGURE 2-9: Query that uses an AND criterion

COMPOUND CRITERIA (3/3)

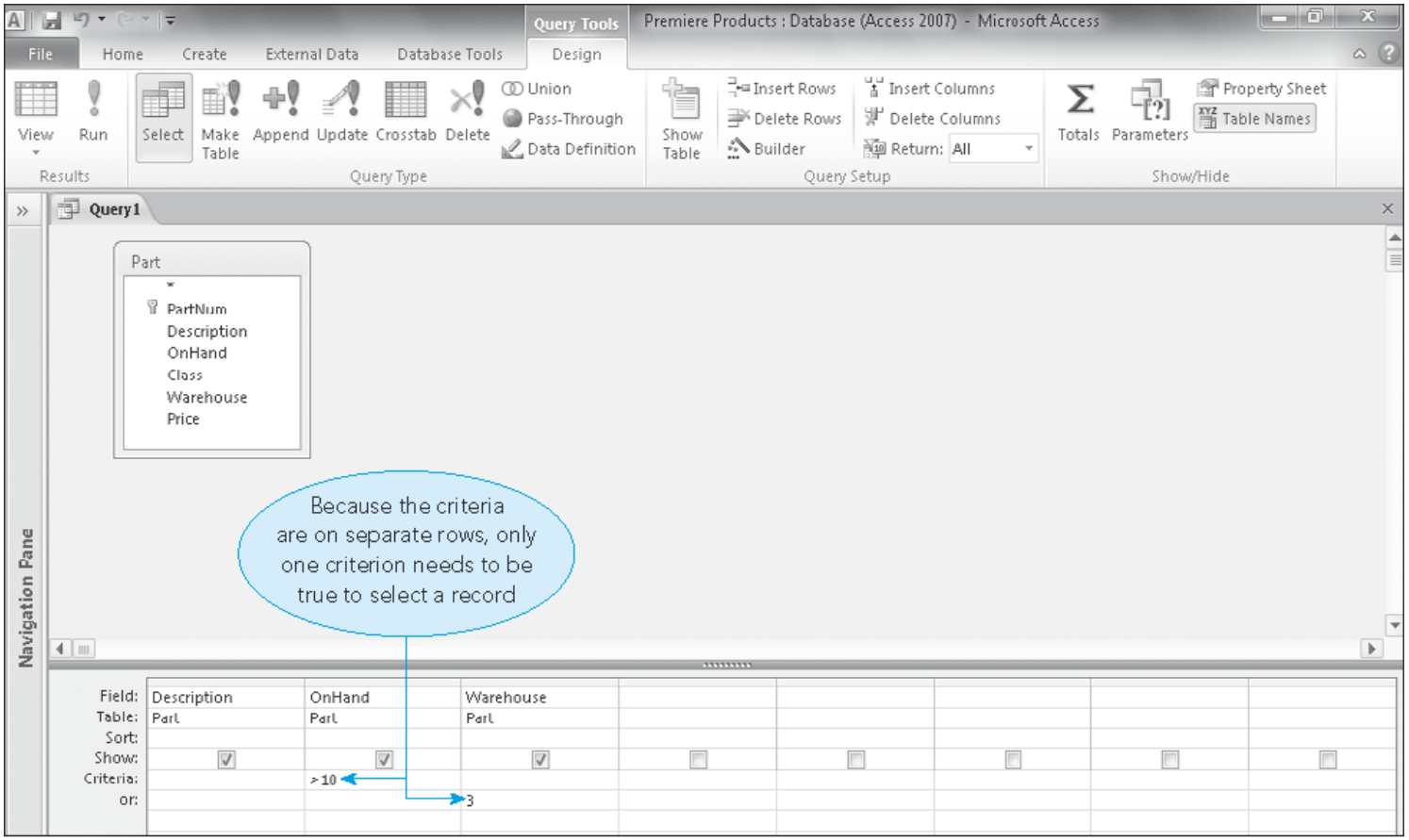


FIGURE 2-11: Query that uses an OR criterion

Computed Fields (1/2)

