

SOLUTIONS MANUAL



Database
Processing

Fundamentals, Design, and Implementation

David M. Kroenke • David J. Auer

12E

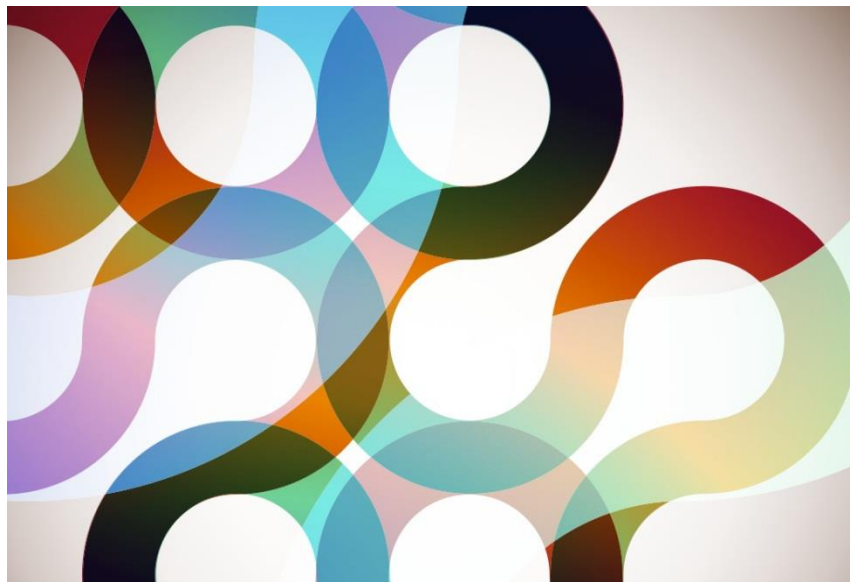
**INSTRUCTOR'S MANUAL
TO ACCOMPANY**

DAVID M. KROENKE AND DAVID J. AUER

Database Processing

Fundamentals, Design, and Implementation
12th Edition

**CHAPTER TWO
INTRODUCTION TO STRUCTURE QUERY LANGUAGE**



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CHAPTER OBJECTIVES

- To understand the use of extracted data sets
- To understand the use of ad-hoc queries
- To understand the history and significance of Structured Query Language (SQL)
- To understand the basic SQL SELECT/FROM/WHERE framework as the basis for database queries
- To be able to write queries in SQL to retrieve data from a single table
- To be able to write queries in SQL to use the SQL SELECT, FROM, WHERE, ORDER BY, GROUP BY, and HAVING clauses
- To be able to write queries in SQL to use SQL DISTINCT, AND, OR, NOT, BETWEEN, LIKE, and IN keywords
- To be able to use the SQL built-in functions of SUM, COUNT, MIN, MAX, and AVG with and without the use of a GROUP BY clause
- To be able to write queries in SQL to retrieve data from a single table but restricting the data based upon data in another table (subquery)
- To be able to write queries in SQL to retrieve data from multiple tables using an SQL JOIN



ERRATA

- Page 84 – [23-JUL-11 – Corrected in the Instructor’s Manual for Chapter 2] — The introductory text between Review Questions 2.16 and 2.17 should refer to Review Question 2.39 instead of Review Question 2.40:

Use only the INVENTORY table to answer Review Questions 2.17 through 2.39:

- Page 96 – [19-JUL-11 – Corrected in DBP e12 International Edition, Chapter 2 PowerPoint Slideshow, and the Instructor’s Manual for Chapter 2] — Figure 2-40 is mislabeled for Martha’s Dry Cleaning (MDC) instead of Morgan Importing (MI). The figure title should read:

The MI Database

- Page 97 – [23-JUL-11 – Corrected in the Instructor’s Manual for Chapter 2] — The introductory text before Project Question A should refer to the MI data instead of the MDC data:

Write SQL statements and show the results based on the MI data for each of the following:

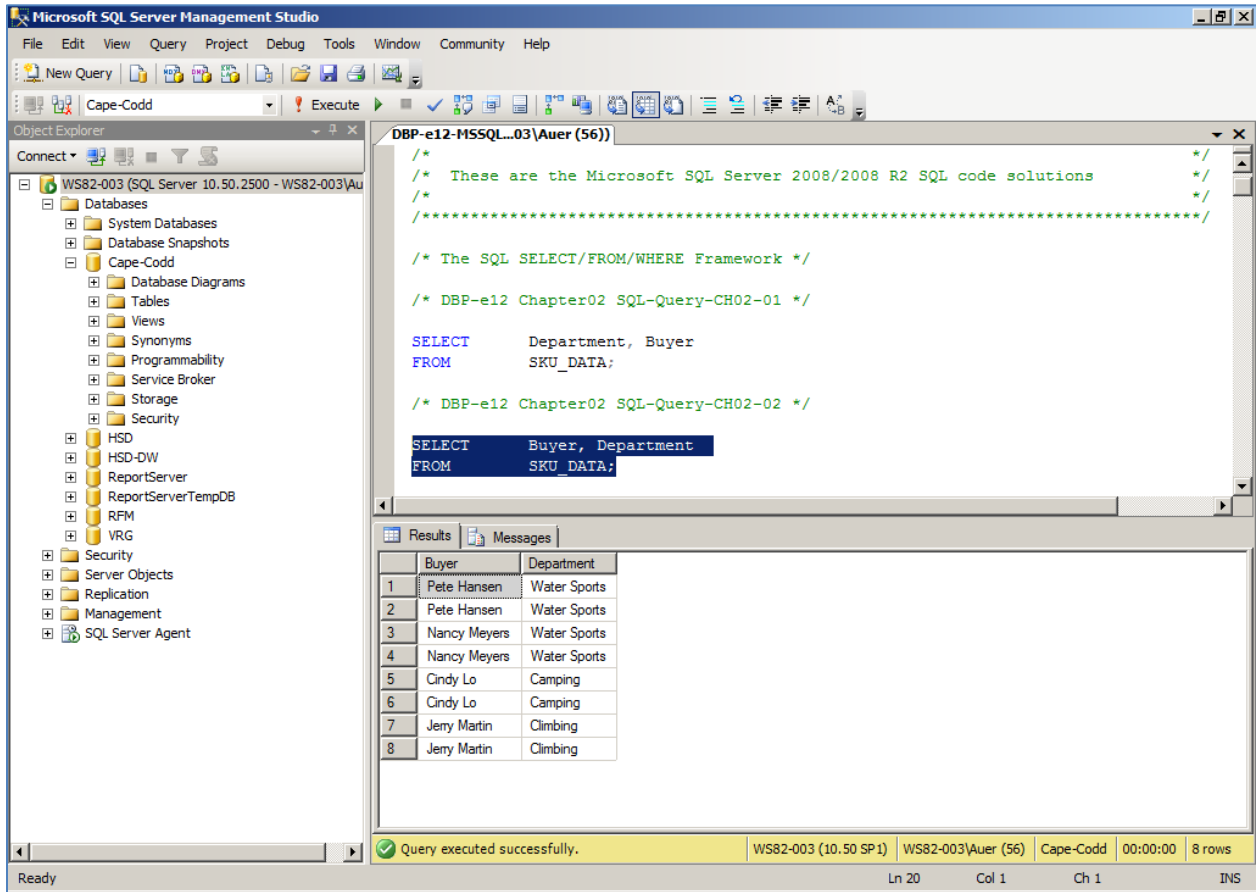
- Page 97 – [23-JUL-11 – Corrected in the Instructor’s Manual for Chapter 2] — The next to the last introductory text line before Figure 2-40 contains a misplaced hyphen (-) in the word Alter-natively. It should read:

Alternatively, SQL scripts for creating the MI-CH02 database in SQL Server, Oracle Data-

TEACHING SUGGESTIONS

- Database files to illustrate the examples in the chapter and solution database files for your use are available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).
- The best way for students to understand SQL is by using it. Have your students work through the Review Questions, Project Questions and the Marcia's Dry Cleaning and Morgan Importing Project Questions in an actual database. Students can create databases in Microsoft Access with basic tables, relationships and data from the material in the book. SQL scripts for Microsoft SQL Server, Oracle Database and MySQL versions of Cape Codd, WPC, MDC and MI are available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).
- Microsoft Access database files for Cape Codd and the NASDAQ data (NDX.accdb), together with SQL scripts for Microsoft SQL Server, Oracle Database and MySQL versions of Cape Codd, MDC and MI are available for student use in the Student Resources on the text's Web site (www.pearsonhighered.com/kroenke).
- The SQL processors in the various DBMSs are very fussy about character sets used for SQL statements. They want to see plain ASCII text, not fancy fonts. This is particularly true of the single quotation (') used to designate character strings, but I've also had problems with the minus sign. If your students are having problems getting a "properly structured SQL statement" to run, look closely for this type of problem.
- There is a useful teaching technique which will allow you to demonstrate the SQL queries in the text using Microsoft SQL Server if you have it available.
 - Open the Microsoft SQL Server Management Studio, and create a new SQL Server database named Cape-Codd.
 - In the Microsoft SQL Server Management Studio, use the SQL statements in the *.sql text file DBP-e12-MSSQL-Cape-Codd-Create-Tables.sql to create the RETAIL_ORDER, ORDER_ITEM and SKU_DATA tables [the WAREHOUSE and INVENTORY tables, used in the Review Questions, are also created].
 - In the Microsoft SQL Server Management Studio, use the SQL statements *.sql text file DBP-e12-MSSQL-Cape-Codd-Insert-Data.sql to populate the RETAIL_ORDER, ORDER_ITEM and SKU_DATA tables [the WAREHOUSE and INVENTORY tables, used in the Review Questions, are also populated].
 - In the Microsoft SQL Server Management Studio, open the *.sql text file *DBP-e12-MSSQL-Cape-Codd-Query-Set-CH02.sql*. This file contains all the queries shown in the Chapter Two text.

- Highlight the query you want to run and Execute Query button to display the results of the query. An example of this is shown in the following screenshot.
- All of the *.sql text files needed to do this are available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).



- Microsoft Access 2010 does not support all SQL-92 (and newer) constructs. While this chapter still considers Microsoft Access as the DBMS most likely to be used by students at this point in the course, there are some Review Questions and Project Questions that use the ORDER BY clause with aliased computed columns that will not run in Access (see Review Questions 2.42 – 2.44 and Project Questions 2.63.e – 2.63.g). The correct solutions for these questions were obtained using Microsoft SQL Server 2008 R2. The Microsoft Access results without the ORDER BY clause are also shown, so you can assign these problems without the ORDER BY part of the questions.
- Microsoft Access 2010 does not support SQL wildcard characters (see Review Questions 2.36 – 2.38), although it does have equivalent wildcard characters as described in the chapter. The correct solutions for these questions were obtained using Microsoft SQL Server 2008 R2.
- For those students who are used to procedural languages, they may have some initial difficulty with a language that does set processing like SQL. These students

are accustomed to processing rows (records) rather than sets. It is time well spent to make sure they understand that SQL processes tables at a time, not rows at a time.

- Students may have some trouble understanding the GROUP BY clause. If you can explain it in terms of traditional control break logic (sort rows on a key then process the rows until the value of the key changes) they will have less trouble. This also explains why the GROUP BY clause will present the rows sorted even though you do not use an ORDER BY clause.
- At this point, students familiar with Microsoft Access will wonder why they are learning SQL. They have made queries in Microsoft Access using Microsoft Access's version of Query-By-Example (QBE), and therefore never had to understand the SQL. In many cases, they will not know that Microsoft Access generates SQL code when you create a query in design view. It is worth letting them know this is done and even showing them the SQL created for and underlying a Microsoft Access query.
- It is also important for students to understand that, in many cases, the Query-By-Example forms such as Microsoft Access' design view can be very inefficient. Also, the QBE forms are not available from within an application program such as Java or C, and so SQL must be written.
- It has been our experience that a review of a Cartesian Product from an algebra class is time well spent. Show students what will happen if a WHERE statement is left off of a join. The following example will work. Assume you create four tables with five columns each and 100 rows each. How many columns and rows will be displayed by the statement:

```
SELECT * FROM TABLE1, TABLE2, TABLE3, TABLE4;
```

The result is 20 columns (not bad) but 100,000,000 rows ($100 * 100 = 10,000$, $10,000 * 100 = 1,000,000$, $1,000,000 * 100 = 100,000,000$). This happens because the JOIN is not qualified. If they understand Cartesian products then they will understand how to fix a JOIN where the results are much too large.

- Note that in the Marcia's Dry Cleaning project, where in previous editions we have used tables named ORDER and ORDER_ITEM, we have changed these table names to INVOICE and INVOICE_ITEM. We did this because ORDER is an SQL reserved word (part of ORDER BY). Therefore, when the table name ORDER is used as part of a query, it may need to be ("must be" in Access 2010) enclosed in delimiters as [ORDER] if the query is going to run correctly. The topic of reserved words and delimiters is discussed in more detail in Chapters 6 and 7. However, now is a good time to introduce it to your students.

❖ **ANSWERS TO REVIEW QUESTIONS**

2.1 *What is a business intelligence (BI) system?*

A business intelligence (BI) system, is a system used to support management decisions by producing information for assessment, analysis, planning and control.

2.2 *What is an ad-hoc query?*

An ad-hoc query is a query created by the user as needed, rather than a query programmed into an application.

2.3 *What does SQL stand for, and what is SQL?*

SQL stands for *Structured Query Language*. SQL is the universal query language for relational DBMS products.

2.4 *What does SKU stand for, and what is an SKU?*

SKU stands for stock keeping unit. An SKU is a an identifier used to label and distinguish each item sold by a business.

2.5 *Summarize how data were altered and filtered in creating the Cape Codd data extraction.*

Data from the Cape Codd operational retail sales database were used to create a retail sales extraction database with three tables: **RETAIL_ORDER**, **ORDER_ITEM** and **SKU_DATA**.

The **RETAIL_ORDER** table uses only a few of the columns in the operational database. The structure of the table is:

RETAIL_ORDER (OrderNumber, StoreNumber, StoreZip, OrderMonth, OrderYear, OrderTotal)

For this table, the original column OrderDate (in the data format MM/DD/YYYY [04/26/2010]) was converted into the columns OrderMonth (in a Character(12) format so that each month is spelled out [April]) and OrderYear (in an Integer format with each year appearing as a four-digit year [2010]).

We also note that the OrderTotal column includes tax, shipping and other charges that do not appear in the data extract. Thus, it does not equal the sum of the related ExtendedPrice column in the **ORDER_ITEM** table discussed below.

The **ORDER_ITEM** table uses an extract of the items purchased for each order. The structure of the table is:

ORDER_ITEM (OrderNumber, SKU, Quantity, Price, ExtendedPrice)

For this table, there is one row for each SKU associated with a given OrderNumber, representing one row for each type of item purchased in a specific order.

The **SKU_DATA** table uses an extract of the item identifying and describing data in the complete operational table. The structure of the table is:

SKU_DATA (SKU, SKU_Description, Department, Buyer)

For this table, there is one row to describe each SKU, representing one particular item that is sold by Cape Codd.

2.6 Explain, in general terms, the relationships of the *RETAIL_ORDER*, *ORDER_ITEM*, and *SKU_DATA* tables.

In general, each sale in *RETAIL_ORDER* relates to one or more rows in *ORDER_ITEM* that detail the items sold in the specific order. Each row in *ORDER_ITEM* is associated with a specific SKU in the *SKU_DATA* table. Thus one SKU may be associated once with each specific order number, but may also be associated with many different order numbers (as long as it appears only once in each order).

Using the Microsoft Access Relationship window, the relationships (including the additional relationships with the *INVENTORY* and *WAREHOUSE* tables described after Review Question 2.15) are shown in Figure 2-23 and look like this:

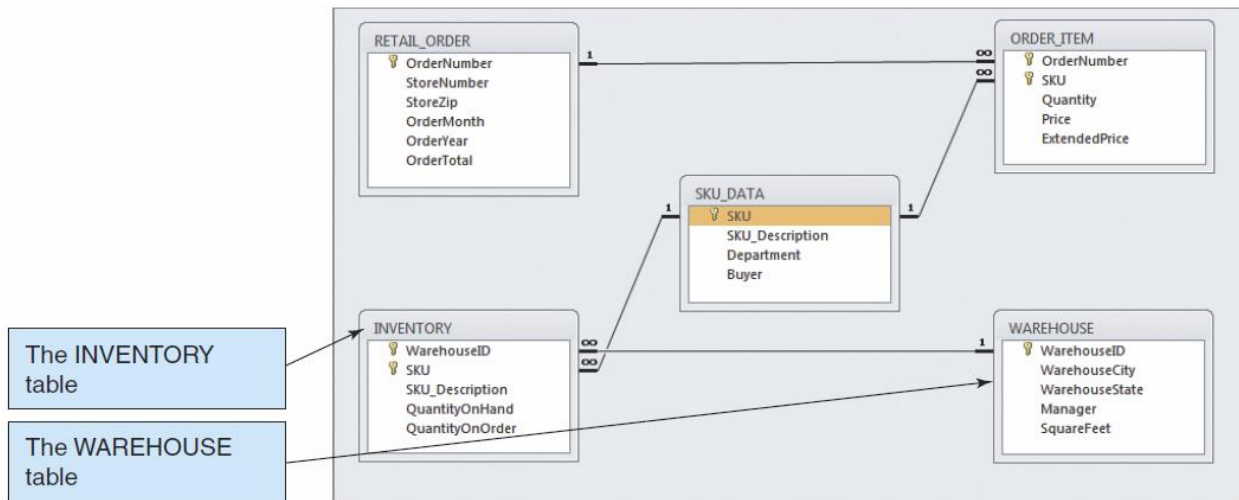


Figure 2-23 – The Cape Codd Database with the *WAREHOUSE* and *INVENTORY* tables

In traditional database terms (which will be discussed in Chapter 6) OrderNumber and SKU in *ORDER_ITEM* are foreign keys that provide the links to the *RETAIL_ORDER* and *SKU_DATA* tables respectively. Using an underline to show primary keys and italics to show foreign keys, the tables and their relationships are shown as:

RETAIL_ORDER (OrderNumber, StoreNumber, StoreZip, OrderMonth, OrderYear, OrderTotal)

ORDER_ITEM (OrderNumber, SKU, Quantity, Price, ExtendedPrice)

SKU_DATA (SKU, SKU_Description, Department, Buyer)

2.7 *Summarize the background of SQL.*

SQL was developed by IBM in the late 1970s, and in 1992 it was endorsed as a national standard by the American National Standards Institute (ANSI). That version is called SQL-92. There is a later version called SQL3 that has some object-oriented concepts, but SQL3 has not received much commercial attention.

2.8 *What is SQL-92? How does it relate to the SQL statements in this chapter?*

SQL-92 is the version of SQL endorsed as a national standard by the American National Standards Institute (ANSI) in 1992. It is the version of SQL supported by most commonly used database management systems. The SQL statements in the chapter are based on SQL-92 and the SQL standards that followed and modified it.

2.9 *What features have been added to SQL in versions subsequent to the SQL-92?*

Versions of SQL subsequent to SQL-92 have extended features or added new features to SQL, the most important of which, for our purposes, is support for Extensible Markup Language (XML).

2.10 *Why is SQL described as a data sublanguage?*

A data sublanguage consists only of language statements for defining and processing a database. To obtain a full programming language, SQL statements must be embedded in scripting languages such as VBScript or in programming languages such as Java or C#.

2.11 *What does DML stand for? What are DML statements?*

DML stands for *data manipulation language*. DML statements are used for querying and modifying data.

2.12 *What does DDL stand for? What are DDL statements?*

DDL stands for *data definition language*. DDL statements are used for creating tables, relationships and other database querying and modifying data.

2.13 *What is the SQL SELECT/FROM/WHERE framework?*

The SQL SELECT/FROM/WHERE framework is the basis for queries in SQL. In this framework:

- The SQL SELECT clause specifies which columns are to be listed in the query results.
- The SQL FROM clause specifies which tables are to be used in the query.
- The SQL WHERE clause specifies which rows are to be listed in the query results.

2.14 *Explain how Microsoft Access uses SQL.*

Microsoft Access uses SQL, but generally hides the SQL from the user. For example, Microsoft Access automatically generates SQL and sends it to the Microsoft Access's internal Access Database Engine (ADE, which is a variant of the Microsoft Jet engine) every time you run a query, process a form or create a report. To go beyond elementary database processing, you need to know how to use SQL in Microsoft Access.

2.15 *Explain how enterprise-class DBMS products use SQL.*

Enterprise-class DBMS products, which include Microsoft SQL Server, Oracle Corporation's Oracle Database and MySQL, and IBM's DB2, require you to know and use SQL. All data manipulation is expressed in SQL in these products.

The Cape Codd Outdoor Sports sale extraction database has been modified to include two additional tables, the INVENTORY table and the WAREHOUSE table. The table schemas for these tables, together with the SKU table, are as follows:

- RETAIL_ORDER (OrderNumber, StoreNumber, StoreZip, OrderMonth, OrderYear, OrderTotal)
- ORDER_ITEM (OrderNumber, SKU, Quantity, Price, ExtendedPrice)
- SKU_DATA (SKU, SKU_Description, Department, Buyer)
- WAREHOUSE (WarehouseID, WarehouseCity, WarehouseState, Manager, Squarefeet)
- INVENTORY (WarehouseID, SKU, SKU_Description, QuantityOnHand, QuantityOnOrder)

The five tables in the revised Cape Codd database schema are shown in Figure 2-23. The column characteristics for the WAREHOUSE table are shown in Figure 2-24, and the column characteristics for the INVENTORY table are shown in Figure 2-25. The data for the WAREHOUSE table are shown in Figure 2-26, and the data for the INVENTORY table are shown in Figure 2-27.

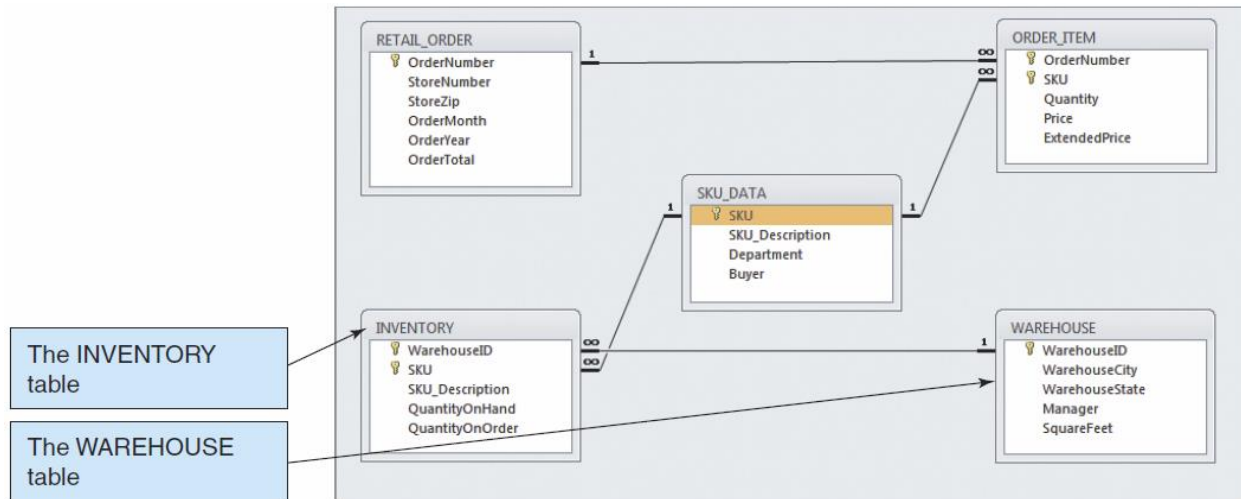


Figure 2-23 – The Cape Codd Database with the WAREHOUSE and INVENTORY tables

WAREHOUSE

Column Name	Type	Key	Required	Remarks
WarehouseID	Integer	Primary Key	Yes	Surrogate Key
WarehouseCity	Text (30)		Yes	
WarehouseState	Text (2)		Yes	
Manager	Text (35)	No	No	
SquareFeet	Integer	No	No	

Figure 2-24 - Column Characteristics for the WAREHOUSE Table

INVENTORY

Column Name	Type	Key	Required	Remarks
WarehouseID	Integer	Primary Key, Foreign Key	Yes	Surrogate Key
SKU	Integer	Primary Key, Foreign Key	Yes	Surrogate Key
SKU_Description	Text (35)	No	Yes	
QuantityOnHand	Integer	No	No	
QuantityOnOrder	Integer	No	No	

Figure 2-25 - Column Characteristics for the INVENTORY Table

WarehouseID	WarehouseCity	WarehouseState	Manager	SquareFeet
100	Atlanta	GA	Dave Jones	125,000
200	Chicago	IL	Lucille Smith	100,000
300	Bangor	MA	Bart Evans	150,000
400	Seattle	WA	Dale Rogers	130,000

Figure 2-26 - Cape Codd Outdoor Sports WAREHOUSE Data

WarehouseID	SKU	SKU_Description	QuantityOnHand	QuantityOnOrder
100	100100	Std. Scuba Tank, Yellow	250	0
200	100100	Std. Scuba Tank, Yellow	100	50
300	100100	Std. Scuba Tank, Yellow	100	0
400	100100	Std. Scuba Tank, Yellow	200	0
100	100200	Std. Scuba Tank, Magenta	200	30
200	100200	Std. Scuba Tank, Magenta	75	75
300	100200	Std. Scuba Tank, Magenta	100	100
400	100200	Std. Scuba Tank, Magenta	250	0
100	101100	Dive Mask, Small Clear	0	500
200	101100	Dive Mask, Small Clear	0	500
300	101100	Dive Mask, Small Clear	300	200
400	101100	Dive Mask, Small Clear	450	0
100	101200	Dive Mask, Med Clear	100	500
200	101200	Dive Mask, Med Clear	50	500
300	101200	Dive Mask, Med Clear	475	0
400	101200	Dive Mask, Med Clear	250	250
100	201000	Half-Dome Tent	2	100
200	201000	Half-Dome Tent	10	250
300	201000	Half-Dome Tent	250	0
400	201000	Half-Dome Tent	0	250
100	202000	Half-Dome Tent Vestibule	10	250
200	202000	Half-Dome Tent Vestibule	1	250
300	202000	Half-Dome Tent Vestibule	100	0
400	202000	Half-Dome Tent Vestibule	0	200
100	301000	Light Fly Climbing Harness	300	250
200	301000	Light Fly Climbing Harness	250	250
300	301000	Light Fly Climbing Harness	0	250
400	301000	Light Fly Climbing Harness	0	250
100	302000	Locking Carabiner, Oval	1000	0
200	302000	Locking Carabiner, Oval	1250	0
300	302000	Locking Carabiner, Oval	500	500
400	302000	Locking Carabiner, Oval	0	1000

Figure 2-27 - Cape Codd Outdoor Sports INVENTORY Data

If at all possible, you should run your SQL solutions to the following questions against an actual database. A Microsoft Access database named Cape-Codd.accdb is available on our Web site (www.pearsonhighered.com/kroenke) that contains all the tables and data for the Cape Codd Outdoor Sports sales data extract database. Also available on our Web site are SQL scripts for creating and populating the tables for the Cape Codd database in SQL Server, Oracle Database, and MySQL.

NOTE: All answers below show the correct SQL statement, as well as SQL statements modified for Microsoft Access 2010 when needed. Whenever possible, all results were obtained by running the SQL statements in Microsoft Access 2010, and the corresponding screen shots of the results are shown below. As explained in the text, some queries cannot be run in Microsoft Access 2010, and for those queries the correct result was obtained using Microsoft SQL Server 2008 R2. The SQL statements shown should run with little, if any, modification needed for Oracle Database 11g and MySQL 5.5.

Solutions to Project Questions 2.16 – 2.53 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

If your students are using a DBMS other than Microsoft Access, the SQL code to create and populate the Cape Codd database is available in the *.sql script files for SQL Server 2008 R2, Oracle Database 11g, and MySQL 5.5 in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

- 2.16 *There is an intentional flaw in the design of the INVENTORY table used in these exercises. This flaw was purposely included in the INVENTORY tables so that you can answer some of the following questions using only that table. Compare the SKU and INVENTORY tables, and determine what design flaw is included in INVENTORY. Specifically, why did we include it?*

The flaw is the inclusion of the SKU_Description attribute in the INVENTORY table. This attribute duplicates the SKU_Description attribute and data in the SKU_DATA table, where the attribute rightfully belongs. By duplicating SKU_Description in the INVENTORY table, we can ask you to list the SKU and its associated description in a single table query against the INVENTORY table. Otherwise, a two table query would be required. If these tables were in a production database, we would eliminate the INVENTORY.SKU_Description column.

Use only the INVENTORY table to answer Review Questions 2.17 through 2.39:

2.17 Write an SQL statement to display SKU and SKU_Description.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

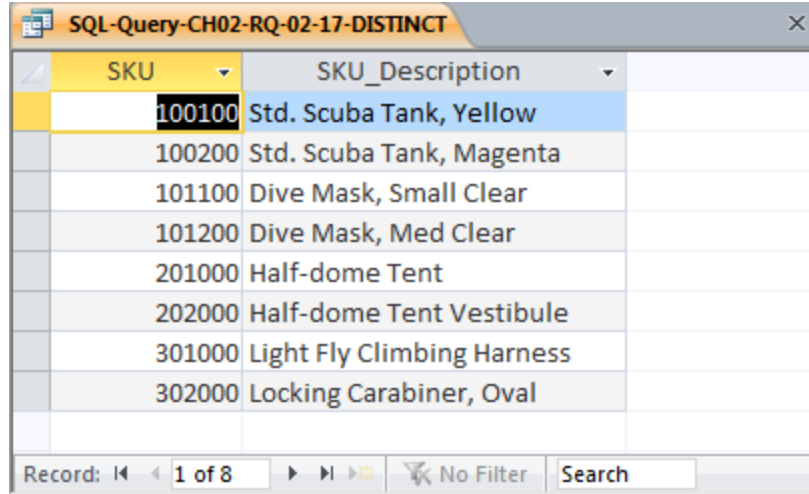
```
SELECT SKU, SKU_Description
FROM INVENTORY;
```

The screenshot shows a window titled "SQL-Query-CH02-RQ-02-17" displaying the results of an SQL query. The results are presented in a table with two columns: "SKU" and "SKU_Description". The first row is highlighted in blue and shows the SKU "100100" and the description "Std. Scuba Tank, Yellow". The table contains 32 rows of data, with a "*" symbol in the bottom left corner of the grid. The status bar at the bottom indicates "Record: 1 of 32" and "No Filter".

SKU	SKU_Description
100100	Std. Scuba Tank, Yellow
100200	Std. Scuba Tank, Magenta
101100	Dive Mask, Small Clear
101200	Dive Mask, Med Clear
201000	Half-dome Tent
202000	Half-dome Tent Vestibule
301000	Light Fly Climbing Harness
302000	Locking Carabiner, Oval
100100	Std. Scuba Tank, Yellow
100200	Std. Scuba Tank, Magenta
101100	Dive Mask, Small Clear
101200	Dive Mask, Med Clear
201000	Half-dome Tent
202000	Half-dome Tent Vestibule
301000	Light Fly Climbing Harness
302000	Locking Carabiner, Oval
100100	Std. Scuba Tank, Yellow
100200	Std. Scuba Tank, Magenta
101100	Dive Mask, Small Clear
101200	Dive Mask, Med Clear
201000	Half-dome Tent
202000	Half-dome Tent Vestibule
301000	Light Fly Climbing Harness
302000	Locking Carabiner, Oval
*	

The question does not ask for unique SKU and SKU_Description data, but could be obtained by using:

```
SELECT UNIQUE SKU, SKU_Description  
FROM INVENTORY;
```



The screenshot shows a window titled "SQL-Query-CH02-RQ-02-17-DISTINCT" displaying the results of a SQL query. The results are presented in a table with two columns: "SKU" and "SKU_Description". The first row is highlighted in blue. The table contains 8 rows of data. At the bottom of the window, there is a status bar showing "Record: 1 of 8", "No Filter", and a "Search" field.

SKU	SKU_Description
100100	Std. Scuba Tank, Yellow
100200	Std. Scuba Tank, Magenta
101100	Dive Mask, Small Clear
101200	Dive Mask, Med Clear
201000	Half-dome Tent
202000	Half-dome Tent Vestibule
301000	Light Fly Climbing Harness
302000	Locking Carabiner, Oval

2.18 Write an SQL statement to display SKU_Description and SKU.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

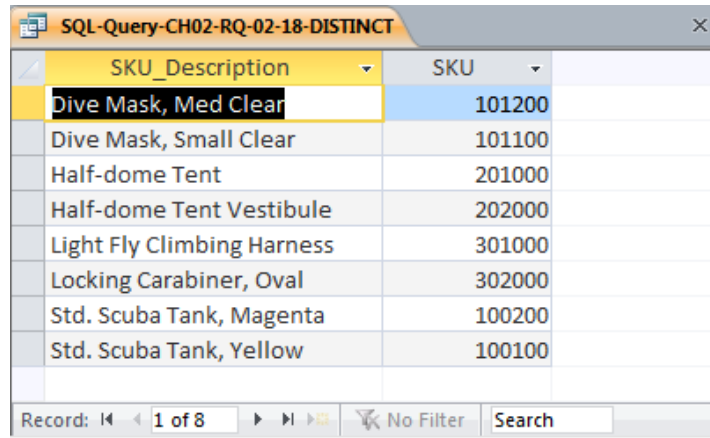
```
SELECT SKU_Description, SKU
FROM INVENTORY;
```

SKU_Description	SKU
Std. Scuba Tank, Yellow	100100
Std. Scuba Tank, Magenta	100200
Dive Mask, Small Clear	101100
Dive Mask, Med Clear	101200
Half-dome Tent	201000
Half-dome Tent Vestibule	202000
Light Fly Climbing Harness	301000
Locking Carabiner, Oval	302000
Std. Scuba Tank, Yellow	100100
Std. Scuba Tank, Magenta	100200
Dive Mask, Small Clear	101100
Dive Mask, Med Clear	101200
Half-dome Tent	201000
Half-dome Tent Vestibule	202000
Light Fly Climbing Harness	301000
Locking Carabiner, Oval	302000
Std. Scuba Tank, Yellow	100100
Std. Scuba Tank, Magenta	100200
Dive Mask, Small Clear	101100
Dive Mask, Med Clear	101200
Half-dome Tent	201000
Half-dome Tent Vestibule	202000
Light Fly Climbing Harness	301000
Locking Carabiner, Oval	302000
*	

Record: 1 of 32 No Filter Search

The question does not ask for unique SKU and SKU_Description data, but could be obtained by using:

```
SELECT UNIQUE SKU_Description, SKU
FROM INVENTORY;
```



The screenshot shows a window titled "SQL-Query-CH02-RQ-02-18-DISTINCT" displaying the results of a SQL query. The results are shown in a table with two columns: "SKU_Description" and "SKU". The table contains 8 rows of data. The first row is highlighted in yellow.

SKU_Description	SKU
Dive Mask, Med Clear	101200
Dive Mask, Small Clear	101100
Half-dome Tent	201000
Half-dome Tent Vestibule	202000
Light Fly Climbing Harness	301000
Locking Carabiner, Oval	302000
Std. Scuba Tank, Magenta	100200
Std. Scuba Tank, Yellow	100100

Record: 1 of 8 No Filter Search

2.19 Write an SQL statement to display WarehouseID.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

```
SELECT WarehouseID
FROM INVENTORY;
```

The screenshot shows a Microsoft Access window titled "SQL-Query-CH02-RQ-02-19". The window displays a table with a single column labeled "WarehouseID". The table contains 32 rows of data. The values in the "WarehouseID" column are: 100 (repeated 10 times), 200 (repeated 6 times), 300 (repeated 6 times), and 400 (repeated 6 times). The status bar at the bottom indicates "Record: 1 of 32".

WarehouseID
100
100
100
100
100
100
100
100
100
100
200
200
200
200
200
200
300
300
300
300
300
300
400
400
400
400
400
400
*

2.20 Write an SQL statement to display unique WarehouseIDs.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kronke).

```
SELECT DISTINCT WarehouseID  
FROM INVENTORY;
```

The screenshot shows a Microsoft Access window titled "SQL-Query-CH02-RQ-02-20". The window displays a table with a single column labeled "WarehouseID". The table contains 4 rows of data, representing the unique values: 100, 200, 300, and 400. The status bar at the bottom indicates "Record: 1 of 4".

WarehouseID
100
200
300
400

2.21 Write an SQL statement to display all of the columns without using the SQL asterisk (*) wildcard character.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT WarehouseID, SKU, SKU_Description,
       QuantityOnHand, QuantityOnOrder
FROM INVENTORY;
```

WarehouseID	SKU	SKU_Description	QuantityOnHand	QuantityOnOrder
100	100100	Std. Scuba Tank, Yellow	250	0
100	100200	Std. Scuba Tank, Magenta	200	30
100	101100	Dive Mask, Small Clear	0	500
100	101200	Dive Mask, Med Clear	100	500
100	201000	Half-dome Tent	2	100
100	202000	Half-dome Tent Vestibule	10	250
100	301000	Light Fly Climbing Harness	300	250
100	302000	Locking Carabiner, Oval	1000	0
200	100100	Std. Scuba Tank, Yellow	100	50
200	100200	Std. Scuba Tank, Magenta	75	75
200	101100	Dive Mask, Small Clear	0	500
200	101200	Dive Mask, Med Clear	50	500
200	201000	Half-dome Tent	10	250
200	202000	Half-dome Tent Vestibule	1	250
200	301000	Light Fly Climbing Harness	250	250
200	302000	Locking Carabiner, Oval	1250	0
300	100100	Std. Scuba Tank, Yellow	100	0
300	100200	Std. Scuba Tank, Magenta	100	100
300	101100	Dive Mask, Small Clear	300	200
300	101200	Dive Mask, Med Clear	475	0
300	201000	Half-dome Tent	250	0
300	202000	Half-dome Tent Vestibule	100	0
300	301000	Light Fly Climbing Harness	0	250
300	302000	Locking Carabiner, Oval	500	500
400	100100	Std. Scuba Tank, Yellow	200	0
400	100200	Std. Scuba Tank, Magenta	250	0
400	101100	Dive Mask, Small Clear	450	0
400	101200	Dive Mask, Med Clear	250	250
400	201000	Half-dome Tent	0	250
400	202000	Half-dome Tent Vestibule	0	200
400	301000	Light Fly Climbing Harness	0	250
400	302000	Locking Carabiner, Oval	0	1000
*				

Record: 1 of 32 No Filter Search

2.22 Write an SQL statement to display all of the columns using the SQL asterisk (*) wildcard character.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT *
FROM INVENTORY;
```

WarehouseID	SKU	SKU_Description	QuantityOnHand	QuantityOnOrder
100	100100	Std. Scuba Tank, Yellow	250	0
100	100200	Std. Scuba Tank, Magenta	200	30
100	101100	Dive Mask, Small Clear	0	500
100	101200	Dive Mask, Med Clear	100	500
100	201000	Half-dome Tent	2	100
100	202000	Half-dome Tent Vestibule	10	250
100	301000	Light Fly Climbing Harness	300	250
100	302000	Locking Carabiner, Oval	1000	0
200	100100	Std. Scuba Tank, Yellow	100	50
200	100200	Std. Scuba Tank, Magenta	75	75
200	101100	Dive Mask, Small Clear	0	500
200	101200	Dive Mask, Med Clear	50	500
200	201000	Half-dome Tent	10	250
200	202000	Half-dome Tent Vestibule	1	250
200	301000	Light Fly Climbing Harness	250	250
200	302000	Locking Carabiner, Oval	1250	0
300	100100	Std. Scuba Tank, Yellow	100	0
300	100200	Std. Scuba Tank, Magenta	100	100
300	101100	Dive Mask, Small Clear	300	200
300	101200	Dive Mask, Med Clear	475	0
300	201000	Half-dome Tent	250	0
300	202000	Half-dome Tent Vestibule	100	0
300	301000	Light Fly Climbing Harness	0	250
300	302000	Locking Carabiner, Oval	500	500
400	100100	Std. Scuba Tank, Yellow	200	0
400	100200	Std. Scuba Tank, Magenta	250	0
400	101100	Dive Mask, Small Clear	450	0
400	101200	Dive Mask, Med Clear	250	250
400	201000	Half-dome Tent	0	250
400	202000	Half-dome Tent Vestibule	0	200
400	301000	Light Fly Climbing Harness	0	250
400	302000	Locking Carabiner, Oval	0	1000

Record: 1 of 32 No Filter Search

2.23 Write an SQL statement to display all data on products having a QuantityOnHand greater than 0.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT *
FROM INVENTORY
WHERE QuantityOnHand >0;
```

WarehouseID	SKU	SKU_Description	QuantityOnHand	QuantityOnOrder
100	100100	Std. Scuba Tank, Yellow	250	0
200	100100	Std. Scuba Tank, Yellow	100	50
300	100100	Std. Scuba Tank, Yellow	100	0
400	100100	Std. Scuba Tank, Yellow	200	0
100	100200	Std. Scuba Tank, Magenta	200	30
200	100200	Std. Scuba Tank, Magenta	75	75
300	100200	Std. Scuba Tank, Magenta	100	100
400	100200	Std. Scuba Tank, Magenta	250	0
300	101100	Dive Mask, Small Clear	300	200
400	101100	Dive Mask, Small Clear	450	0
100	101200	Dive Mask, Med Clear	100	500
200	101200	Dive Mask, Med Clear	50	500
300	101200	Dive Mask, Med Clear	475	0
400	101200	Dive Mask, Med Clear	250	250
100	201000	Half-dome Tent	2	100
200	201000	Half-dome Tent	10	250
300	201000	Half-dome Tent	250	0
100	202000	Half-dome Tent Vestibule	10	250
200	202000	Half-dome Tent Vestibule	1	250
300	202000	Half-dome Tent Vestibule	100	0
100	301000	Light Fly Climbing Harness	300	250
200	301000	Light Fly Climbing Harness	250	250
100	302000	Locking Carabiner, Oval	1000	0
200	302000	Locking Carabiner, Oval	1250	0
300	302000	Locking Carabiner, Oval	500	500
*				

Record: 14 of 25 | No Filter | Search

2.24 Write an SQL statement to display the SKU and SKU_Description for products having QuantityOnHand equal to 0.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description
FROM INVENTORY
WHERE QuantityOnHand =0;
```

SKU	SKU_Description
101100	Dive Mask, Small Clear
101100	Dive Mask, Small Clear
201000	Half-dome Tent
202000	Half-dome Tent Vestibule
301000	Light Fly Climbing Harness
301000	Light Fly Climbing Harness
302000	Locking Carabiner, Oval

2.25 Write an SQL statement to display the SKU, SKU_Description, and Warehouse for products having QuantityOnHand equal to 0. Sort the results in ascending order by Warehouse.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description, WarehouseID
FROM INVENTORY
WHERE QuantityOnHand =0
ORDER BY WarehouseID;
```

SKU	SKU_Description	WarehouseID
101100	Dive Mask, Small Clear	100
101100	Dive Mask, Small Clear	200
301000	Light Fly Climbing Harness	300
302000	Locking Carabiner, Oval	400
301000	Light Fly Climbing Harness	400
202000	Half-dome Tent Vestibule	400
201000	Half-dome Tent	400

2.26 Write an SQL statement to display the SKU, SKU_Description, and WarehouseID for products having QuantityOnHand greater than 0. Sort the results in descending order by WarehouseID and ascending order by SKU.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description, WarehouseID
FROM INVENTORY
WHERE QuantityOnHand > 0
ORDER BY WarehouseID DESC, SKU;
```

SKU	SKU_Description	WarehouseID
100100	Std. Scuba Tank, Yellow	400
100200	Std. Scuba Tank, Magenta	400
101100	Dive Mask, Small Clear	400
101200	Dive Mask, Med Clear	400
100100	Std. Scuba Tank, Yellow	300
100200	Std. Scuba Tank, Magenta	300
101100	Dive Mask, Small Clear	300
101200	Dive Mask, Med Clear	300
201000	Half-dome Tent	300
202000	Half-dome Tent Vestibule	300
302000	Locking Carabiner, Oval	300
100100	Std. Scuba Tank, Yellow	200
100200	Std. Scuba Tank, Magenta	200
101200	Dive Mask, Med Clear	200
201000	Half-dome Tent	200
202000	Half-dome Tent Vestibule	200
301000	Light Fly Climbing Harness	200
302000	Locking Carabiner, Oval	200
100100	Std. Scuba Tank, Yellow	100
100200	Std. Scuba Tank, Magenta	100
101200	Dive Mask, Med Clear	100
201000	Half-dome Tent	100
202000	Half-dome Tent Vestibule	100
301000	Light Fly Climbing Harness	100
302000	Locking Carabiner, Oval	100
*		

Record: 1 of 25 | No Filter | Search

- 2.27 Write an SQL statement to display SKU, SKU_Description, and WarehouseID for all products that have a QuantityOnHand equal to 0 and a QuantityOnOrder greater than 0. Sort the results in descending order by WarehouseID and in ascending order by SKU.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT      SKU, SKU_Description, WarehouseID
FROM        INVENTORY
WHERE       QuantityOnHand = 0
           AND QuantityOnOrder > 0
ORDER BY   WarehouseID DESC, SKU;
```

SKU	SKU_Description	WarehouseID
201000	Half-dome Tent	400
202000	Half-dome Tent Vestibule	400
301000	Light Fly Climbing Harness	400
302000	Locking Carabiner, Oval	400
301000	Light Fly Climbing Harness	300
101100	Dive Mask, Small Clear	200
101100	Dive Mask, Small Clear	100

- 2.28 Write an SQL statement to display SKU, SKU_Description, and WarehouseID for all products that have a QuantityOnHand equal to 0 or a QuantityOnOrder equal to 0. Sort the results in descending order by WarehouseID and in ascending order by SKU.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT      SKU, SKU_Description, WarehouseID
FROM        INVENTORY
WHERE       QuantityOnHand = 0
           OR  QuantityOnOrder = 0
ORDER BY   WarehouseID DESC, SKU;
```

SKU	SKU_Description	WarehouseID
100100	Std. Scuba Tank, Yellow	400
100200	Std. Scuba Tank, Magenta	400
101100	Dive Mask, Small Clear	400
201000	Half-dome Tent	400
202000	Half-dome Tent Vestibule	400
301000	Light Fly Climbing Harness	400
302000	Locking Carabiner, Oval	400
100100	Std. Scuba Tank, Yellow	300
101200	Dive Mask, Med Clear	300
201000	Half-dome Tent	300
202000	Half-dome Tent Vestibule	300
301000	Light Fly Climbing Harness	300
101100	Dive Mask, Small Clear	200
302000	Locking Carabiner, Oval	200
100100	Std. Scuba Tank, Yellow	100
101100	Dive Mask, Small Clear	100
302000	Locking Carabiner, Oval	100
*		

2.29 Write an SQL statement to display the SKU, SKU_Description, WarehouseID, and QuantityOnHand for all products having a QuantityOnHand greater than 1 and less than 10. Do not use the BETWEEN keyword.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description, WarehouseID, QuantityOnHand
FROM INVENTORY
WHERE QuantityOnHand > 1
AND QuantityOnhand < 10;
```

SKU	SKU_Description	WarehouseID	QuantityOnHand
201000	Half-dome Tent	100	2
*			

- 2.30 Write an SQL statement to display the SKU, SKU_Description, WarehouseID, and QuantityOnHand for all products having a QuantityOnHand greater than 1 and less than 10. Use the BETWEEN keyword.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT     SKU, SKU_Description, WarehouseID, QuantityOnHand
FROM       INVENTORY
WHERE      QuantityOnHand BETWEEN 2 AND 9;
```

SKU	SKU_Description	WarehouseID	QuantityOnHand
201000	Half-dome Tent	100	2

Record: 1 of 1

- 2.31 Write an SQL statement to show a unique SKU and SKU_Description for all products having an SKU description starting with ‘Half-dome’.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

Note that, as discussed in Chapter 2, Microsoft Access 2010 uses wildcard characters that differ from the SQL standard.