- **Computed field** or **calculated field**
  - Result of a calculation on one or more existing fields
- To include a computed field in a query:
  - Enter a name for the computed field, followed by a colon, followed by an expression in one of the columns in the Field row
- Alternative method
  - Right-click the column in the Field row, and then click Zoom to open the Zoom dialog box
  - Type the expression in the Zoom dialog box

COMPUTED FIELDS (2/2)

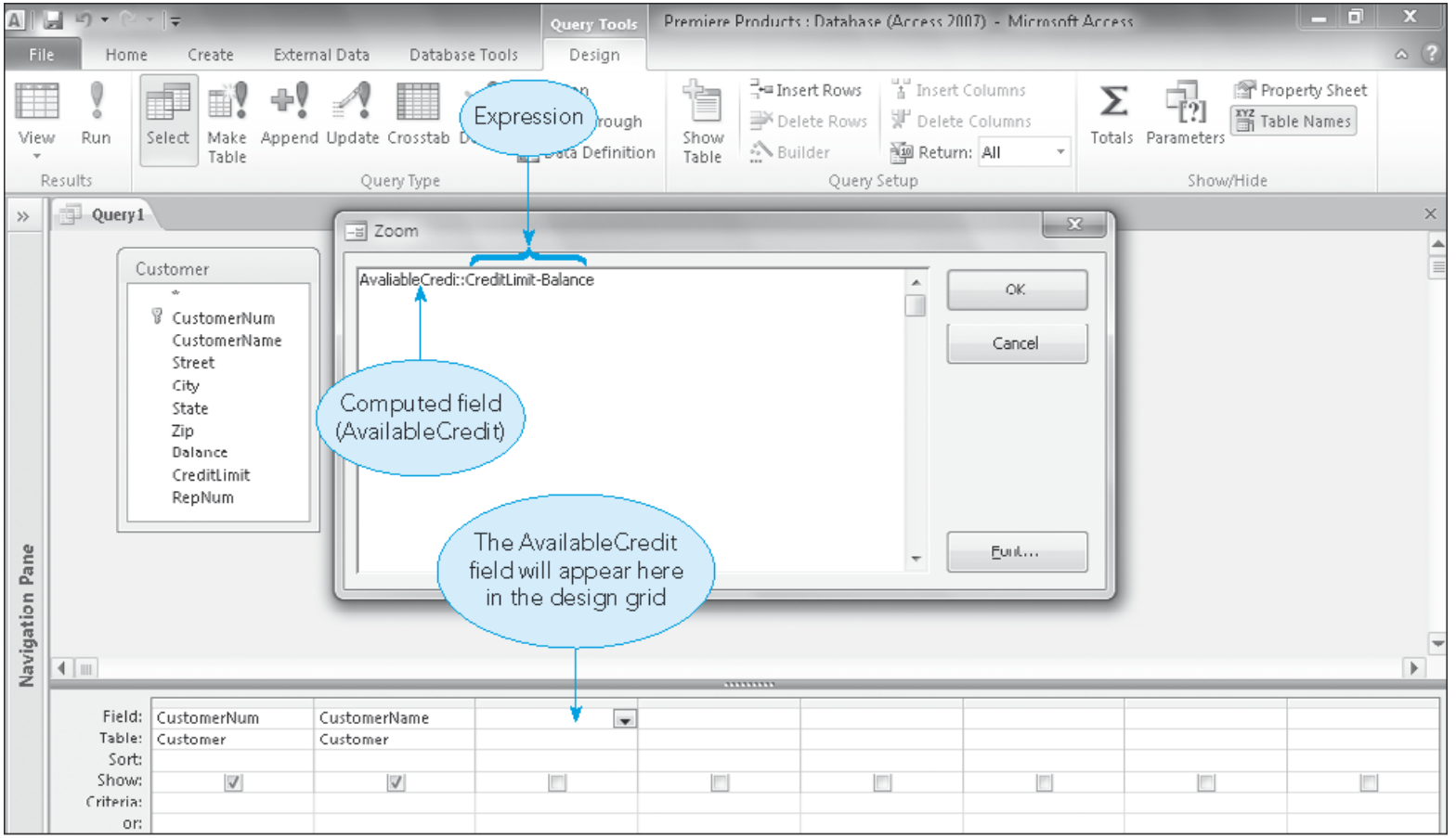


FIGURE 2-15: Query that uses a computed field