For Microsoft SQL Server, Oracle Database and MySQL:

```
SELECT     DISTINCT SKU, SKU_Description
FROM       INVENTORY
WHERE      SKU_Description LIKE 'Half-dome%';
```

For Microsoft Access:

```
SELECT     DISTINCT SKU, SKU_Description
FROM       INVENTORY
WHERE      SKU_Description LIKE 'Half-dome*';
```

SKU	SKU_Description
201000	Half-dome Tent
202000	Half-dome Tent Vestibule

Record: 1 of 2

- 2.32 Write an SQL statement to show a unique SKU and SKU_Description for all products having a description that includes the word 'Climb'.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

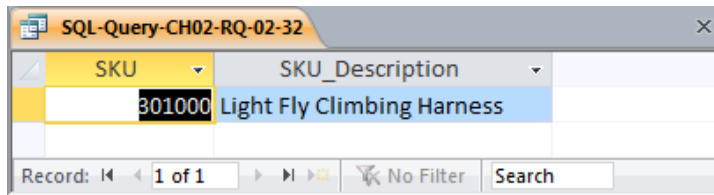
Note that, as discussed in Chapter 2, Microsoft Access 2010 uses wildcard characters that differ from the SQL standard.

For Microsoft SQL Server, Oracle Database and MySQL:

```
SELECT DISTINCT SKU, SKU_Description
FROM INVENTORY
WHERE SKU_Description LIKE '%Climb%';
```

For Microsoft Access:

```
SELECT DISTINCT SKU, SKU_Description
FROM INVENTORY
WHERE SKU_Description LIKE '*Climb*';
```



- 2.33 Write an SQL statement to show a unique SKU and SKU_Description for all products having a 'd' in the third position from the left in SKU_Description.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

Note that, as discussed in Chapter 2, Microsoft Access 2010 uses wildcard characters that differ from the SQL standard.

For Microsoft SQL Server, Oracle Database and MySQL:

```
SELECT DISTINCT SKU, SKU_Description
FROM INVENTORY
WHERE SKU_Description LIKE '___d%';
```

For Microsoft Access:

```
SELECT DISTINCT SKU, SKU_Description
FROM INVENTORY
WHERE SKU_Description LIKE '???d*';
```


SKU	SKU_Description
100100	Std. Scuba Tank, Yellow
100200	Std. Scuba Tank, Magenta

- 2.34 Write an SQL statement that uses all of the SQL built-in functions on the QuantityOnHand column. Include meaningful column names in the result.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT    COUNT (QuantityOnHand) AS NumberOfRows,
          SUM (QuantityOnHand) AS TotalQuantityOnHand,
          AVG (QuantityOnHand) AS AverageQuantityOnHand,
          MAX (QuantityOnHand) AS MaximumQuantityOnHand,
          MIN (QuantityOnHand) AS MinimumQuantityOnHand
FROM      INVENTORY;
```

NumberOfRows	TotalQuantityOnHand	AverageQuantityOnHand	MaximumQuantityOnHand	MinimumQuantityOnHand
32	6573	205.40625	1250	0

- 2.35 Explain the difference between the SQL built-in functions COUNT and SUM.

COUNT counts the number of rows or records in a table, while SUM adds up the data values in the specified column.

- 2.36 Write an SQL statement to display the WarehouseID and the sum of QuantityOnHand, grouped by WarehouseID. Name the sum TotalItemsOnHand and display the results in descending order of TotalItemsOnHand.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

For Microsoft SQL Server, Oracle Database and MySQL:

```
SELECT    WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHand
FROM      INVENTORY
GROUP BY  WarehouseID
ORDER BY  TotalItemsOnHand DESC;
```

The correct results, obtained from SQL Server 2008 / 2008 R2, are:

```

/* DBP-e12 Chapter02 SQL-Query-Review-Question-2.36
SELECT      WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHand
FROM        INVENTORY
GROUP BY   WarehouseID
ORDER BY   TotalItemsOnHand DESC;
    
```

WarehouseID	TotalItemsOnHand
100	1862
300	1825
200	1736
400	1150

Query executed... | STARSHIP024\SQLSERVER2008 (... | WWU\Auer (52) | DBP-e12-Cape-Codd | 00:00:00 | 4 rows

For Microsoft Access:

Unfortunately, Microsoft Access cannot process the ORDER BY clause because it contains an aliased computed result. To correct this, we use an SQL statement with the un-aliased computation:

```

SELECT      WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHand
FROM        INVENTORY
GROUP BY   WarehouseID
ORDER BY   SUM(QuantityOnHand) DESC;
    
```

WarehouseID	TotalItemsOnHand
400	1150
200	1736
300	1825
100	1862

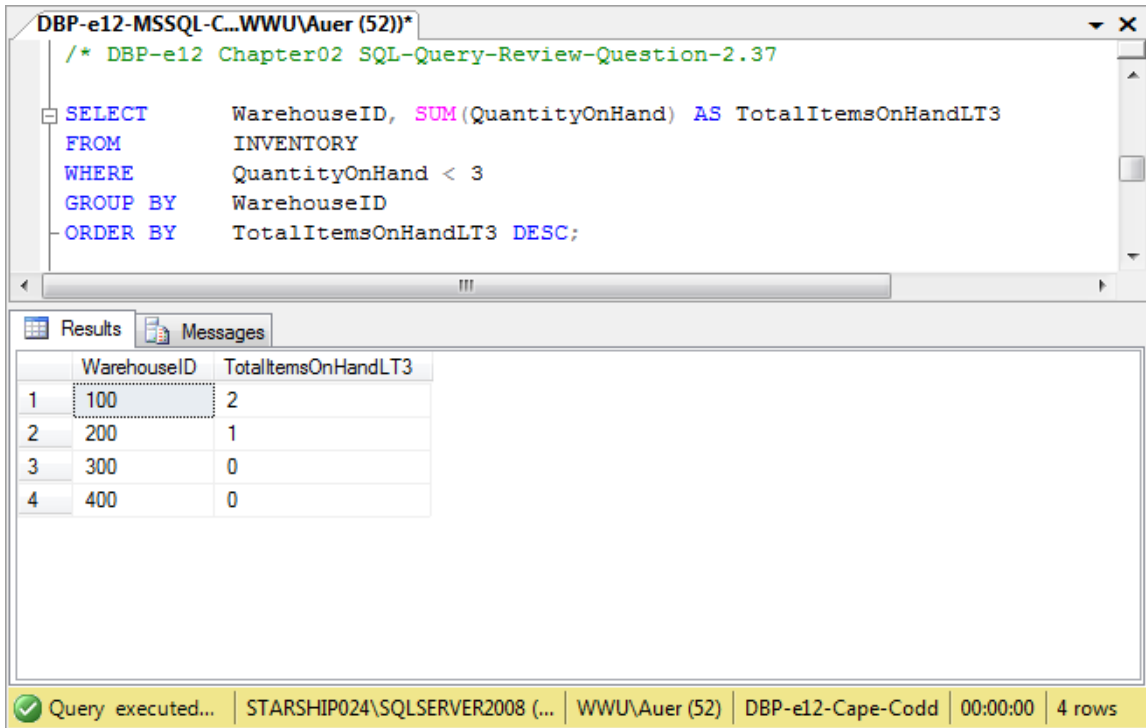
Record: 1 of 4 | No Filter | Search

- 2.37 Write an SQL statement to display the WarehouseID and the sum of QuantityOnHand, grouped by WarehouseID. Omit all SKU items that have 3 or more items on hand from the sum, and name the sum TotalItemsOnHandLT3 and display the results in descending order of TotalItemsOnHandLT3.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

For Microsoft SQL Server, Oracle Database and MySQL:

```
SELECT WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHandLT3
FROM INVENTORY
WHERE QuantityOnHand < 3
GROUP BY WarehouseID
ORDER BY TotalItemsOnHandLT3 DESC;
```



For Microsoft Access:

Unfortunately, Microsoft Access cannot process the ORDER BY clause because it contains an aliased computed result. To correct this, we use an SQL statement with the un-aliased computation:

```
SELECT WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHandLT3
FROM INVENTORY
WHERE QuantityOnHand < 3
GROUP BY WarehouseID
ORDER BY SUM(QuantityOnHand) DESC;
```

WarehouseID	TotalItemsOnHandLT3
100	2
200	1
400	0
300	0

2.38 Write an SQL statement to display the WarehouseID and the sum of QuantityOn-Hand grouped by WarehouseID. Omit all SKU items that have 3 or more items on hand from the sum, and name the sum TotalItemsOnHandLT3. Show Warehouse ID only for warehouses having fewer than 2 SKUs in their TotalItemsOnHandLT3 and display the results in descending order of TotalItemsOnHandLT3.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kronke).

For Microsoft SQL Server, Oracle Database and MySQL:

```
SELECT WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHandLT3
FROM INVENTORY
WHERE QuantityOnHand < 3
GROUP BY WarehouseID
HAVING COUNT(*) < 2
ORDER BY TotalItemsOnHandLT3 DESC;
```

```
/* DBP-e12 Chapter02 SQL-Query-Review-Question-2.38
SELECT WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHandLT3
FROM INVENTORY
WHERE QuantityOnHand < 3
GROUP BY WarehouseID
HAVING COUNT(*) < 2
ORDER BY TotalItemsOnHandLT3 DESC;
```

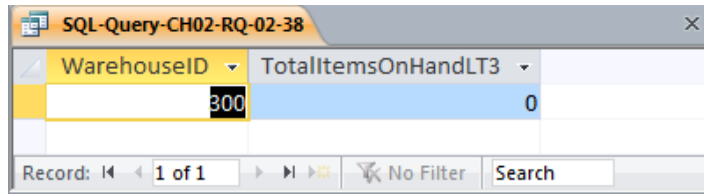
WarehouseID	TotalItemsOnHandLT3
300	0

Query executed... STARSHIP024\SQLSERVER2008 (... WWU\Auer (52) DBP-e12-Cape-Codd 00:00:00 1 rows

For Microsoft Access:

Unfortunately, Microsoft Access cannot process the ORDER BY clause because it contains an aliased computed result. To correct this, we use an SQL statement with the un-aliased computation:

```
SELECT WarehouseID, SUM(QuantityOnHand) AS TotalItemsOnHandLT3
FROM INVENTORY
WHERE QuantityOnHand < 3
GROUP BY WarehouseID
HAVING COUNT(*) < 2
ORDER BY SUM(QuantityOnHand) DESC;
```



WarehouseID	TotalItemsOnHandLT3
300	0

2.39 *In your answer to Review Question 2.38, was the WHERE or HAVING applied first? Why?*

The WHERE clause is always applied before the HAVING clause. Otherwise there would be ambiguity in the SQL statement and the results would differ according to which clause was applied first.

Use both the *INVENTORY* and *WAREHOUSE* tables to answer Review Questions 2.40 through 2.52:

- 2.40 Write an SQL statement to display the *SKU*, *SKU_Description*, and *WarehouseID*, *WarehouseCity*, and *WarehouseState* for all items stored in the Atlanta, Bangor, or Chicago warehouse. Do not use the *IN* keyword.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description,
       WAREHOUSE.WarehouseID, WarehouseCity, WarehouseState
FROM INVENTORY, WAREHOUSE
WHERE INVENTORY.WarehouseID=WAREHOUSE.WarehouseID
      AND (WarehouseCity = 'Atlanta'
          OR WarehouseCity = 'Bangor'
          OR WarehouseCity = 'Chicago')
```

SKU	SKU_Description	WarehouseID	WarehouseCity	WarehouseState
100100	Std. Scuba Tank, Yellow	100	Atlanta	GA
100200	Std. Scuba Tank, Magenta	100	Atlanta	GA
101100	Dive Mask, Small Clear	100	Atlanta	GA
101200	Dive Mask, Med Clear	100	Atlanta	GA
201000	Half-dome Tent	100	Atlanta	GA
202000	Half-dome Tent Vestibule	100	Atlanta	GA
301000	Light Fly Climbing Harness	100	Atlanta	GA
302000	Locking Carabiner, Oval	100	Atlanta	GA
100100	Std. Scuba Tank, Yellow	200	Chicago	IL
100200	Std. Scuba Tank, Magenta	200	Chicago	IL
101100	Dive Mask, Small Clear	200	Chicago	IL
101200	Dive Mask, Med Clear	200	Chicago	IL
201000	Half-dome Tent	200	Chicago	IL
202000	Half-dome Tent Vestibule	200	Chicago	IL
301000	Light Fly Climbing Harness	200	Chicago	IL
302000	Locking Carabiner, Oval	200	Chicago	IL
100100	Std. Scuba Tank, Yellow	300	Bangor	ME
100200	Std. Scuba Tank, Magenta	300	Bangor	ME
101100	Dive Mask, Small Clear	300	Bangor	ME
101200	Dive Mask, Med Clear	300	Bangor	ME
201000	Half-dome Tent	300	Bangor	ME
202000	Half-dome Tent Vestibule	300	Bangor	ME
301000	Light Fly Climbing Harness	300	Bangor	ME
302000	Locking Carabiner, Oval	300	Bangor	ME

Record: 1 of 24 | No Filter | Search

2.41 Write an SQL statement to display the SKU, SKU_Description, and WarehouseID, WarehouseCity, and WarehouseState for all items stored in the Atlanta, Bangor, or Chicago warehouse. Use the IN keyword.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description,
       WAREHOUSE.WarehouseID, WarehouseCity, WarehouseState
FROM INVENTORY, WAREHOUSE
WHERE INVENTORY.WarehouseID=WAREHOUSE.WarehouseID
      AND WarehouseCity IN ('Atlanta', 'Bangor' , 'Chicago');
```

SKU	SKU_Description	WarehouseID	WarehouseCity	WarehouseState
100100	Std. Scuba Tank, Yellow	100	Atlanta	GA
100200	Std. Scuba Tank, Magenta	100	Atlanta	GA
101100	Dive Mask, Small Clear	100	Atlanta	GA
101200	Dive Mask, Med Clear	100	Atlanta	GA
201000	Half-dome Tent	100	Atlanta	GA
202000	Half-dome Tent Vestibule	100	Atlanta	GA
301000	Light Fly Climbing Harness	100	Atlanta	GA
302000	Locking Carabiner, Oval	100	Atlanta	GA
100100	Std. Scuba Tank, Yellow	200	Chicago	IL
100200	Std. Scuba Tank, Magenta	200	Chicago	IL
101100	Dive Mask, Small Clear	200	Chicago	IL
101200	Dive Mask, Med Clear	200	Chicago	IL
201000	Half-dome Tent	200	Chicago	IL
202000	Half-dome Tent Vestibule	200	Chicago	IL
301000	Light Fly Climbing Harness	200	Chicago	IL
302000	Locking Carabiner, Oval	200	Chicago	IL
100100	Std. Scuba Tank, Yellow	300	Bangor	ME
100200	Std. Scuba Tank, Magenta	300	Bangor	ME
101100	Dive Mask, Small Clear	300	Bangor	ME
101200	Dive Mask, Med Clear	300	Bangor	ME
201000	Half-dome Tent	300	Bangor	ME
202000	Half-dome Tent Vestibule	300	Bangor	ME
301000	Light Fly Climbing Harness	300	Bangor	ME
302000	Locking Carabiner, Oval	300	Bangor	ME

Record: 14 | 1 of 24 | No Filter | Search

2.42 Write an SQL statement to display the SKU, SKU_Description, WarehouseID, WarehouseCity, and WarehouseState of all items not stored in the Atlanta, Bangor, or Chicago warehouse. Do not use the NOT IN keyword.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

NOTE: The symbol for “not equal to” is <>. Since we want the query output for warehouses that are not Atlanta or Bangor or Chicago as a set, we must ask for warehouses that are not in the group (Atlanta **and** Bangor **and** Chicago). This means we use AND in the WHERE clause – if we used OR in the WHERE clause, we would end up with ALL warehouses being in the query output. This happens because each OR eliminates only one warehouse, but that warehouse still qualifies for inclusion in the other OR statements. To demonstrate this, substitute OR for each AND in the SQL statement below.

```
SELECT SKU, SKU_Description,
       WAREHOUSE.WarehouseID, WarehouseCity, WarehouseState
FROM INVENTORY, WAREHOUSE
WHERE INVENTORY.WarehouseID=WAREHOUSE.WarehouseID
      AND WarehouseCity <> 'Atlanta'
      AND WarehouseCity <> 'Bangor'
      AND WarehouseCity <> 'Chicago';
```

SKU	SKU_Description	WarehouseID	WarehouseCity	WarehouseState
100100	Std. Scuba Tank, Yellow	400	Seattle	WA
100200	Std. Scuba Tank, Magenta	400	Seattle	WA
101100	Dive Mask, Small Clear	400	Seattle	WA
101200	Dive Mask, Med Clear	400	Seattle	WA
201000	Half-dome Tent	400	Seattle	WA
202000	Half-dome Tent Vestibule	400	Seattle	WA
301000	Light Fly Climbing Harness	400	Seattle	WA
302000	Locking Carabiner, Oval	400	Seattle	WA

- 2.43 Write an SQL statement to display the SKU, SKU_Description, WarehouseID, WarehouseCity, and WarehouseState of all items not stored in the Atlanta, Bangor, or Chicago warehouse. Use the NOT IN keyword.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description,
       WAREHOUSE.WarehouseID, WarehouseCity, WarehouseState
FROM INVENTORY, WAREHOUSE
WHERE INVENTORY.WarehouseID=WAREHOUSE.WarehouseID
      AND WarehouseCity NOT IN ('Atlanta', 'Bangor', 'Chicago');
```

SKU	SKU_Description	WarehouseID	WarehouseCity	WarehouseState
100100	Std. Scuba Tank, Yellow	400	Seattle	WA
100200	Std. Scuba Tank, Magenta	400	Seattle	WA
101100	Dive Mask, Small Clear	400	Seattle	WA
101200	Dive Mask, Med Clear	400	Seattle	WA
201000	Half-dome Tent	400	Seattle	WA
202000	Half-dome Tent Vestibule	400	Seattle	WA
301000	Light Fly Climbing Harness	400	Seattle	WA
302000	Locking Carabiner, Oval	400	Seattle	WA

- 2.44 Write an SQL statement to produce a single column called ItemLocation that combines the SKU_Description, the phrase “is in a warehouse in”, and WarehouseCity. Do not be concerned with removing leading or trailing blanks.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

Note that the SQL syntax will vary depending upon the DBMS – see the discussion in Chapter 2.

```
SELECT SKU_Description+' is in a warehouse in '
       +WarehouseCity AS ITEM_Location
FROM INVENTORY, WAREHOUSE
WHERE INVENTORY.WarehouseID=WAREHOUSE.WarehouseID;
```

ITEM_Location
Std. Scuba Tank, Yellow is in a warehouse in Atlanta
Std. Scuba Tank, Magenta is in a warehouse in Atlanta
Dive Mask, Small Clear is in a warehouse in Atlanta
Dive Mask, Med Clear is in a warehouse in Atlanta
Half-dome Tent is in a warehouse in Atlanta
Half-dome Tent Vestibule is in a warehouse in Atlanta
Light Fly Climbing Harness is in a warehouse in Atlanta
Locking Carabiner, Oval is in a warehouse in Atlanta
Std. Scuba Tank, Yellow is in a warehouse in Chicago
Std. Scuba Tank, Magenta is in a warehouse in Chicago
Dive Mask, Small Clear is in a warehouse in Chicago
Dive Mask, Med Clear is in a warehouse in Chicago
Half-dome Tent is in a warehouse in Chicago
Half-dome Tent Vestibule is in a warehouse in Chicago
Light Fly Climbing Harness is in a warehouse in Chicago
Locking Carabiner, Oval is in a warehouse in Chicago
Std. Scuba Tank, Yellow is in a warehouse in Bangor
Std. Scuba Tank, Magenta is in a warehouse in Bangor
Dive Mask, Small Clear is in a warehouse in Bangor
Dive Mask, Med Clear is in a warehouse in Bangor
Half-dome Tent is in a warehouse in Bangor
Half-dome Tent Vestibule is in a warehouse in Bangor
Light Fly Climbing Harness is in a warehouse in Bangor
Locking Carabiner, Oval is in a warehouse in Bangor
Std. Scuba Tank, Yellow is in a warehouse in Seattle
Std. Scuba Tank, Magenta is in a warehouse in Seattle
Dive Mask, Small Clear is in a warehouse in Seattle
Dive Mask, Med Clear is in a warehouse in Seattle
Half-dome Tent is in a warehouse in Seattle
Half-dome Tent Vestibule is in a warehouse in Seattle
Light Fly Climbing Harness is in a warehouse in Seattle
Locking Carabiner, Oval is in a warehouse in Seattle

Record: 1 of 32 No Filter Search

- 2.45 Write an SQL statement to show the SKU, SKU_Description, WarehouseID for all items stored in a warehouse managed by 'Lucille Smith'. Use a subquery.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description, WarehouseID
FROM INVENTORY
WHERE WarehouseID IN
    (SELECT WarehouseID
     FROM WAREHOUSE
     WHERE Manager = 'Lucille Smith');
```

SKU	SKU_Description	WarehouseID
100100	Std. Scuba Tank, Yellow	200
100200	Std. Scuba Tank, Magenta	200
101100	Dive Mask, Small Clear	200
101200	Dive Mask, Med Clear	200
201000	Half-dome Tent	200
202000	Half-dome Tent Vestibule	200
301000	Light Fly Climbing Harness	200
302000	Locking Carabiner, Oval	200

- 2.46 Write an SQL statement to show the SKU, SKU_Description, WarehouseID for all items stored in a warehouse managed by 'Lucille Smith'. Use a join.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

```
SELECT SKU, SKU_Description, WAREHOUSE.WarehouseID
FROM INVENTORY, WAREHOUSE
WHERE INVENTORY.WarehouseID=WAREHOUSE.WarehouseID
AND Manager = 'Lucille Smith';
```

SKU	SKU_Description	WarehouseID
100100	Std. Scuba Tank, Yellow	200
100200	Std. Scuba Tank, Magenta	200
101100	Dive Mask, Small Clear	200
101200	Dive Mask, Med Clear	200
201000	Half-dome Tent	200
202000	Half-dome Tent Vestibule	200
301000	Light Fly Climbing Harness	200
302000	Locking Carabiner, Oval	200

2.47 Write an SQL statement to show the WarehouseID and average QuantityOnHand of all items stored in a warehouse managed by 'Lucille Smith'. Use a subquery.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

```
SELECT WarehouseID,
        AVG(QuantityOnHand) AS AverageQuantityOnHand
FROM INVENTORY
WHERE WarehouseID IN
      (SELECT WarehouseID
       FROM WAREHOUSE
       WHERE Manager = 'Lucille Smith')
GROUP BY WarehouseID;
```

WarehouseID	AverageQuantityOnHand
200	217

Record: 1 of 1 | No Filter | Search

2.48 Write an SQL statement to show the WarehouseID and average QuantityOnHand of all items stored in a warehouse managed by 'Lucille Smith'. Use a join.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

```
SELECT INVENTORY.WarehouseID,
        AVG(QuantityOnHand) AS AverageQuantityOnHand
FROM INVENTORY, WAREHOUSE
WHERE INVENTORY.WarehouseID = WAREHOUSE.WarehouseID
      AND Manager = 'Lucille Smith'
GROUP BY INVENTORY.Warehouse.ID;
```

Note the use of the complete references to **INVENTORY.Warehouse** – the query will NOT work without them.

WarehouseID	AverageQuantityOnHand
200	217

Record: 1 of 1 | No Filter | Search

2.49 Write an SQL statement to display the WarehouseID, the sum of QuantityOnOrder and sum of QuantityOnHand, grouped by WarehouseID and QuantityOnOrder. Name the sum of QuantityOnOrder as TotalItemsOnOrder and the sum of QuantityOnHand as TotalItemsOnHand.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```
SELECT WarehouseID,
        SUM(QuantityOnOrder) AS TotalItemsOnOrder,
        SUM(QuantityOnHand) AS TotalItemsOnHand
FROM INVENTORY
GROUP BY WarehouseID, QuantityOnOrder;
```

WarehouseID	TotalItemsOnOrder	TotalItemsOnHand
100	500	0
100	100	2
100	250	10
100	500	100
100	30	200
100	0	250
100	250	300
100	0	1000
200	500	0
200	250	1
200	250	10
200	500	50
200	75	75
200	50	100
200	250	250
200	0	1250
300	250	0
300	100	300
300	0	250
300	200	300
300	0	475
300	500	500
400	1700	0
400	0	200
400	250	500
400	0	450

Record: 1 of 26 No Filter Search

2.50 Write an SQL statement to show the WarehouseID, WarehouseCity, WarehouseState, Manager, SKU, SKU_Description, and QuantityOnHand of all items with a Manager of 'Lucille Smith'. Use a join.

SQL Solutions to Project Questions 2.17 – 2.52 are contained in the Microsoft Access database *DBP-e12-IM-CH02-Cape-Codd-RQ.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

```
SELECT W.WarehouseID, WarehouseCity,
       WarehouseState, Manager,
       SKU, SKU_Description, QuantityOnHand
FROM INVENTORY AS I, WAREHOUSE AS W
WHERE I.WarehouseID=W.WarehouseID
      AND Manager = 'Lucille Smith';
```

WarehouseID	WarehouseCity	WarehouseState	Manager	SKU	SKU_Description	QuantityOnHand
200	Chicago	IL	Lucille Smith	100100	Std. Scuba Tank, Yellow	100
200	Chicago	IL	Lucille Smith	100200	Std. Scuba Tank, Magenta	75
200	Chicago	IL	Lucille Smith	101100	Dive Mask, Small Clear	0
200	Chicago	IL	Lucille Smith	101200	Dive Mask, Med Clear	50
200	Chicago	IL	Lucille Smith	201000	Half-dome Tent	10
200	Chicago	IL	Lucille Smith	202000	Half-dome Tent Vestibule	1
200	Chicago	IL	Lucille Smith	301000	Light Fly Climbing Harness	250
200	Chicago	IL	Lucille Smith	302000	Locking Carabiner, Oval	1250

Note the use of the complete references to **INVENTORY.WarehouseID (aliased as I.Warehouse)** and **WAREHOUSE.WarehouseID (aliased as W.WarehouseID)** – the query will NOT work without them.

2.51 Explain why you cannot use a subquery in your answer to question 2.50.

In a query that contains a subquery, only data from fields in the table used in the top-level query can be included in the SELECT statement. If data from fields from other tables are also needed, a join must be used. In question 2.51 we needed to display WAREHOUSE.Manager but INVENTORY would have been the table in the top-level query. Therefore, we had to use a join.

2.52 Explain how subqueries and joins differ.

(1) In a query that contains a subquery, only data from fields in the table used in the top-level query can be included in the SELECT statement. If data from fields from other tables are also needed, a join must be used. See the answer to question 2.51.

(2) The subqueries in this chapter are **non-correlated subqueries**, which have an equivalent join structure. In Chapter 8, **correlated subqueries** will be discussed, and correlated subqueries do not have an equivalent join structure – you must use subqueries.

❖ ANSWERS TO PROJECT QUESTIONS

For this set of project questions, we will continue creating a Microsoft Access database for the Wedgewood Pacific Corporation (WPC). Founded in 1957 in Seattle, Washington, WPC has grown into an internationally recognized organization. The company is located in two buildings. One building houses the Administration, Accounting, Finance, and Human Resources departments, and the second houses the Production, Marketing, and Information Systems departments. The company database contains data about company employees, departments, company projects, company assets such as computer equipment, and other aspects of company operations.

In the following project questions, we have already created the WPC.accdb database with the following two tables (see Chapter 1 Project Questions):

DEPARTMENT (DepartmentName, BudgetCode, OfficeNumber, Phone)

EMPLOYEE (EmployeeNumber, FirstName, LastName, Department, Phone, Email)

Now we will add in the following two tables:

PROJECT (ProjectID, Name, Department, MaxHours, StartDate, EndDate)

ASSIGNMENT (ProjectID, EmployeeNumber, HoursWorked)

The four tables in the revised WPC database schema are shown in Figure 2-28. The column characteristics for the PROJECT table are shown in Figure 2-29, and the column characteristics for the ASSIGNMENT table are shown in Figure 2-31. Data for the PROJECT table are shown in Figure 2-30, and the data for the ASSSIGNMENT table are shown in Figure 2-32.

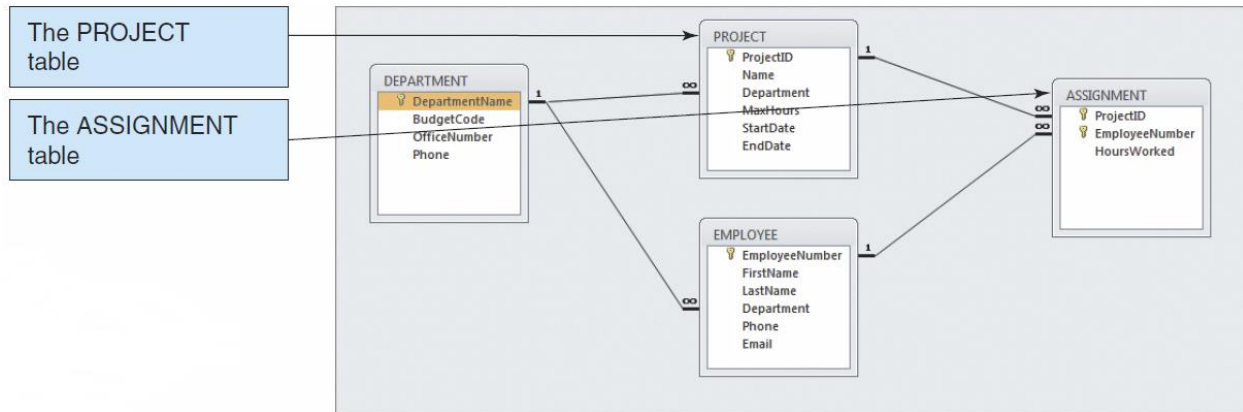


Figure 2-28 – The WPC Database with the PROJECT and ASSIGNMENT Tables

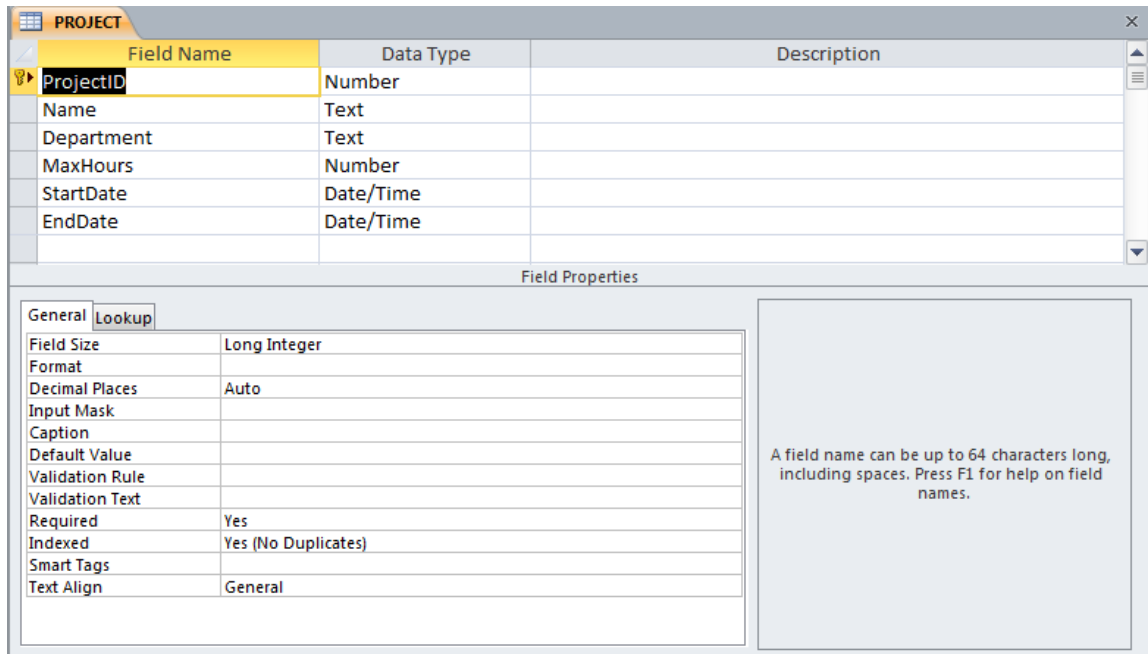
2.53 Figure 2-29 shows the column characteristics for the WPC PROJECT table. Using the column characteristics, create the PROJECT table in the WPC.accdb database.

SQL Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

PROJECT

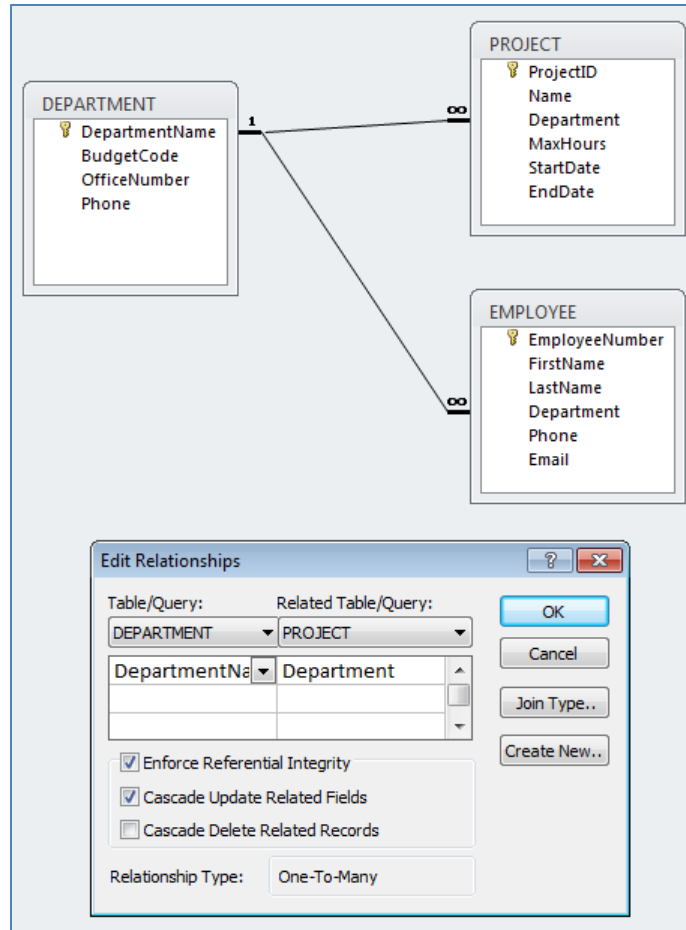
Column Name	Type	Key	Required	Remarks
ProjectID	Number	Primary Key	Yes	Long Integer
Name	Text (50)	No	Yes	
Department	Text (35)	Foreign Key	Yes	
MaxHours	Number	No	Yes	Double
StartDate	Date/Time	No	No	
EndDate	Date/Time	No	No	

Figure 2-29 - Column Characteristics for the PROJECT Table



2.54 Create the relationship and referential integrity constraint between PROJECT and DEPARTMENT. Enable enforcing of referential integrity and cascading of data updates, but do not enable cascading of data from deleted records.

SQL Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text's Web site (www.pearsonhighered.com/kronke).



2.55 Figure 2-30 shows the data for the WPC PROJECT table. Using the Datasheet view, enter the data shown in Figure 2-27 into your PROJECT table.

Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

ProjectID	Name	Department	MaxHours	StartDate	EndDate
1000	2011 Q3 Product Plan	Marketing	135.00	05/10/11	06/15/11
1100	2011 Q3 Portfolio Analysis	Finance	120.00	07/05/11	07/25/11
1200	2011 Q3 Tax Preparation	Accounting	145.00	08/10/11	10/25/11
1300	2011 Q4 Product Plan	Marketing	150.00	08/10/11	09/15/11
1400	2011 Q4 Portfolio Analysis	Finance	140.00	10/05/11	

Figure 2-30 - Sample Data for the PROJECT Table

ProjectID	Name	Department	MaxHours	StartDate	EndDate
1000	2011 Q3 Product Plan	Marketing	135.00	5/10/2011	6/15/2011
1100	2011 Q3 Portfolio Analysis	Finance	120.00	7/5/2011	7/25/2011
1200	2011 Q3 Tax Preparation	Accounting	145.00	8/10/2011	10/15/2011
1300	2011 Q4 Product Plan	Marketing	150.00	8/10/2011	9/15/2011
1400	2011 Q4 Portfolio Analysis	Finance	140.00	10/5/2011	

2.56 Figure 2-31 shows the column characteristics for the WPC ASSIGNMENT table. Using the column characteristics, create the ASSIGNMENT table in the WPC.accdb database.

Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

ASSIGNMENT

Column Name	Type	Key	Required	Remarks
ProjectID	Number	Primary Key, Foreign Key	Yes	Long Integer
EmployeeNumber	Number	Primary Key, Foreign Key	Yes	Long Integer
HoursWorked	Number	No	No	Double

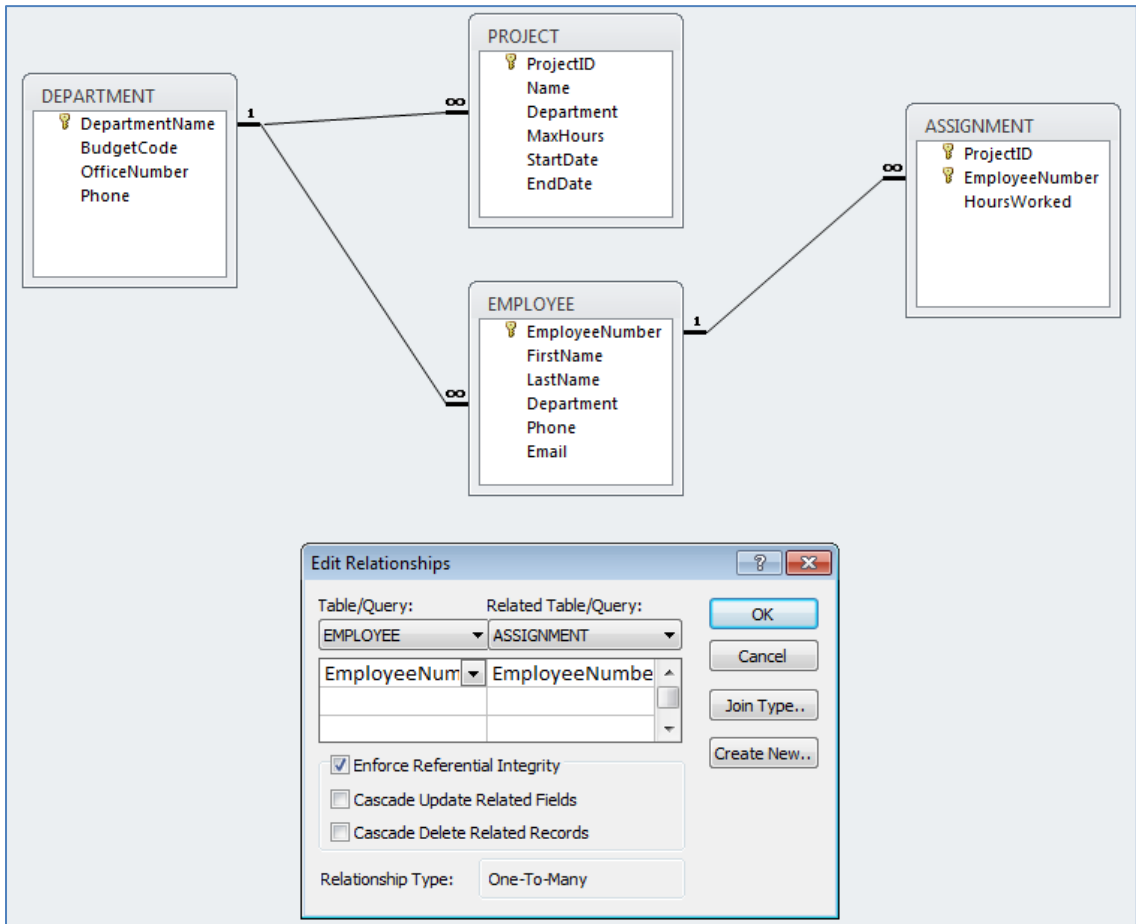
Figure 2-31 - Column Characteristics for the ASSIGNMENT Table

Field Name	Data Type	Description
ProjectID	Number	
EmployeeNumber	Number	
HoursWorked	Number	

Field Properties	
General	
Field Size	Long Integer
Format	
Decimal Places	Auto
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	Yes
Indexed	No
Smart Tags	
Text Align	General

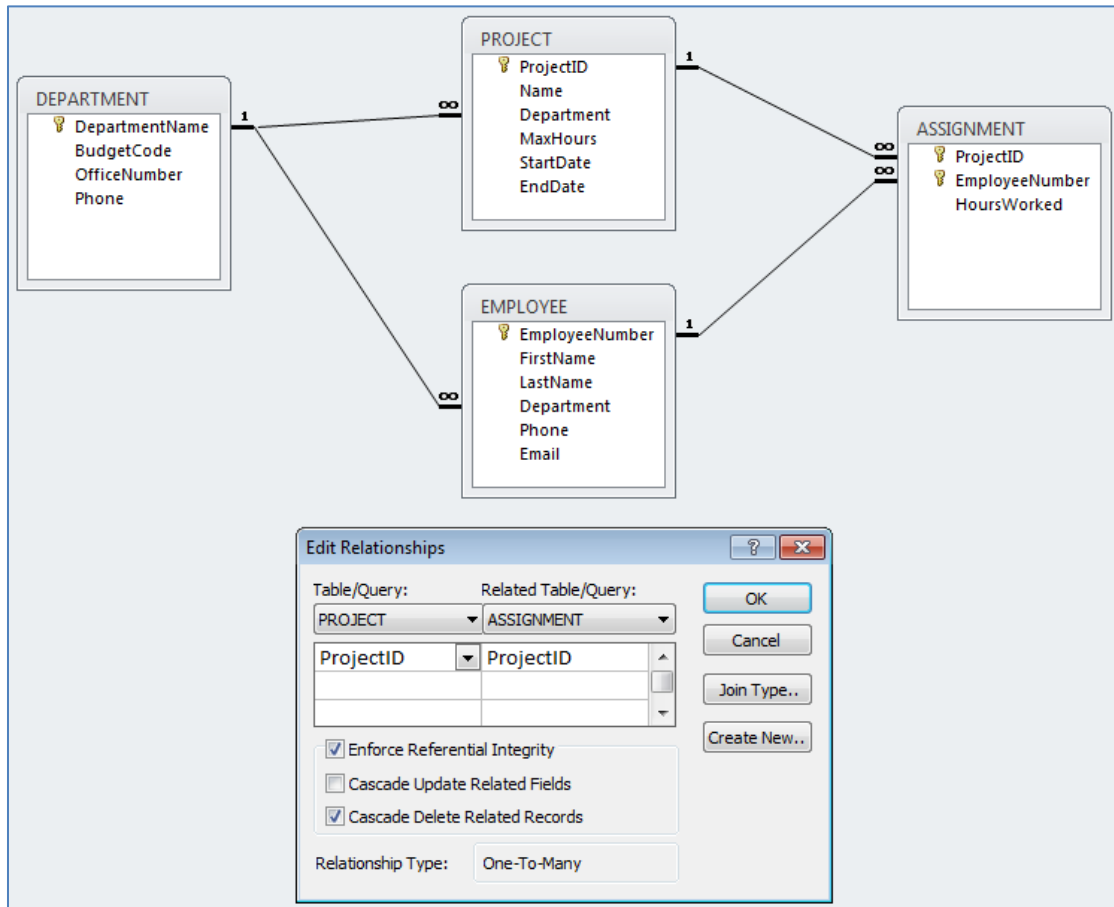
- 2.57 Create the relationship and referential integrity constraint between ASSIGNMENT and EMPLOYEE. Enable enforcing of referential integrity, but do not enable either cascading updates or the cascading of data from deleted records.

Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).



- 2.58 Create the relationship and referential integrity constraint between ASSIGNMENT and PROJECT. Enable enforcing of referential integrity and cascading of deletes, but do not enable cascading updates.

Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).



2.59 Figure 2-32 shows the data for the WPC ASSIGNMENT table. Using the Datasheet view, enter the data shown in Figure 2-32 into your ASSIGNMENT table.

Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

ProjectID	EmployeeNumber	HoursWorked
1000	1	30.0
1000	8	75.0
1000	10	55.0
1100	4	40.0
1100	6	45.0
1100	1	25.0
1200	2	20.0
1200	4	45.0
1200	5	40.0
1300	1	35.0
1300	8	80.0
1300	10	50.0
1400	4	15.0
1400	5	10.0
1400	6	27.5

Figure 2-32 - Sample Data for the PROJECT Table

ProjectID	EmployeeNumber	HoursWorked
1000	1	30.00
1000	8	75.00
1000	10	55.00
1100	1	25.00
1100	4	40.00
1100	6	45.00
1200	2	20.00
1200	4	45.00
1200	5	40.00
1300	1	35.00
1300	8	80.00
1300	10	50.00
1400	4	15.00
1400	5	10.00
1400	6	27.50
*		

2.60 In Project Question 2.55, the table data was entered after referential integrity constraints were created in Project Question 2.54. In Project Question 2.59, the table data was entered after referential integrity constraints were created in Project Questions 2.57 and 2.58. Why was the data entered after the referential integrity constraints were created instead of before the constraints were created?

Both the PROJECT and ASSIGNMENT tables have foreign keys. PROJECT.Department is the foreign key in PROJECT, and both ASSIGNMENT.ProjectID and ASSIGNMENT.EmployeeNumber are foreign keys in ASSIGNMENT. If data was entered into these columns before the referential integrity constraints were established, it would be possible to enter foreign key data that had no corresponding primary key data. Thus, we establish the referential integrity constraints so that the DBMS will not allow inconsistent data to be entered into the foreign key columns.

2.61 Using Access SQL, create and run queries to answer the following questions. Save each query using the query name format SQL-Query-02-##, where the ## sign is replaced by the letter designator of the question. For example, the first query will be saved as SQL-Query-02-A. Write SQL queries to produce the following results:

Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

A. What projects are in the PROJECT table? Show all information for each project.

```

/***** Question A - SQL-Query-02-A *****/

SELECT * FROM PROJECT;
    
```

ProjectID	Name	Department	MaxHours	StartDate	EndDate
1000	2011 Q3 Product Plan	Marketing	135.00	5/10/2011	6/15/2011
1100	2011 Q3 Portfolio Analysis	Finance	120.00	7/5/2011	7/25/2011
1200	2011 Q3 Tax Preparation	Accounting	145.00	8/10/2011	10/15/2011
1300	2011 Q4 Product Plan	Marketing	150.00	8/10/2011	9/15/2011
1400	2011 Q4 Portfolio Analysis	Finance	140.00	10/5/2011	

B. What are the ProjectID, Name, StartDate, and EndDate values of projects in the PROJECT table?

```

/***** Question B - SQL-Query-02-B *****/

SELECT ProjectID, Name, StartDate, EndDate
FROM PROJECT;
    
```

ProjectID	Name	StartDate	EndDate
1000	2011 Q3 Product Plan	5/10/2011	6/15/2011
1100	2011 Q3 Portfolio Analysis	7/5/2011	7/25/2011
1200	2011 Q3 Tax Preparation	8/10/2011	10/15/2011
1300	2011 Q4 Product Plan	8/10/2011	9/15/2011
1400	2011 Q4 Portfolio Analysis	10/5/2011	

C. What projects in the PROJECT table started before August 1, 2010? Show all the information for each project.

Note that the answer is an **empty set** – there are **no** PROJECTs that were started before **August 1, 2010**. This answer may surprise students, but it is the correct and intended answer. Point out in class that sometimes the results of a query will be an empty set. Then ask your class to rerun the query with the dates **August 1, 2011** and **August 1, 2012** and compare the results of the three queries.

```

/***** Question C - SQL-Query-02-C *****/

SELECT *
FROM PROJECT
WHERE StartDate < #01-AUG-10#;
    
```

ProjectID	Name	Department	MaxHours	StartDate	EndDate
*					

D. What projects in the PROJECT table have not been completed? Show all the information for each project.

```

/***** Question D - SQL-Query-02-D *****/

SELECT *
FROM PROJECT
WHERE EndDate IS NULL;
    
```

ProjectID	Name	Department	MaxHours	StartDate	EndDate
1400	2011 Q4 Portfolio Analysis	Finance	140.00	10/5/2011	

E. Who are the employees assigned to each project? Show ProjectID, Employee-Number, LastName, FirstName, and Phone.

```

/***** Question E - SQL-Query-02-E *****/

SELECT ProjectID, E.EmployeeNumber, LastName, FirstName, Phone
FROM ASSIGNMENT AS A INNER JOIN EMPLOYEE AS E
ON A.EmployeeNumber=E.EmployeeNumber;
    
```

ProjectID	EmployeeNumber	LastName	FirstName	Phone
1000	1	Jacobs	Mary	360-285-8110
1100	1	Jacobs	Mary	360-285-8110
1300	1	Jacobs	Mary	360-285-8110
1200	2	Jackson	Rosalie	360-285-8120
1100	4	Caruthers	Tom	360-285-8310
1200	4	Caruthers	Tom	360-285-8310
1400	4	Caruthers	Tom	360-285-8310
1200	5	Jones	Heather	360-285-8320
1400	5	Jones	Heather	360-285-8320
1100	6	Abernathy	Mary	360-285-8410
1400	6	Abernathy	Mary	360-285-8410
1000	8	Jackson	Tom	360-287-8610
1300	8	Jackson	Tom	360-287-8610
1000	10	Numoto	Ken	360-287-8710
1300	10	Numoto	Ken	360-287-8710
*		(New)		

Record: 1 of 15 | No Filter | Search

F. Who are the employees assigned to each project? Show the ProjectID, Name, and Department. Show EmployeeNumber, LastName, FirstName, and Phone.

Note the use of the aliases **ProjectName**, **ProjectDepartment**, **DepartmentPhone** and **EmployeePhone**)

```

/***** Question F - SQL-Query-02-F *****/

SELECT P.ProjectID, Name AS ProjectName,
       P.Department AS ProjectDepartment,
       E.EmployeeNumber, LastName, FirstName,
       Phone AS EmployeePhone
FROM   (ASSIGNMENT AS A INNER JOIN EMPLOYEE AS E
        ON A.EmployeeNumber=E.EmployeeNumber)
       INNER JOIN PROJECT AS P
        ON A.ProjectID=P.ProjectID;
    
```

ProjectID	ProjectName	ProjectDepartment	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	1	Jacobs	Mary	360-285-8110
1000	2011 Q3 Product Plan	Marketing	8	Jackson	Tom	360-287-8610
1000	2011 Q3 Product Plan	Marketing	10	Numoto	Ken	360-287-8710
1100	2011 Q3 Portfolio Analysis	Finance	4	Caruthers	Tom	360-285-8310
1100	2011 Q3 Portfolio Analysis	Finance	6	Abernathy	Mary	360-285-8410
1100	2011 Q3 Portfolio Analysis	Finance	1	Jacobs	Mary	360-285-8110
1200	2011 Q3 Tax Preparation	Accounting	2	Jackson	Rosalie	360-285-8120
1200	2011 Q3 Tax Preparation	Accounting	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	5	Jones	Heather	360-285-8320
1300	2011 Q4 Product Plan	Marketing	1	Jacobs	Mary	360-285-8110
1300	2011 Q4 Product Plan	Marketing	8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	10	Numoto	Ken	360-287-8710
1400	2011 Q4 Portfolio Analysis	Finance	4	Caruthers	Tom	360-285-8310
1400	2011 Q4 Portfolio Analysis	Finance	5	Jones	Heather	360-285-8320
1400	2011 Q4 Portfolio Analysis	Finance	6	Abernathy	Mary	360-285-8410

Record: 1 of 15 | No Filter | Search

G. Who are the employees assigned to each project? Show ProjectID, Name, Department, and Department Phone. Show EmployeeNumber, LastName, FirstName, and Employee Phone. Sort by ProjectID in ascending order.

Note the use of the aliases **ProjectName**, **ProjectDepartment**, **DepartmentPhone** and **EmployeePhone**.

```

/***** Question G - SQL-Query-02-G *****/

SELECT P.ProjectID, Name AS ProjectName,
       D.DepartmentName AS ProjectDepartment,
       D.Phone AS DepartmentPhone,
       E.EmployeeNumber, LastName, FirstName,
       E.Phone AS EmployeePhone
FROM ((ASSIGNMENT AS A INNER JOIN EMPLOYEE AS E
      ON A.EmployeeNumber=E.EmployeeNumber)
      INNER JOIN PROJECT AS P
      ON A.ProjectID=P.ProjectID)
      INNER JOIN DEPARTMENT AS D
      ON P.Department=D.DepartmentName
ORDER BY P.ProjectID;
    
```

ProjectID	ProjectName	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1000	2011 Q3 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1000	2011 Q3 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	1	Jacobs	Mary	360-285-8110
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	5	Jones	Heather	360-285-8320
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	2	Jackson	Rosalie	360-285-8120
1300	2011 Q4 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1300	2011 Q4 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	5	Jones	Heather	360-285-8320
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	4	Caruthers	Tom	360-285-8310

- H. Who are the employees assigned to projects run by the marketing department? Show ProjectID, Name, Department, and Department Phone. Show EmployeeNumber, LastName, FirstName, and Employee Phone. Sort by ProjectID in ascending order.

Note the use of the aliases **ProjectName**, **ProjectDepartment**, **DepartmentPhone** and **EmployeePhone**.

```

/***** Question H - SQL-Query-02-H *****/

SELECT P.ProjectID, Name AS ProjectName,
       D.DepartmentName AS ProjectDepartment,
       D.Phone AS DepartmentPhone,
       E.EmployeeNumber, LastName, FirstName,
       E.Phone AS EmployeePhone
FROM ((ASSIGNMENT AS A INNER JOIN EMPLOYEE AS E
      ON A.EmployeeNumber=E.EmployeeNumber)
      INNER JOIN PROJECT AS P
      ON A.ProjectID=P.ProjectID)
      INNER JOIN DEPARTMENT AS D
      ON P.Department=D.DepartmentName
WHERE DepartmentName='Marketing'
ORDER BY P.ProjectID;
    
```

ProjectID	ProjectName	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1000	2011 Q3 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1000	2011 Q3 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1300	2011 Q4 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1300	2011 Q4 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110

- I. How many projects are being run by the marketing department? Be sure to assign an appropriate column name to the computed results.

Note the use of the alias **NumberOfMarketingProjects**.

```

/***** Question I - SQL-Query-02-I *****/

SELECT COUNT(*) AS NumberOfMarketingProjects
FROM PROJECT
WHERE Department='Marketing';
    
```

NumberOfMarketingProjects
2

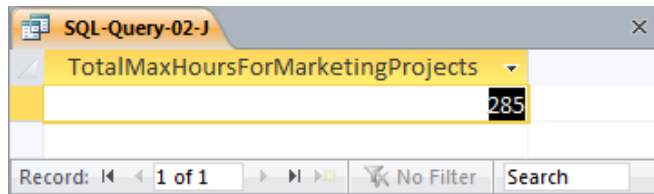
- J. What is the total MaxHours of projects being run by the marketing department? Be sure to assign an appropriate column name to the computed results.

Note the use of the alias **TotalMaxHoursForMarketingProjects**.

```

/***** Question J - SQL-Query-02-J *****/

SELECT SUM(MaxHours) AS TotalMaxHoursForMarketingProjects
FROM PROJECT
WHERE Department='Marketing';
    
```



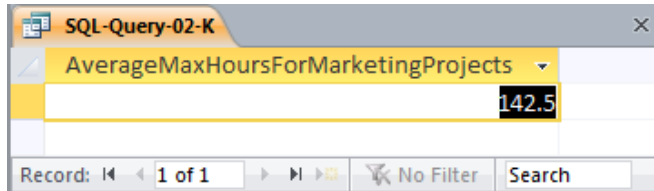
- K. What is the average MaxHours of projects being run by the marketing department? Be sure to assign an appropriate column name to the computed results.

Note the use of the alias **AverageMaxHoursForMarketingProjects**.

```

/***** Question K - SQL-Query-02-K *****/

SELECT AVG(MaxHours) AS AverageMaxHoursForMarketingProjects
FROM PROJECT
WHERE Department='Marketing';
    
```



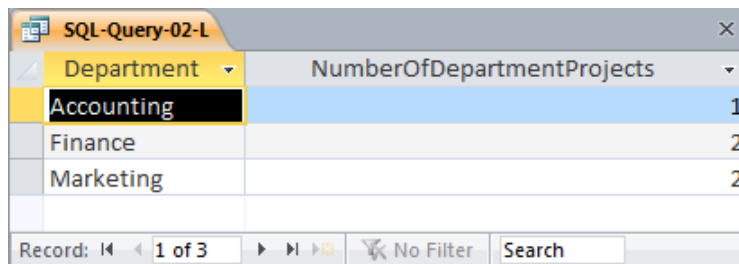
- L. How many projects are being run by each department? Be sure to display each DepartmentName and to assign an appropriate column name to the computed results.

Note the use of the alias **NumberOfDepartmentProjects**.

```

/***** Question L - SQL-Query-02-L *****/

SELECT Department, COUNT(*) AS NumberOfDepartmentProjects
FROM PROJECT
GROUP BY Department;
    
```

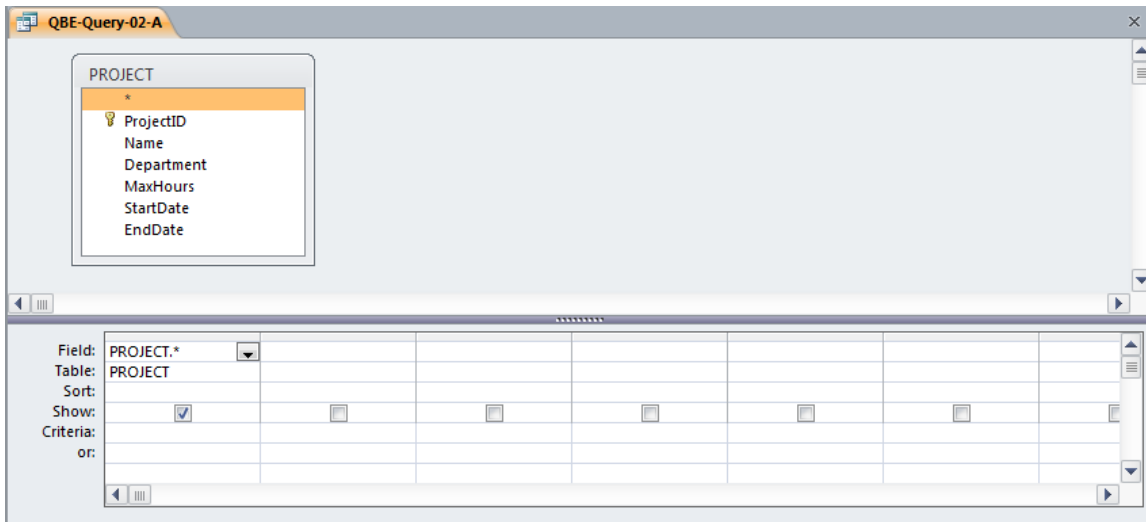


2.62 Using Access QBE, create and run new queries to answer the questions in exercise 2.61. Save each query using the query name format QBE-Query-02-##, where the ## sign is replaced by the letter designator of the question. For example, the first query will be saved as QBE-Query-02-A.

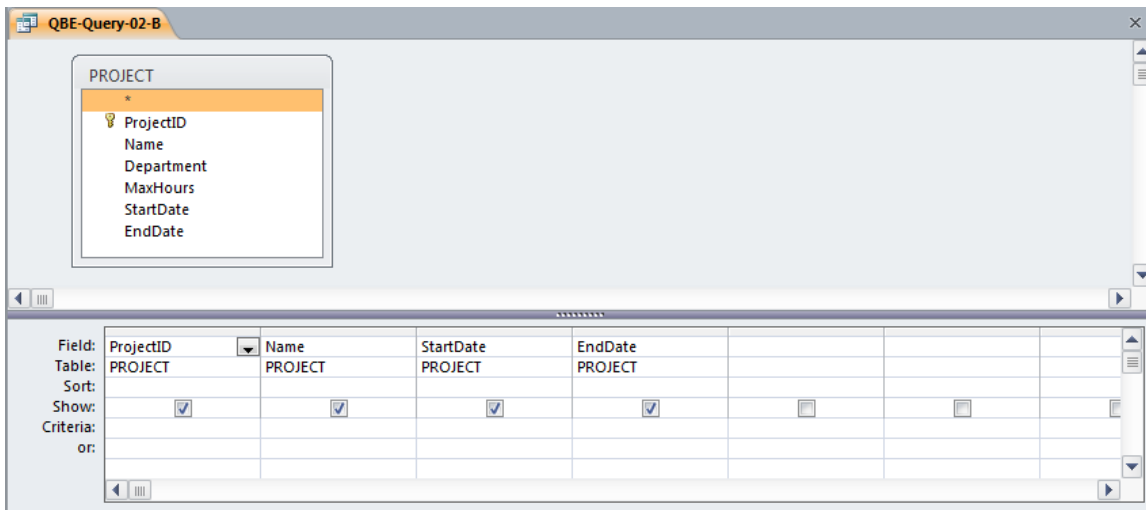
Solutions to Project Questions 2.53 – 2.62 are contained in the Microsoft Access database *DBP-e12-IM-CH02-WPC.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

The results of each query will be identical to the corresponding SQL query in the previous Project Question. Here we will show the QBE design of the query.

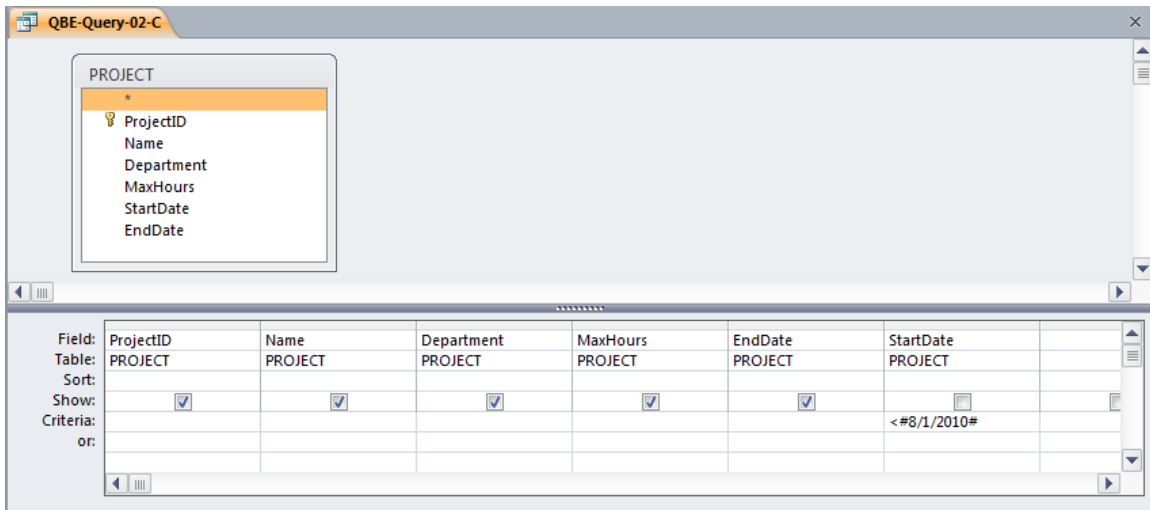
A. What projects are in the *PROJECT* table? Show all information for each project.



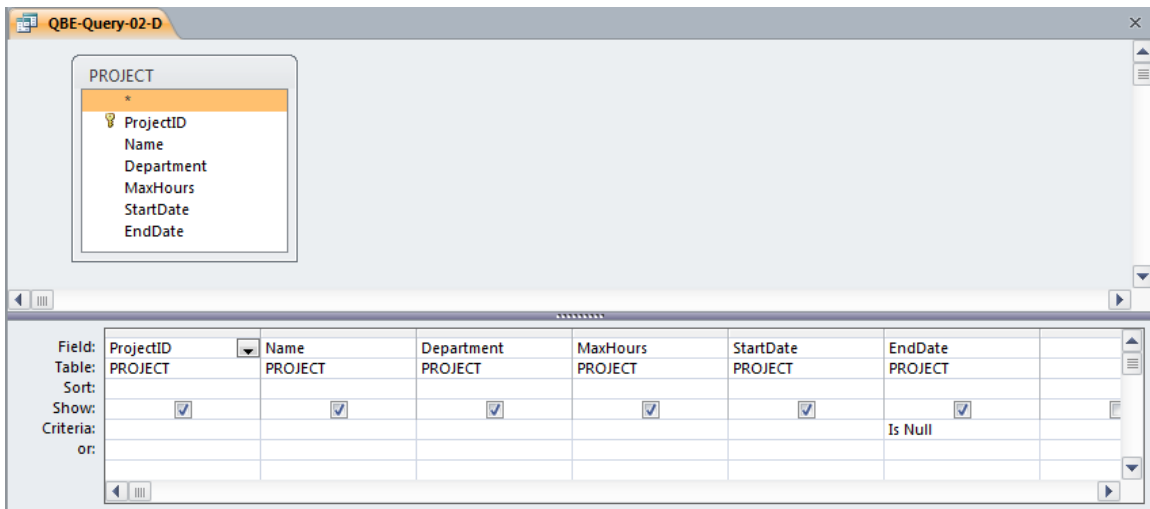
B. What are the ProjectID, Name, StartDate, and EndDate values of projects in the *PROJECT* table?



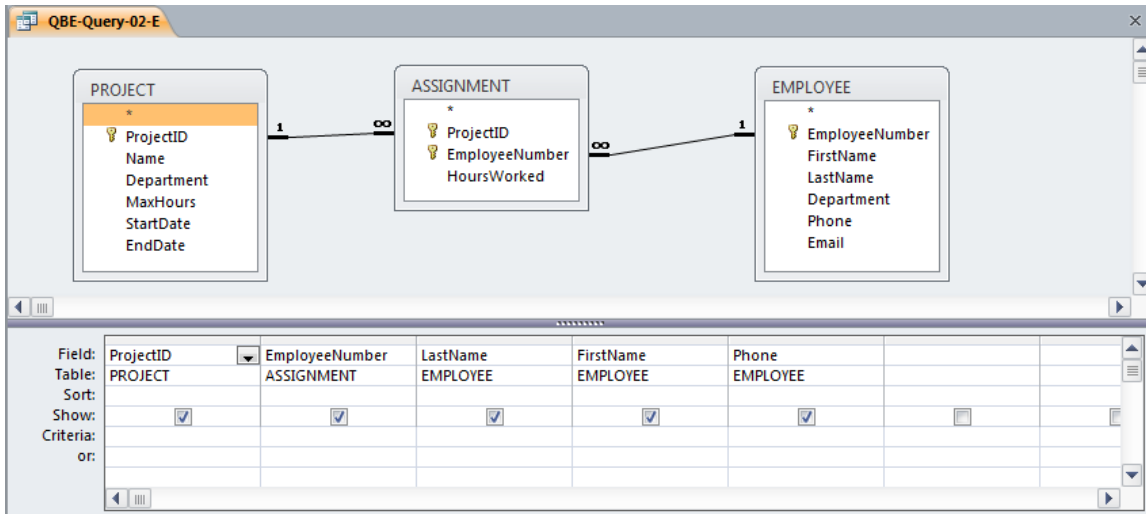
C. What projects in the *PROJECT* table started before August 1, 2008? Show all the information for each project.



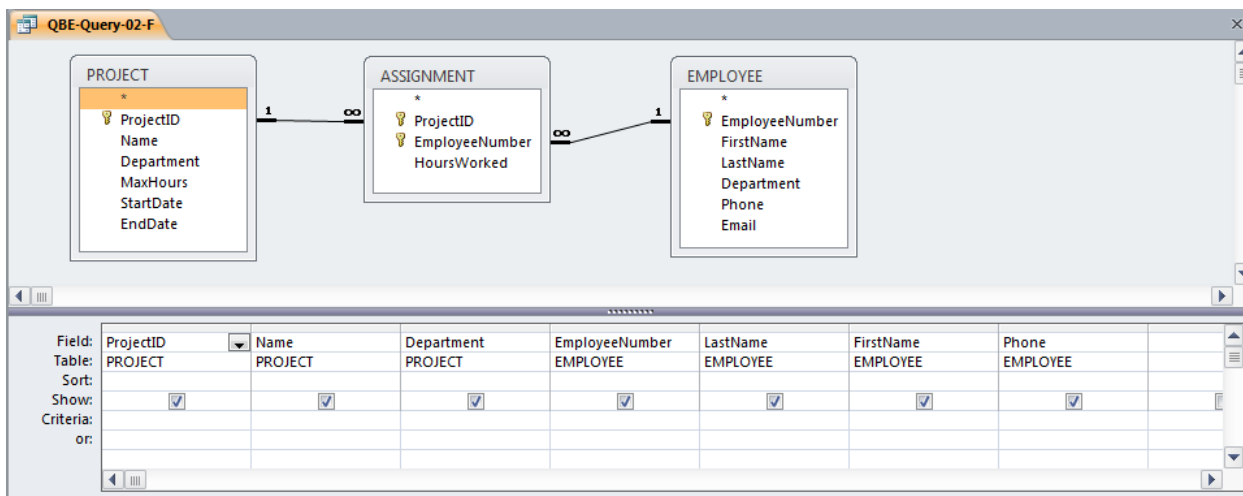
D. What projects in the *PROJECT* table have not been completed? Show all the information for each project.



E. Who are the employees assigned to each project? Show ProjectID, Employee-Number, LastName, FirstName, and Phone.



F. Who are the employees assigned to each project? Show the ProjectID, Name, and Department. Show EmployeeNumber, LastName, FirstName, and Phone.



G. Who are the employees assigned to each project? Show ProjectID, Name, Department, and Department Phone. Show EmployeeNumber, LastName, FirstName, and Employee Phone. Sort by ProjectID in ascending order.

This question is more complicated than it seems. It also raises the important question of why students need to know SQL, and provides one answer: QBE equivalents may not always work, or at least they don't work as intended. You should use this question as the basis for a discussion of this issue.

We have already run this query as an SQL query, and gotten the correct results. That SQL Query (from RQ 2.61-G) is

```

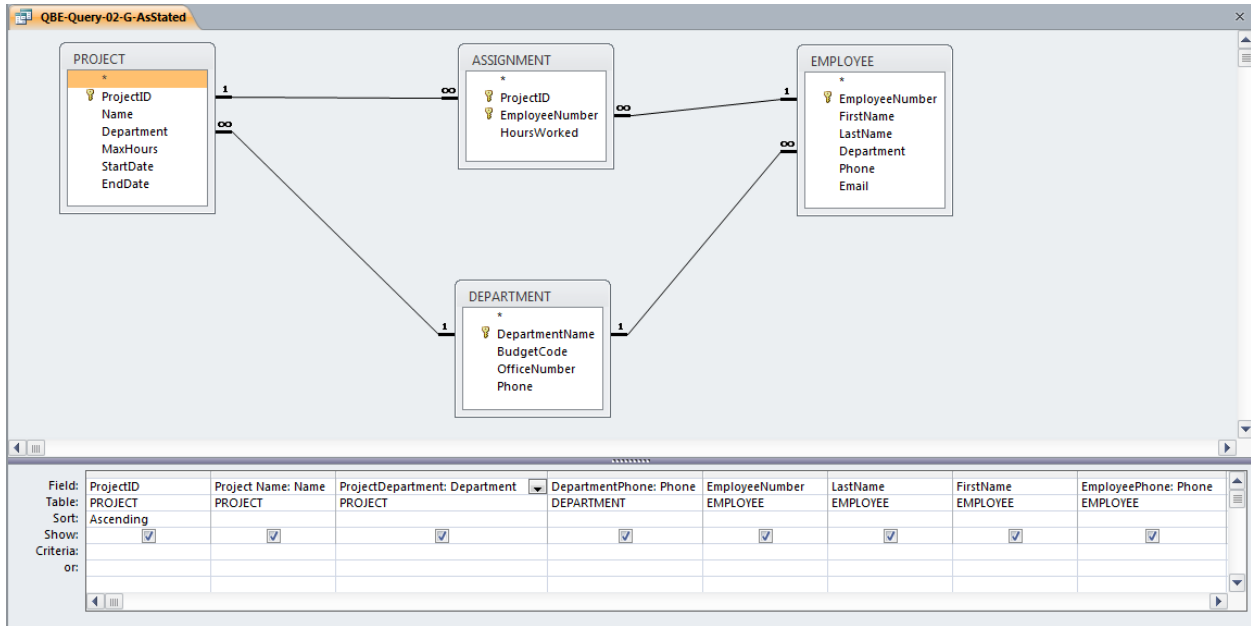
/***** Question G - SQL-Query-02-G *****/

SELECT P.ProjectID, Name AS ProjectName,
       D.DepartmentName AS ProjectDepartment,
       D.Phone AS DepartmentPhone,
       E.EmployeeNumber, LastName, FirstName,
       E.Phone AS EmployeePhone
FROM ((ASSIGNMENT AS A INNER JOIN EMPLOYEE AS E
      ON A.EmployeeNumber=E.EmployeeNumber)
      INNER JOIN PROJECT AS P
      ON A.ProjectID=P.ProjectID)
      INNER JOIN DEPARTMENT AS D
      ON P.Department=D.DepartmentName
ORDER BY P.ProjectID;
    
```

The results, which are correct, of this query are:

ProjectID	ProjectName	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1000	2011 Q3 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1000	2011 Q3 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	1	Jacobs	Mary	360-285-8110
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	5	Jones	Heather	360-285-8320
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	2	Jackson	Rosalie	360-285-8120
1300	2011 Q4 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1300	2011 Q4 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	5	Jones	Heather	360-285-8320
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	4	Caruthers	Tom	360-285-8310

If we build the obvious corresponding QBE query we get (note the use of the aliases **ProjectName**, **ProjectDepartment**, **DepartmentPhone** and **EmployeePhone**):



This QBE query shows the solution to the question as stated, but it will not run correctly due to how Microsoft Access interprets the JOIN...ON commands in the QBE query it itself created! The QBE query results are:

ProjectID	Project Name	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	5	Jones	Heather	360-285-8320
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	4	Caruthers	Tom	360-285-8310
1300	2011 Q4 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410

Compare these results with those shown for SQL-Query-2-G above, and you will see the difference and these results are clearly wrong. Looking at the data itself and thinking about what the query results *should* be also make it obvious that there is a problem here.

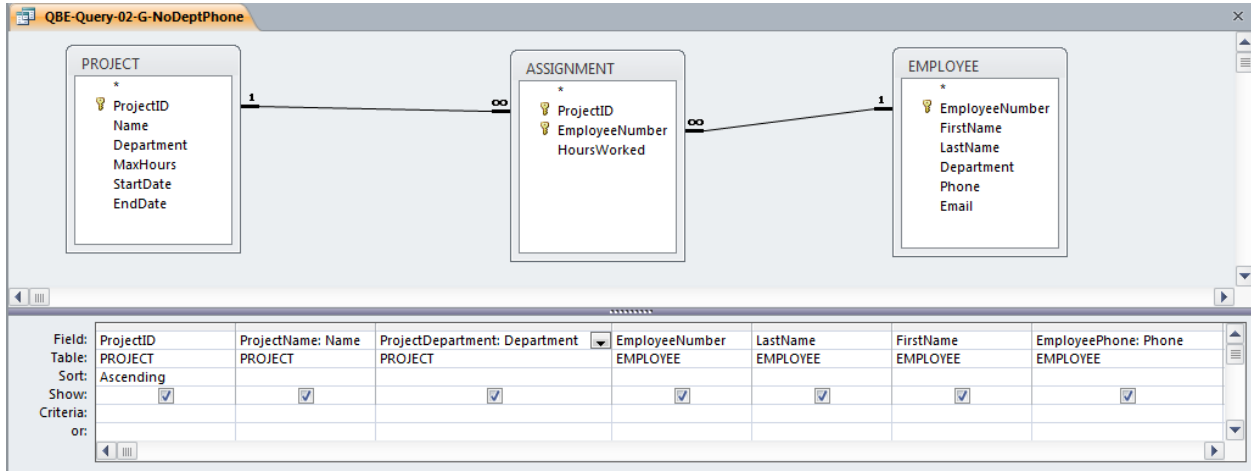
For reference, here is the SQL code that Microsoft Access created from the QBE query:

```

SELECT    PROJECT.ProjectID, PROJECT.Name AS [Project Name],
          PROJECT.Department, DEPARTMENT.Phone AS DepartmentPhone,
          EMPLOYEE.EmployeeNumber, EMPLOYEE.LastName, EMPLOYEE.FirstName,
          EMPLOYEE.Phone AS EmployeePhone
FROM      ((DEPARTMENT INNER JOIN PROJECT ON
            DEPARTMENT.DepartmentName = PROJECT.Department)
          INNER JOIN EMPLOYEE ON
            DEPARTMENT.DepartmentName = EMPLOYEE.Department)
          INNER JOIN ASSIGNMENT ON
            (PROJECT.ProjectID = ASSIGNMENT.ProjectID)
          AND
            (EMPLOYEE.EmployeeNumber = ASSIGNMENT.EmployeeNumber)
ORDER BY PROJECT.ProjectID;
    
```

What can we do? There are two work arounds.

First, create the query *without* Department Phone. This is the only column needed from the DEPARTMENT table, which can thus be eliminated from the query. The QBE query is ((note the use of the aliases **ProjectName**, **ProjectDepartment** and **EmployeePhone**):



The results will be correct, but without the DepartmentPhone column. The results are:

ProjectID	ProjectName	ProjectDepartment	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	10	Numoto	Ken	360-287-8710
1000	2011 Q3 Product Plan	Marketing		8	Jackson	Tom
1000	2011 Q3 Product Plan	Marketing	1	Jacobs	Mary	360-285-8110
1100	2011 Q3 Portfolio Analysis	Finance	1	Jacobs	Mary	360-285-8110
1100	2011 Q3 Portfolio Analysis	Finance	6	Abernathy	Mary	360-285-8410
1100	2011 Q3 Portfolio Analysis	Finance	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	5	Jones	Heather	360-285-8320
1200	2011 Q3 Tax Preparation	Accounting	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	2	Jackson	Rosalie	360-285-8120
1300	2011 Q4 Product Plan	Marketing	10	Numoto	Ken	360-287-8710
1300	2011 Q4 Product Plan	Marketing	8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	1	Jacobs	Mary	360-285-8110
1400	2011 Q4 Portfolio Analysis	Finance	6	Abernathy	Mary	360-285-8410
1400	2011 Q4 Portfolio Analysis	Finance	5	Jones	Heather	360-285-8320
1400	2011 Q4 Portfolio Analysis	Finance	4	Caruthers	Tom	360-285-8310
*				(New)		

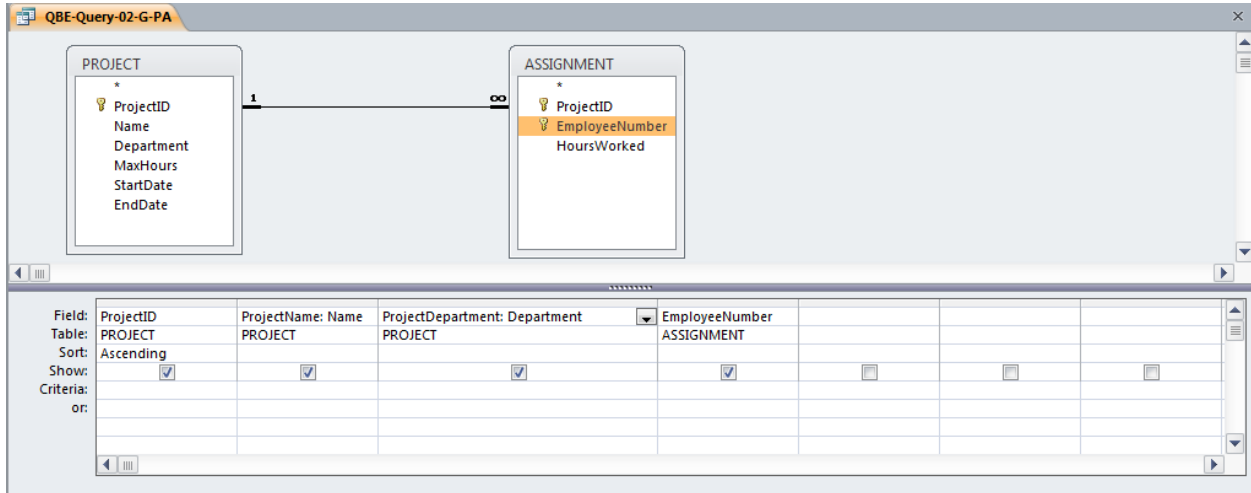
Alternatively, as devised by Professor John Schauf of Edgewood College, Madison, WI, you can illustrate building a set of queries, where each one uses the previous query and adds one additional table. This is possible because Microsoft Access allows saved queries to be used as the equivalent of a table in a query. By adding in one table at a time, you can control the JOIN...ON statement sequence, and obtain the correct answer.

This is a much better solution, because the end result is exactly what we want, rather than a truncated version of it.

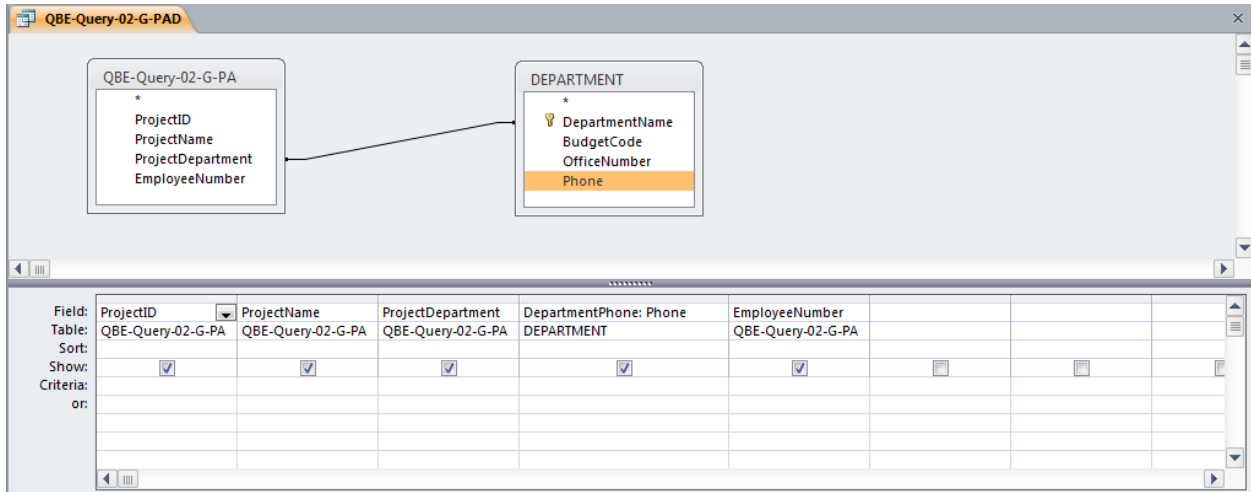
You should use this solution in class to illustrate how to use Microsoft Access query objects as pseudo tables in queries, and point out that they can also be used in forms and reports.

The steps below show how to create the needed sequence of QBE queries:

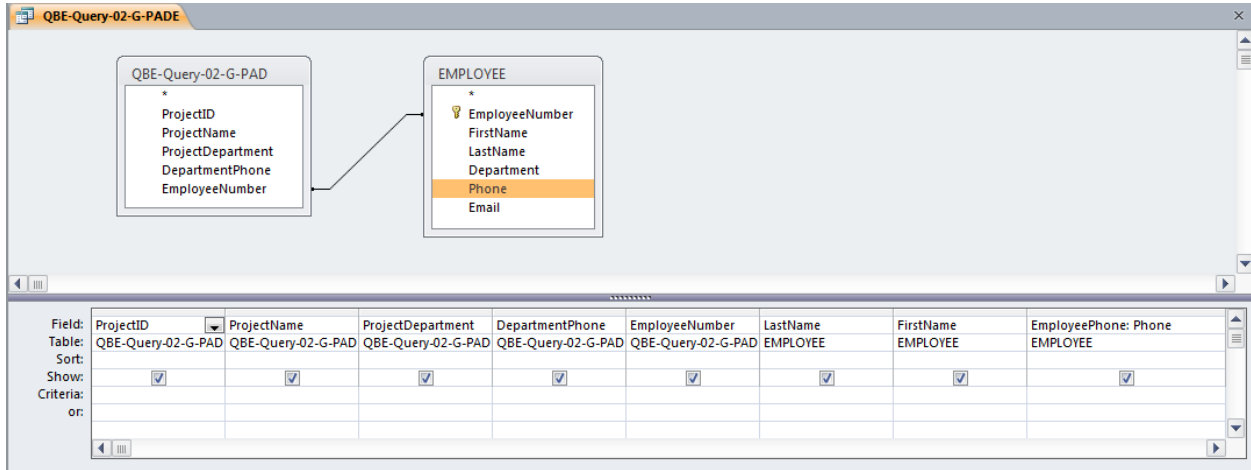
- (1) Create a query that joins PROJECT and ASSIGNMENT, and name it QBE-Query-02-G-PA. Note that you must include ASSIGNMENT.EmployeeNumber in this query. Also note the use of the two aliases **ProjectName** and **ProjectDepartment**:



- (2) Create a query that joins QBE-Query-02-G-PA and DEPARTMENT, and name it QBE-Query-02-G-PAD. Note that you will have to **manually link** the DEPARTMENT primary key to the foreign key in QBE-Query-02-G-PA. Also note the use of the alias **DepartmentPhone**:



(3) Create a query that joins QBE-Query-02-G-PAD and EMPLOYEE, and name it QBE-Query-02-G-PADE. Note that you will have to **manually link** the DEPARTMENT primary key to the foreign key in QBE-Query-02-G-PAD. Also note the use of the alias **EmployeePhone**:



The query results are now correct:

ProjectID	ProjectName	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1000	2011 Q3 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1000	2011 Q3 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	4	Caruthers	Tom	360-285-8310
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410
1100	2011 Q3 Portfolio Analysis	Finance	360-285-8400	1	Jacobs	Mary	360-285-8110
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	2	Jackson	Rosalie	360-285-8120
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	4	Caruthers	Tom	360-285-8310
1200	2011 Q3 Tax Preparation	Accounting	360-285-8300	5	Jones	Heather	360-285-8320
1300	2011 Q4 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1300	2011 Q4 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	4	Caruthers	Tom	360-285-8310
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	5	Jones	Heather	360-285-8320
1400	2011 Q4 Portfolio Analysis	Finance	360-285-8400	6	Abernathy	Mary	360-285-8410

H. Who are the employees assigned to projects run by the marketing department? Show ProjectID, Name, Department, and Department Phone. Show EmployeeNumber, LastName, FirstName, and Employee Phone. Sort by ProjectID in ascending order.

This question is identical to question G except for the restriction to marketing department projects. And, again, this question is more complicated than it seems. It also raises the important question of why students need to know SQL, and provides one answer: QBE equivalents may not always work, or at least they don't work as intended. You should use this question as the basis for a discussion of this issue.

We have already run this query as an SQL query, and gotten the correct results. That SQL Query (from RQ 2.61-H) is

```

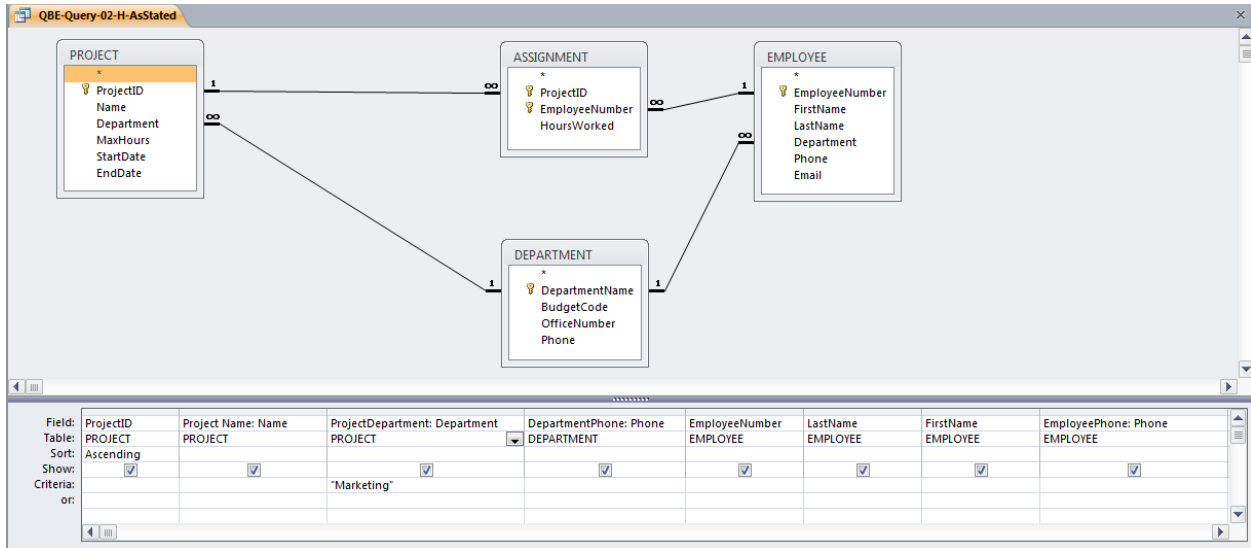
/***** Question H - SQL-Query-02-H *****/

SELECT    P.ProjectID, Name AS ProjectName,
          D.DepartmentName AS ProjectDepartment,
          D.Phone AS DepartmentPhone,
          E.EmployeeNumber, LastName, FirstName,
          E.Phone AS EmployeePhone
FROM      ((ASSIGNMENT AS A INNER JOIN EMPLOYEE AS E
          ON A.EmployeeNumber=E.EmployeeNumber)
          INNER JOIN PROJECT AS P
          ON A.ProjectID=P.ProjectID)
          INNER JOIN DEPARTMENT AS D
          ON P.Department=D.DepartmentName
WHERE     DepartmentName='Marketing'
ORDER BY P.ProjectID;
    
```

The results, which are correct, of this query are:

ProjectID	ProjectName	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1000	2011 Q3 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1000	2011 Q3 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110
1300	2011 Q4 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1300	2011 Q4 Product Plan	Marketing	360-287-8700	8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110

If we build the obvious corresponding QBE query we get (note the use of the aliases **ProjectName**, **ProjectDepartment**, **DepartmentPhone** and **EmployeePhone**):



The results are:

ProjectID	Project Name	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone
1000	2011 Q3 Product Plan	Marketing	360-287-8700	10	Numoto	Ken	360-287-8710
1300	2011 Q4 Product Plan	Marketing	360-287-8700		Numoto	Ken	360-287-8710

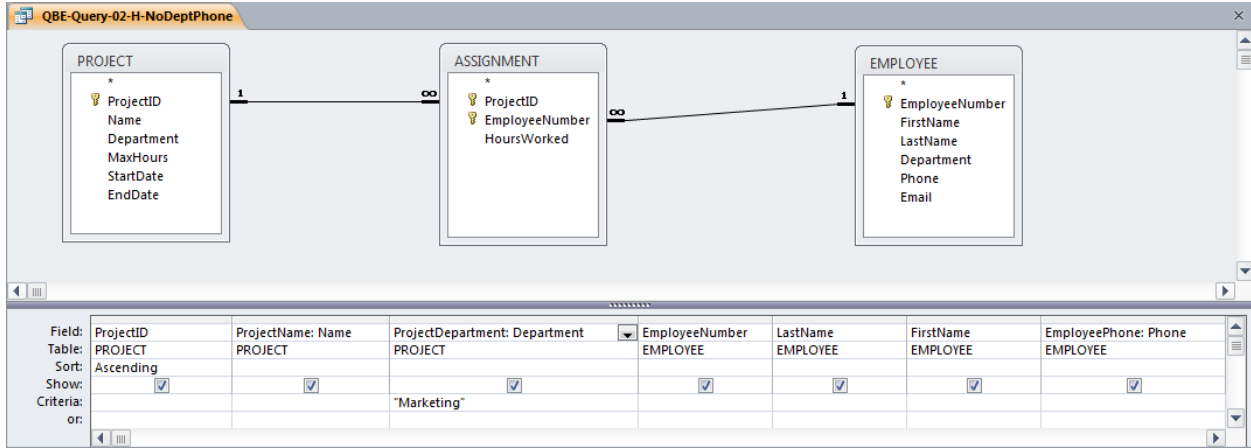
Compare these results with those shown for SQL-Query-02-H above, and you will see the difference.

For reference, here is the SQL code that Microsoft Access created from the QBE query:

```

SELECT    PROJECT.ProjectID, PROJECT.Name AS [Project Name],
          PROJECT.Department AS ProjectDepartment,
          DEPARTMENT.Phone AS DepartmentPhone, EMPLOYEE.EmployeeNumber,
          EMPLOYEE.LastName, EMPLOYEE.FirstName,
          EMPLOYEE.Phone AS EmployeePhone
FROM      ((DEPARTMENT INNER JOIN PROJECT ON
            DEPARTMENT.DepartmentName = PROJECT.Department)
          INNER JOIN EMPLOYEE ON
            DEPARTMENT.DepartmentName = EMPLOYEE.Department)
          INNER JOIN ASSIGNMENT ON
            (PROJECT.ProjectID = ASSIGNMENT.ProjectID)
          AND
            (EMPLOYEE.EmployeeNumber = ASSIGNMENT.EmployeeNumber)
WHERE     (((PROJECT.Department)="Marketing"))
ORDER BY PROJECT.ProjectID;
    
```

The problem we are encountering here is the same as described above in 2.62 G. Again, there are two work arounds. First, create the query *without* Department Phone. This is the only column needed from the DEPARTMENT table, which can thus be eliminated from the query. The QBE Query is (note the use of the aliases **ProjectName**, **ProjectDepartment** and **EmployeePhone**):



The results will be correct, but without the DepartmentPhone column:

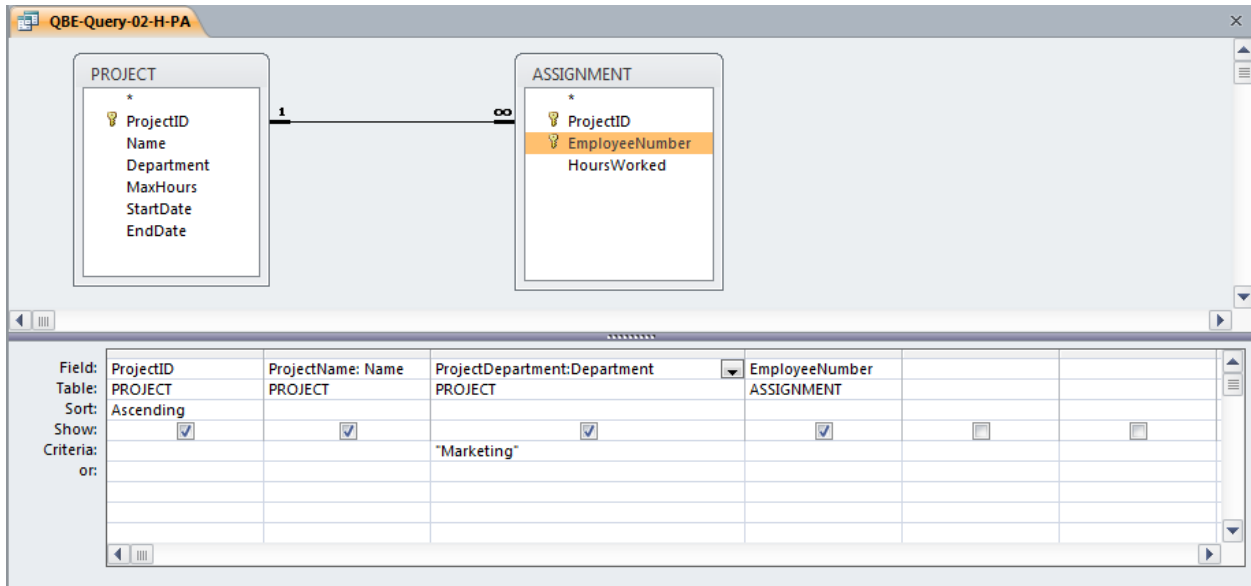
Alternatively, as devised by Professor John Schauf of Edgewood College, Madison, WI, you can illustrate building a set of queries, where each one uses the previous query and adds one additional table. This is possible because Microsoft Access allows saved queries to be used as the equivalent of a table in a query. By adding in one table at a time, you can control the JOIN...ON statement sequence, and obtain the correct answer.

This is a much better solution, because the end result is exactly what we want, rather than a truncated version of it.

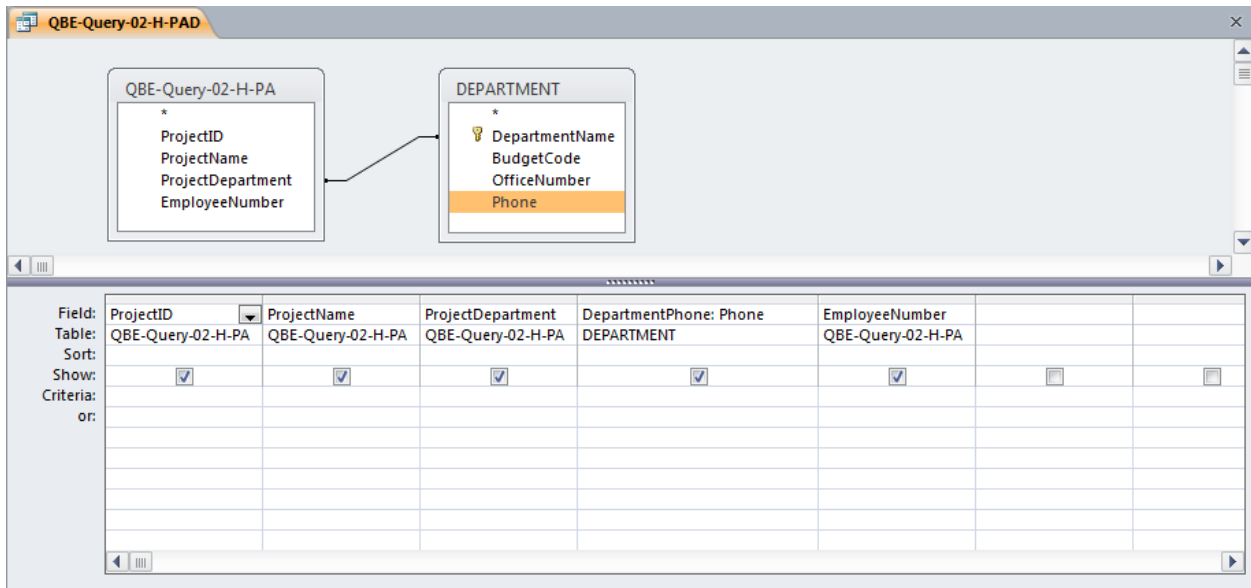
You should use this solution in class to illustrate how to use Microsoft Access query objects as pseudo tables in queries, and point out that they can also be used in forms and reports.

The steps below show how to create the needed sequence of QBE queries:

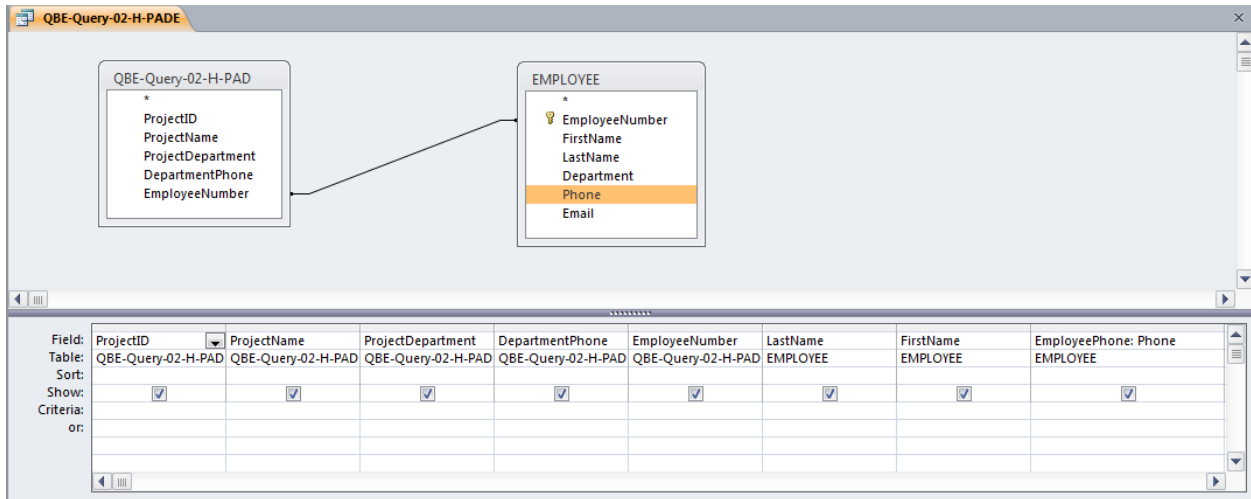
(1) Create a query that joins PROJECT and ASSIGNMENT, and name it QBE-Query-0H-G-PA. Note that you must include ASSIGNMENT.EmployeeNumber in this query, and note the use of the aliases **ProjectName** and **ProjectDepartment**:



(2) Create a query that joins QBE-Query-02-H-PA and DEPARTMENT, and name it QBE-Query-02-H-PAD. Note that you will have to **manually link** the DEPARTMENT primary key to the foreign key in QBE-Query-02-H-PA, and note the use of the alias **DepartmentPhone**:



(3) Create a query that joins QBE-Query-02-H-PAD and EMPLOYEE, and name it QBE-Query-02-H-PADE. Note that you will have to **manually link** the DEPARTMENT primary key to the foreign key in QBE-Query-02-H-PAD, and note the use of the alias **EmployeePhone**:

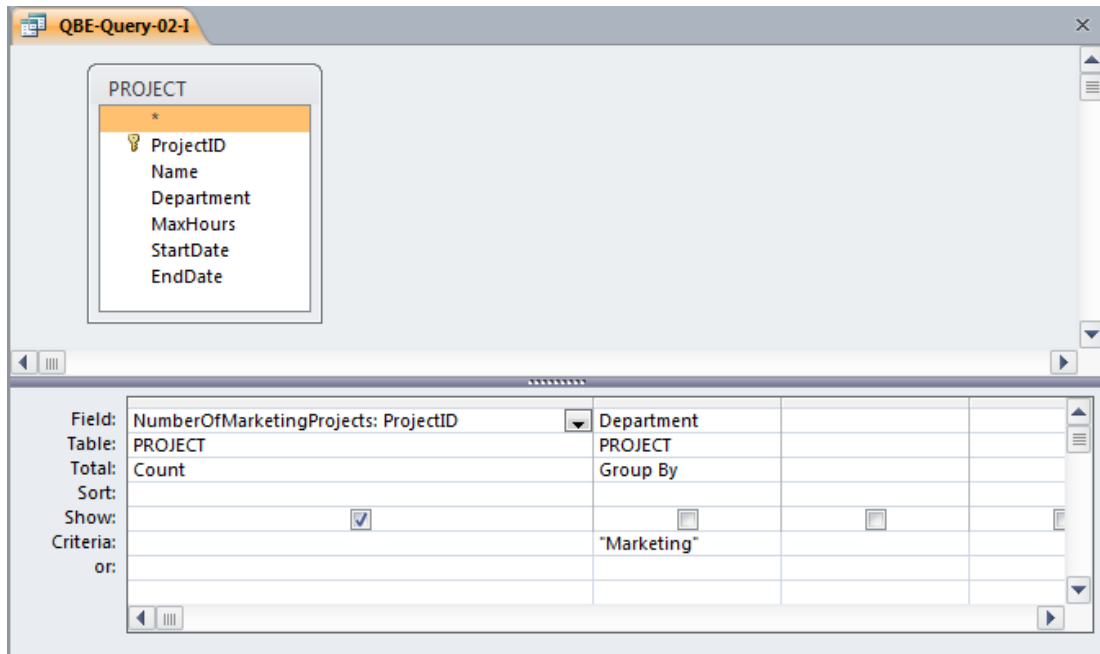


The query results are now correct:

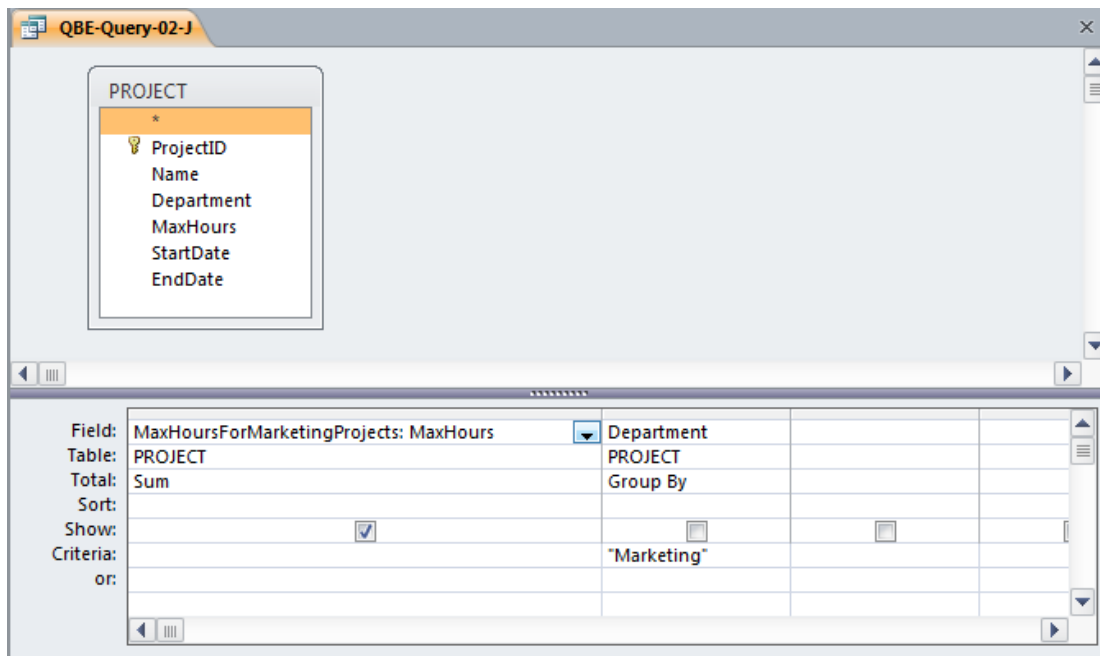
ProjectID	ProjectName	ProjectDepartment	DepartmentPhone	EmployeeNumber	LastName	FirstName	EmployeePhone	
1000	2011 Q3 Product Plan	Marketing	360-287-8700	1	Jacobs	Mary	360-285-8110	
1000	2011 Q3 Product Plan	Marketing	360-287-8700		8	Jackson	Tom	360-287-8610
1000	2011 Q3 Product Plan	Marketing	360-287-8700		10	Numoto	Ken	360-287-8710
1300	2011 Q4 Product Plan	Marketing	360-287-8700		1	Jacobs	Mary	360-285-8110
1300	2011 Q4 Product Plan	Marketing	360-287-8700		8	Jackson	Tom	360-287-8610
1300	2011 Q4 Product Plan	Marketing	360-287-8700		10	Numoto	Ken	360-287-8710
*								

Records: 1 of 6

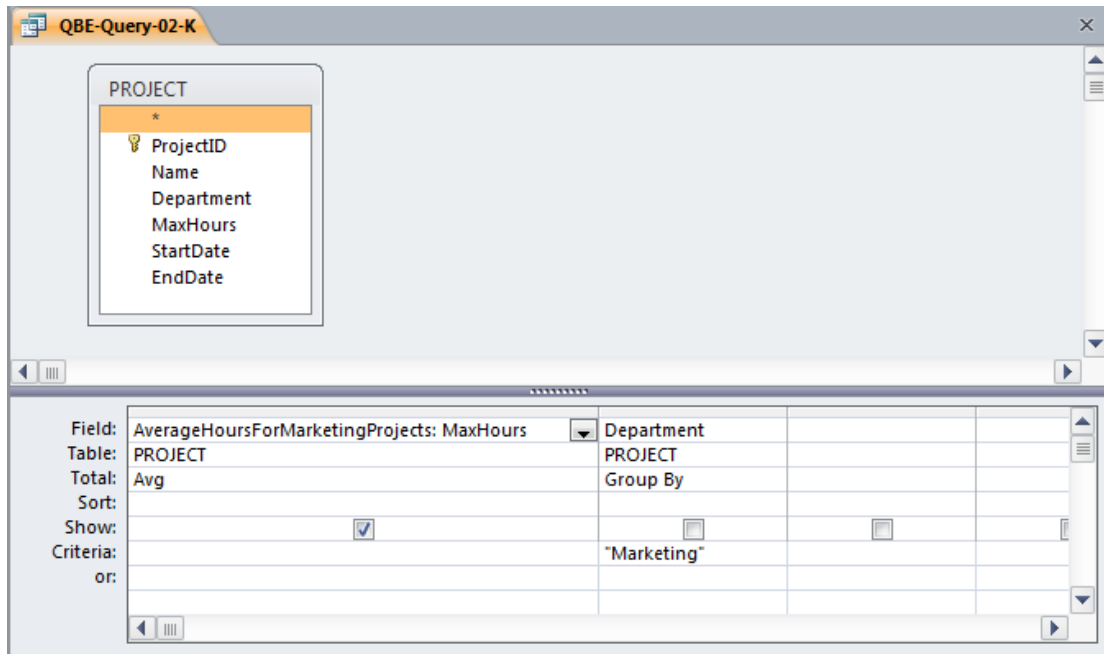
- I. How many projects are being run by the marketing department? Be sure to assign an appropriate column name to the computed results.



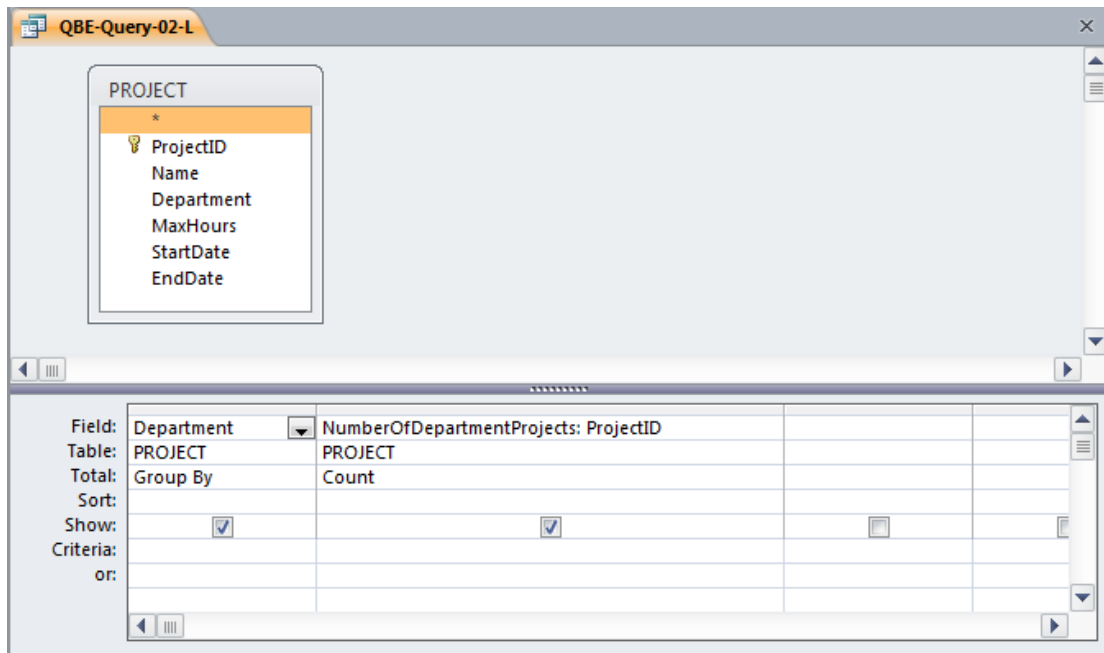
- J. What is the total MaxHours of projects being run by the marketing department? Be sure to assign an appropriate column name to the computed results.



- K. What is the average MaxHours of projects being run by the marketing department? Be sure to assign an appropriate column name to the computed results.



- L. How many projects are being run by each department? Be sure to display each DepartmentName and to assign an appropriate column name to the computed results.



The following questions refer to the NDX table of data as described starting on page 72. You can obtain a copy of this data in the Access database, DBPe11-NDX.accdb located on this text's Web site at www.pearsonhighered.com/kroenke.

2.63 Write SQL queries to produce the following results:

A. The ChangeClose on Fridays.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP e12-IM-CH02-NDX.accdb* which is available on the text's Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-2-63-A *** */
```

```
SELECT ChangeClose
FROM NDX
WHERE TDayOfWeeK = 'Friday';
```

ChangeClose
-10.19000000000001
-4.350000000000014
0.670000000000073
-5.13999999999987
0.309999999999945
-25.47
4.14000000000001
9.82999999999993
-32.3599999999999
-3.34999999999991
-0.990000000000001
-7.49999999999977
-32.69000000000001
7.92000000000007
38.22
-16.44000000000001
-7.870000000000012
6.830000000000015
-11.3599999999999
8.870000000000012
-10.11000000000001
1.730000000000002
-9.890000000000001
-12.60000000000001
24.55

B. The minimum, maximum, and average ChangeClose on Fridays.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP-e12-IM-CH02-NDX.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-2-63-B *** */

SELECT    MIN (ChangeClose) AS MinFridayChangeClose,
          MAX (ChangeClose) AS MaxFridayChangeClose,
          AVG (ChangeClose) AS AverageFridayChangeClose
FROM      NDX
WHERE     TDayOfWeeK = 'Friday';
    
```

MinFridayChangeClose	MaxFridayChangeClose	AverageFridayChangeClose
-345.85	273.32	0.146021739130452

C. The average ChangeClose grouped by TYear. Show TYear.

Since TYear is being displayed, it makes sense to sort the results by TYear although this is not explicitly stated in the question.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP-e12-IM-CH02-NDX.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-2-63-C *** */

SELECT    TYear, AVG (ChangeClose) AS AverageChangeClose
FROM      NDX
GROUP BY  TYear
ORDER BY  TYear;
    
```

TYear	AverageChangeClose
1985	0.639841269841275
1986	0.0720158102766874
1987	0.117351778656135
1988	0.167272727272733
1989	0.368452380952389
1990	-0.184229249011848
1991	1.03023715415022
1992	0.230944881889775
1993	0.301146245059303
1994	-1.55670634920634
1995	0.682380952380964
1996	0.965078740157492
1997	0.669841897233221
1998	3.35388888888891
1999	7.42785714285718
2000	-5.42115079365074
2001	-3.08326612903223
2002	-2.37071999999998
2003	1.91884920634923
2004	8.75666666666666

D. The average ChangeClose grouped by TYear and TMonth. Show TYear and TMonth.

Since TYear and TMonth are being displayed, it makes sense to sort the results by TYear and TMonth although this is not explicitly stated in the question.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP-e12-IM-CH02-NDX.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-2-63-D-A *** */

SELECT  TYear, TMonth,
        AVG (ChangeClose) AS AverageChangeClose
FROM    NDX
GROUP BY TYear, TMonth
ORDER BY TYear, TMonth;
    
```

TYear	TMonth	AverageChangeClose
1985	December	0.593809523809532
1985	November	1.058
1985	October	0.303636363636368
1986	April	0.550000000000009
1986	August	0.666190476190487
1986	December	-0.594090909090896
1986	February	0.789473684210538
1986	January	0.057272727272732
1986	July	-1.62818181818181
1986	June	-0.0519047619047553
1986	March	0.843500000000003
1986	May	0.785714285714291
1986	November	0.364210526315796
1986	October	0.60739130434783
1986	September	-1.35285714285714
1987	April	-0.115238095238088
1987	August	1.25952380952383
1987	December	1.73863636363637
1987	February	1.6921052631579
1987	January	2.40666666666668
1987	July	0.646363636363638

Unfortunately, the table NDX does not contain a numeric value of the month, so in order to sort the months correctly, we need a TMonthNumber which has a column containing a representative number for each month (January = 1, February = 2, etc.)

Although the SQL DDL and DML for doing this is not covered until Chapter 7, this is a good exercise in adding a column to an existing table, and you may want to show this to your students at this time.

We can create this column as follows (note that Microsoft Access can only run one SQL command at a time!):

```
/* *** SQL-ALTER-TABLE-2-63-D *** */  
  
ALTER TABLE NDX  
    ADD COLUMN TMonthNumber Int NULL;  
  
/* *** SQL-UPDATES-2-63-D *** */  
  
UPDATE NDX  
    SET      TMonthNumber = 1  
    WHERE   TMonth = 'January';  
  
UPDATE NDX  
    SET      TMonthNumber = 2  
    WHERE   TMonth = 'February';  
  
UPDATE NDX  
    SET      TMonthNumber = 3  
    WHERE   TMonth = 'March';  
  
UPDATE NDX  
    SET      TMonthNumber = 4  
    WHERE   TMonth = 'April';  
  
UPDATE NDX  
    SET      TMonthNumber = 5  
    WHERE   TMonth = 'May';  
  
UPDATE NDX  
    SET      TMonthNumber = 6  
    WHERE   TMonth = 'June';  
  
UPDATE NDX  
    SET      TMonthNumber = 7  
    WHERE   TMonth = 'July';  
  
UPDATE NDX  
    SET      TMonthNumber = 8  
    WHERE   TMonth = 'August';  
  
UPDATE NDX  
    SET      TMonthNumber = 9  
    WHERE   TMonth = 'September';
```



```
UPDATE NDX
  SET      TMonthNumber = 10
  WHERE    TMonth = 'October';

UPDATE NDX
  SET      TMonthNumber = 11
  WHERE    TMonth = 'November';

UPDATE NDX
  SET      TMonthNumber = 12
  WHERE    TMonth = 'December';
```

=====
An SQL or QBE Query can be used to show the data in the table (use GROUP BY):

TMonthNumber	TMonth
1	January
2	February
3	March
4	April
5	May
6	June
7	July
8	August
9	September
10	October
11	November
12	December

Record: 1 of 12 No Filter Search

Now that the NDX table includes this column, we can use it as follows to sort the data correctly:

```
/* *** SQL-Query-2-63-D-B *** */

SELECT  TYear, TMonth,
        AVG (ChangeClose) AS AverageFridayChangeClose
FROM    NDX
GROUP BY TYear, TMonth, TMonthNumber
ORDER BY TYear, TMonthNumber;
```

TYear	TMonth	AverageFridayChangeClose
1985	October	0.303636363636368
1985	November	1.058
1985	December	0.593809523809532
1986	January	0.057272727272732
1986	February	0.789473684210538
1986	March	0.843500000000003
1986	April	0.550000000000009
1986	May	0.785714285714291
1986	June	-0.0519047619047553
1986	July	-1.62818181818181
1986	August	0.666190476190487
1986	September	-1.35285714285714
1986	October	0.60739130434783
1986	November	0.364210526315796
1986	December	-0.594090909090896
1987	January	2.40666666666668
1987	February	1.6921052631579
1987	March	0.299090909090916
1987	April	-0.115238095238088
1987	May	0.394000000000002
1987	June	0.0427272727272778
1987	July	0.646363636363638
1987	August	1.25952380952383
1987	September	-0.387619047619033

- E. The average ChangeClose grouped by TYear, TQuarter, TMonth shown in descending order of the average (you will have to give a name to the average in order to sort by it). Show TYear, TQuarter, and TMonth. Note that months appear in alphabetical and not calendar order. Explain what you need to do to obtain months in calendar order.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP-e12-IM—CH02-NDX.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

For Microsoft SQL Server, Oracle Database and MySQL:

```

/* *** SQL-Query-2-63-E *** */

SELECT  TYear, TQuarter, TMonth,
        AVG(ChangeClose) AS AverageChangeClose
FROM    NDX
GROUP BY TYear, TQuarter, TMonth
ORDER BY AverageChangeClose DESC;

```

For Microsoft Access:

Unfortunately, as discussed above, Microsoft Access cannot process the ORDER BY clause correctly when an SQL built-in function is used in it. Therefore we rewrite the query as:

```

/* *** SQL-Query-2-63-E-Access *** */

SELECT   TYear, TQuarter, TMonth,
         AVG(ChangeClose) AS AverageChangeClose
FROM     NDX
GROUP BY TYear, TQuarter, TMonth
ORDER BY AVG(ChangeClose) DESC;
    
```

The result is:

TYear	TQuarter	TMonth	AverageChangeClose
2000	1	February	34.8445
1999	4	December	33.6872727272728
2000	3	August	20.3582608695652
2000	2	June	19.9868181818182
1999	4	November	15.6795238095239
1999	1	January	15.3252631578948
2001	2	April	14.095
1998	4	December	12.6386363636364
2001	1	January	11.9666666666667
2001	4	November	11.0128571428572
1999	4	October	10.9304761904763
1998	3	September	9.76857142857144
1999	2	June	9.41227272727276
2004	1	January	8.75666666666666
2001	4	October	8.53956521739133
1999	1	March	7.87434782608696
1998	4	November	7.87200000000003
2002	4	October	6.82695652173916
1997	3	July	6.80590909090912
1998	2	June	6.60318181818183
1998	1	February	6.47368421052633
2002	4	November	6.32800000000003
1999	3	August	5.72454545454546
2000	1	March	5.69130434782619

In order to obtain the months in calendar order, we would have to use the TMonthNumber column we created in PQ 2.63-D with a numerical value for each month (1, 2, 3, ..., 12) and sort by those values.

- F. The difference between the maximum ChangeClose and the minimum ChangeClose grouped by TYear, TQuarter, TMonth shown in descending order of the difference (you will have to give a name to the difference in order to sort by it). Show TYear, TQuarter, and TMonth.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP-e12-IM—CH02-NDX.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

For Microsoft SQL Server, Oracle Database and MySQL:

```
/* *** SQL-Query-2-63-F *** */

SELECT  TYear, TQuarter, TMonth,
        (MAX(ChangeClose) - MIN(ChangeClose)) AS DifChangeClose
FROM    NDX
GROUP BY TYear, TQuarter, TMonth
ORDER BY DifChangeClose DESC;
```

For Microsoft Access:

Unfortunately, as discussed above, Microsoft Access cannot process the ORDER BY clause correctly when an SQL built-in function is used in it. Therefore we rewrite the query as:

```
/* *** SQL-Query-2-63-F-Access *** */

SELECT  TYear, TQuarter, TMonth,
        (MAX(ChangeClose) - MIN(ChangeClose)) AS DifChangeClose
FROM    NDX
GROUP BY TYear, TQuarter, TMonth
ORDER BY (MAX(ChangeClose) - MIN(ChangeClose)) DESC;
```

The query result is:

TYear	TQuarter	TMonth	DifChangeClose
2000	2	April	667.34
2001	1	January	612.52
2000	2	May	553.88
2000	4	October	518.97
2000	4	December	487.78
2000	1	January	433.14
2000	4	November	423.36
2000	1	March	423.13
1994	1	January	406.18
2000	2	June	402.58
2000	3	July	360.91
2000	1	February	360.59
2000	3	September	325.42
2001	2	April	280.96
2001	1	February	255.95
2001	1	March	242.47
2000	3	August	231.01
1999	3	September	224.96
2001	2	May	220.04
1999	4	December	213.6
1999	4	November	205.26
1999	1	February	199.38
1999	2	April	196.55
2001	3	July	190.98

- G. The average ChangeClose grouped by TYear shown in descending order of the average (you will have to give a name to the average in order to sort by it). Show only groups for which the average is positive.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP-e12-IM—CH02-NDX.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

For Microsoft SQL Server, Oracle Database and MySQL:

```

/* *** SQL-Query-2-63-G *** */

SELECT      TYear,
            AVG (ChangeClose) AS AverageChangeClose
FROM        NDX
GROUP BY    TYear
HAVING      AVG (ChangeClose) > 0
ORDER BY    AverageChangeClose DESC;
    
```

For Microsoft Access:

Unfortunately, as discussed above, Microsoft Access cannot process the ORDER BY clause correctly when an SQL built-in function is used in it. Therefore we rewrite the query as:

```

/* *** SQL-Query-2-63-G-Access *** */

SELECT      TYear,
            AVG (ChangeClose) AS AverageChangeClose
FROM        NDX
GROUP BY    TYear
HAVING      AVG (ChangeClose) > 0
ORDER BY    AVG (ChangeClose) DESC;
    
```

The result is:

TYear	AverageChangeClose
2004	8.75666666666666
1999	7.42785714285718
1998	3.35388888888891
2003	1.91884920634923
1991	1.03023715415022
1996	0.965078740157492
1995	0.682380952380964
1997	0.669841897233221
1985	0.639841269841275
1989	0.368452380952389
1993	0.301146245059303
1992	0.230944881889775
1988	0.167272727272733
1987	0.117351778656135
1986	0.0720158102766874

H. Display a single field with the date in the form: day/month/year. Do not be concerned with trailing blanks.

Solutions to Project Questions 2.63.A – 2.63.H are contained in the Microsoft Access database *DBP-e12-IM—CH02-NDX.accdb* which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

The solution to this question requires the student to use the DBMS help function or other references to figure out a conversion function to convert the numerical day of the month to a character string that can be combined with other data already in character format. The original table NDX does not have a numeric value for month, so the names of the months will appear in the solution. If we want the numeric value of the month, we could use the modified NDX table, which has a numeric value TMonthNumber column. We would need to use the data type conversion on this field as well.

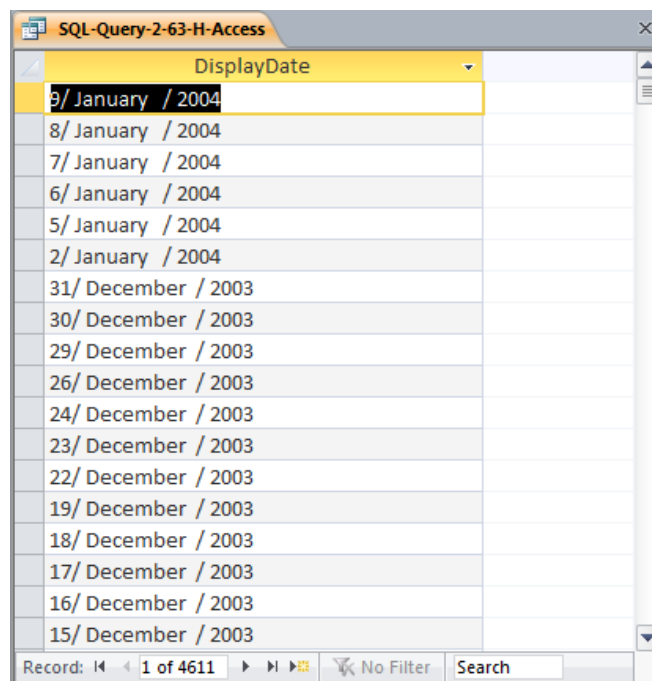
The SQL Statement using SQL Server 2008 R2 character string functions is:

```
/* *** SQL-Query-2-63-H *** */
SELECT      CAST (TDayOfMonth AS Char (2)) + ' / ' +
            TMonth + ' / ' + TYear AS DisplayDate
FROM        NDX;
```

The SQL Statement (as created with Expression Builder) for Microsoft Access 2010 is:

```
/* *** SQL-Query-2-63-H-Access *** */
SELECT      [NDX]![TDayOfMonth]
            &'/'&[NDX]![TMonth]
            &'/'&[NDX]![TYear] AS DisplayDate
FROM        NDX;
```

The Microsoft Access 2010 result is:



2.64 *It is possible that volume (the number of shares traded) has some correlation with the direction of the stock market. Use the SQL you have learned in this chapter to investigate that possibility. Develop at least five different SQL statements in your investigation.*

If volume is correlated with the direction of the stock market, this means that there should be either:

- (1) POSITIVE CORRELEATION: Higher volume when the market closes higher, or
- (2) NEGATIVE CORRELATION: Higher volume when the market closes lower.

When does the market close higher? When NDX.ChangeClose is positive.

```

/* *** SQL-Query-2-64-A *** */

SELECT    TMonth, TDayOfMonth, TYear, ChangeClose
FROM      NDX
WHERE     ChangeClose > 0;
    
```

TMonth	TDayOfMonth	TYear	ChangeClose
January	8	2004	16.3900000000001
January	7	2004	13
January	6	2004	4.68000000000006
January	5	2004	33.01
December	29	2003	26.5100000000002
December	26	2003	0.670000000000073
December	23	2003	16.46
December	22	2003	5.53999999999996
December	18	2003	31.3099999999999
December	16	2003	6.46000000000004

When does the market close lower? When NDX.ChangeClose is negative.

```

/* *** SQL-Query-2-64-B *** */

SELECT    TMonth, TDayOfMonth, TYear, ChangeClose
FROM      NDX
WHERE     ChangeClose < 0;
    
```

TMonth	TDayOfMonth	TYear	ChangeClose
January	9	2004	-10.1900000000001
January	2	2004	-4.35000000000014
December	31	2003	-2.08999999999992
December	30	2003	-0.35999999999999
December	24	2003	-4.98000000000002
December	19	2003	-5.13999999999987
December	17	2003	-3.27999999999997
December	15	2003	-20.45
December	9	2003	-34.3899999999999
December	5	2003	-25.47

Now, what are the average positive and negative changes?

```

/* *** SQL-Query-2-64-C *** */

SELECT      AVG (ChangeClose) AS AvgPositiveChange
FROM        NDX
WHERE       ChangeClose > 0;
    
```

AvgPositiveChange
15.8756384676776

```

/* *** SQL-Query-2-64-D *** */

SELECT      AVG (ChangeClose) AS AvgNegativeChange
FROM        NDX
WHERE       ChangeClose < 0;
    
```

AvgPositiveChange
-18.3364316341114

Now, what are the average volumes associated with the positive and negative changes?

```

/* *** SQL-Query-2-64-E *** */

SELECT      AVG (ChangeClose) AS AvgPositiveChange,
            AVG (Volume) AS AvgVolumeOnPositiveChange
FROM        NDX
WHERE       ChangeClose > 0;
    
```


AvgPositiveChange	AvgVolumeOnPositiveChange
15.8756384676776	6414170.11173184

```

/* *** SQL-Query-2-64-F *** */

SELECT      AVG (ChangeClose) AS AvgNegativeChange,
            AVG (Volume) AS AvgVolumeOnNegativeChange
FROM        NDX
WHERE       ChangeClose < 0;
    
```

AvgPositiveChange	AvgVolumeOnPositiveChange
-18.3364316341114	6742500.66698428

So, when there is a positive, or upward, change in the market we have an average volume of 641417.1117318 shares traded, and when we have a negative, or downward, change in the market we have an average volume of 6742500.66698428 shares. These numbers do not look significantly different, we will conclude that there is no correlation between the direction of the market movement and the volume of shares traded (if we wanted to be more formal, we could use a statistical procedure and do a hypothesis test as to whether or not there is really a statistically significant difference between these two numbers).

❖ **ANSWERS TO MARCIA’S DRY CLEANING PROJECT QUESTIONS**

Marcia Wilson owns and operates Marcia’s Dry Cleaning, which is an upscale dry cleaner in a well-to-do suburban neighborhood. Marcia makes her business stand out from the competition by providing superior customer service. She wants to keep track of each of her customers and their orders. Ultimately, she wants to notify them that their clothes are ready via e-mail. To provide this service, she has developed an initial database with several tables. Three of those tables are the following:

CUSTOMER (CustomerID, *FirstName*, *LastName*, *Phone*, *Email*)

INVOICE (InvoiceNumber, *CustomerNumber*, *DateIn*, *DateOut*, *TotalAmount*)

INVOICE_ITEM (InvoiceNumber, ItemNumber, *Item*, *Quantity*, *UnitPrice*)

In the database schema above, the primary keys are underlined and the foreign keys are shown in italics. The database that Marcia has created is named MDC, and the three tables in the MDC database schema are shown in Figure 2-33.

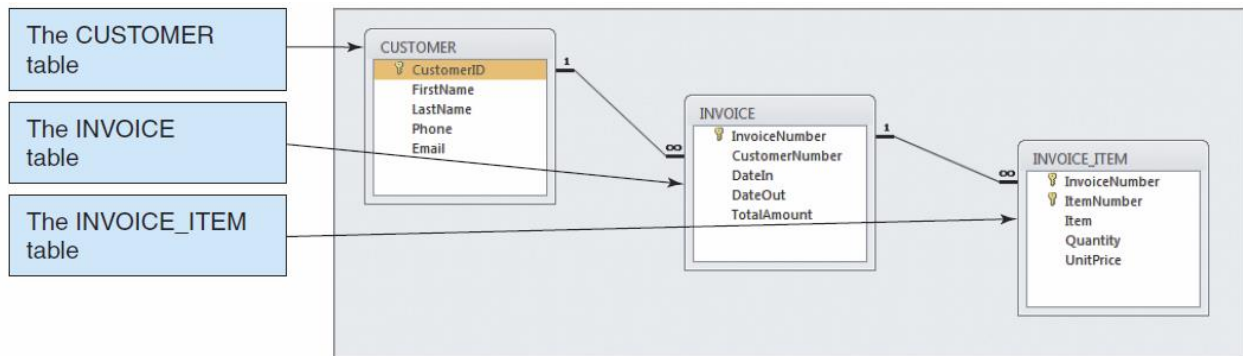


FIGURE 2-33 – The MDC Database

The column characteristics for the tables are shown in Figures 2-34, 2-35, and 2-36. The relationship between CUSTOMER and INVOICE should enforce referential integrity, but not cascade updates or deletions, while the relationship between INVOICE and INVOICE_ITEM should enforce referential integrity and cascade both updates and deletions. The data for these tables are shown in Figures 2-37, 2-38, and 2-39.

We recommend that you create a Microsoft Access 2010 database named MDC-CH02.accdb using the database schema, column characteristics, and data shown above, and then use this database to test your solutions to the questions in this section. Alternatively, SQL scripts for creating the MDC-CH02 database in SQL Server, Oracle Database, and MySQL are available on our Web site at www.pearsonhighered.com/kroenke.

CUSTOMER

Column Name	Type	Key	Required	Remarks
CustomerID	AutoNumber	Primary Key	Yes	Surrogate Key
FirstName	Text (25)	No	Yes	
LastName	Text (25)	No	Yes	
Phone	Text (12)	No	No	
Email	Text (100)	No	No	

Figure 2-34 - Column Characteristics for the CUSTOMER Table

INVOICE

Column Name	Type	Key	Required	Remarks
InvoiceNumber	Number	Primary Key	Yes	Long Integer
CustomerNumber	Number	Foreign Key	Yes	Long Integer
DateIn	Date/Time	No	Yes	
DateOut	Date/Time	No	No	
TotalAmount	Currency	No	No	Two Decimal Places

Figure 2-35 - Column Characteristics for the INVOICE Table

INVOICE_ITEM

Column Name	Type	Key	Required	Remarks
InvoiceNumber	Number	Primary Key, Foreign Key	Yes	Long Integer
ItemNumber	Number	Primary Key	Yes	Long Integer
Item	Text (50)	No	Yes	
Quantity	Number	No	Yes	Long Integer
UnitPrice	Currency	No	Yes	Two Decimal Places

Figure 2-36 - Column Characteristics for the INVOICE_ITEM Table

CustomerID	FirstName	LastName	Phone	Email
1	Nikki	Kaccaton	723-543-1233	Nikki.Kaccaton@somewhere.com
2	Brenda	Catnazaro	723-543-2344	Brenda.Catnazaro@somewhere.com
3	Bruce	LeCat	723-543-3455	Bruce.LeCat@somewhere.com
4	Betsy	Miller	725-654-3211	Betsy.Miller@somewhere.com
5	George	Miller	725-654-4322	George.Miller@somewhere.com
6	Kathy	Miller	723-514-9877	Kathy.Miller@somewhere.com
7	Betsy	Miller	723-514-8766	Betsy.Miller@elsewhere.com

Figure 2-37 - Sample Data for the CUSTOMER table

InvoiceNumber	CustomerNumber	DateIn	DateOut	TotalAmount
2011001	1	04-Oct-11	06-Oct-11	\$158.50
2011002	2	04-Oct-11	06-Oct-11	\$25.00
2011003	1	06-Oct-11	08-Oct-11	\$49.00
2011004	4	06-Oct-11	08-Oct-11	\$17.50
2011005	6	07-Oct-11	11-Oct-11	\$12.00
2011006	3	11-Oct-11	13-Oct-11	\$152.50
2011007	3	11-Oct-11	13-Oct-11	\$7.00
2011008	7	12-Oct-11	14-Oct-11	\$140.50
2011009	5	12-Oct-11	14-Oct-11	\$27.00

Figure 2-38 - Sample Data for the ORDER table

InvoiceNumber	ItemNumber	Item	Quantity	UnitPrice
2011001	1	Blouse	2	\$3.50
2011001	2	Dress Shirt	5	\$2.50
2011001	3	Formal Gown	2	\$10.00
2011001	4	Slacks-Mens	10	\$5.00
2011001	5	Slacks-Womens	10	\$6.00
2011001	6	Suit-Mens	1	\$9.00
2011002	1	Dress Shirt	10	\$2.50
2011003	1	Slacks-Mens	5	\$5.00
2011003	2	Slacks-Womens	4	\$6.00
2011004	1	Dress Shirt	7	\$2.50
2011005	1	Blouse	2	\$3.50
2011005	2	Dress Shirt	2	\$2.50
2011006	1	Blouse	5	\$3.50
2011006	2	Dress Shirt	10	\$2.50
2011006	3	Slacks-Mens	10	\$5.00
2011006	4	Slacks-Womens	10	\$6.00
2011007	1	Blouse	2	\$3.50
2011008	1	Blouse	3	\$3.50
2011008	2	Dress Shirt	12	\$2.50
2011008	3	Slacks-Mens	8	\$5.00
2011008	4	Slacks-Womens	10	\$6.00
2011009	1	Suit-Mens	3	\$9.00

Figure 2-39 - Sample Data for the ORDER_ITEM table

Write SQL statements and show the results based on the MDC data for each of the following:

A. Show all data in each of the tables.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MDC-A-CUSTOMER *** */

SELECT *
FROM CUSTOMER;
```

Note there are two customers both named Betsy Miller.

CustomerID	FirstName	LastName	Phone	Email
1	Nikki	Kaccaton	723-543-1233	Nikki.Kaccaton@somewhere.com
2	Brenda	Catnazaro	723-543-2344	Brenda.Catnazaro@somewhere.com
3	Bruce	LeCat	723-543-3455	Bruce.LeCat@somewhere.com
4	Betsy	Miller	725-654-3211	Betsy.Miller@somewhere.com
5	George	Miller	725-654-4322	George.Miller@somewhere.com
6	Kathy	Miller	723-514-9877	Kathy.Miller@somewhere.com
7	Betsy	Miller	723-514-8766	Betsy.Miller@elsewhere.com

```
/* *** SQL-Query-MDC-A-INVOICE *** */

SELECT *
FROM INVOICE;
```

InvoiceNumber	CustomerNumber	DateIn	DateOut	TotalAmount
2011001	1	10/4/2011	10/6/2011	\$158.50
2011002	2	10/4/2011	10/6/2011	\$25.00
2011003	1	10/6/2011	10/8/2011	\$49.00
2011004	4	10/6/2011	10/8/2011	\$17.50
2011005	6	10/7/2011	10/11/2011	\$12.00
2011006	3	10/11/2011	10/13/2011	\$152.50
2011007	3	10/11/2011	10/13/2011	\$7.00
2011008	7	10/12/2011	10/14/2011	\$140.50
2011009	5	10/12/2011	10/14/2011	\$27.00

Chapter Two – Introduction to Structured Query Language

```
/* *** SQL-Query-MDC-A-INVOICE-ITEM *** */
```

```
SELECT *
FROM INVOICE_ITEM;
```

InvoiceNumber	ItemNumber	Item	Quantity	UnitPrice
2011001	1	Blouse	2	\$3.50
2011001	2	Dress Shirt	5	\$2.50
2011001	3	Formal Gown	2	\$10.00
2011001	4	Slacks-Mens	10	\$5.00
2011001	5	Slacks-Womens	10	\$6.00
2011001	6	Suit-Mens	1	\$9.00
2011002	1	Dress Shirt	10	\$2.50
2011003	1	Slacks-Mens	5	\$5.00
2011003	2	Slacks-Womens	4	\$6.00
2011004	1	Dress Shirt	7	\$2.50
2011005	1	Blouse	2	\$3.50
2011005	2	Dress Shirt	2	\$2.50
2011006	1	Blouse	5	\$3.50
2011006	2	Dress Shirt	10	\$2.50
2011006	3	Slacks-Mens	10	\$5.00
2011006	4	Slacks-Womens	10	\$6.00
2011007	1	Blouse	2	\$3.50
2011008	1	Blouse	3	\$3.50
2011008	2	Dress Shirt	12	\$2.50
2011008	3	Slacks-Mens	8	\$5.00
2011008	4	Slacks-Womens	10	\$6.00
2011009	1	Suit-Mens	3	\$9.00
*				

Record: 1 of 22 No Filter Search

B. List the Phone and LastName of all customers.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MDC-B *** */
```

```
SELECT Phone, LastName
FROM CUSTOMER;
```

Phone	LastName
723-543-1233	Kaccaton
723-543-2344	Catnazaro
723-543-3455	LeCat
725-654-3211	Miller
725-654-4322	Miller
723-514-9877	Miller
723-514-8766	Miller
*	

C. List the Phone and LastName for all customers with a FirstName of “Nikki”.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MDC-C *** */
```

```
SELECT Phone, LastName
FROM CUSTOMER
WHERE FirstName = 'Nikki';
```

Phone	LastName
723-543-1233	Kaccaton
*	

D. List the Phone, DateIn, and DateOut of all orders in excess of 100.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MDC-D *** */

SELECT   Phone, DateIn, DateOut
FROM     CUSTOMER, INVOICE
WHERE    TotalAmount >100
        AND   CUSTOMER.CustomerID = INVOICE.CustomerNumber;
    
```

Phone	DateIn	DateOut
723-543-1233	10/4/2011	10/6/2011
723-543-3455	10/11/2011	10/13/2011
723-514-8766	10/12/2011	10/14/2011

E. List the Phone and FirstName of all customers whose first name starts with 'B'.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

The correct SQL-92 statement, which uses the wildcard %, is:

```

/* *** SQL-Query-MDC-E *** */

SELECT   Phone, FirstName
FROM     CUSTOMER
WHERE    FirstName LIKE 'B%';

/* *** SQL-Query-MDC-E-Access *** */
    
```

However, Microsoft Access uses the wildcard *, which gives the following SQL statement:

```

/* *** SQL-Query-MDC-E-Access *** */

SELECT   Phone, FirstName
FROM     CUSTOMER
WHERE    FirstName LIKE 'B*';
    
```

Phone	FirstName
723-543-2344	Brenda
723-543-3455	Bruce
725-654-3211	Betsy
723-514-8766	Betsy
*	

- F. List the Phone and FirstName of all customers whose last name includes the characters, 'cat'.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

The correct SQL-92 statement, which uses the wildcard %, is:

```
/* *** SQL-Query-MDC-F *** */
SELECT Phone, FirstName
FROM CUSTOMER
WHERE LastName LIKE '%cat%';
```

However, Microsoft Access uses the wildcard *, which give the following SQL statement:

```
/* *** SQL-Query-MDC-F-Access *** */
SELECT Phone, FirstName
FROM CUSTOMER
WHERE LastName LIKE '*cat*';
```

Phone	FirstName
723-543-1233	Nikki
723-543-2344	Brenda
723-543-3455	Bruce
*	

- G. List the Phone, FirstName, and LastName for all customers whose second and third characters of phone number is 23.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

Note that since the phone numbers in this database include the area code, we are really finding phone numbers with ‘23’ as the second and third numbers in the area code. We

could, off course, write statements to find '23' in the prefix or in the 4-digit sequence portion of the phone number.

The correct SQL-92 statement, which uses the wildcards % and _, is:

```
/* *** SQL-Query-MDC-G *** */

SELECT Phone, FirstName, LastName
FROM CUSTOMER
WHERE Phone LIKE '_23%';
```

However, Microsoft Access uses the wildcards * and ?, which give the following SQL statement:

```
/* *** SQL-Query-MDC-G-Access *** */

SELECT Phone, FirstName, LastName
FROM CUSTOMER
WHERE Phone LIKE '?23*';
```

Phone	FirstName	LastName
723-543-1233	Nikki	Kaccaton
723-543-2344	Brenda	Catnazaro
723-543-3455	Bruce	LeCat
723-514-9877	Kathy	Miller
723-514-8766	Betsy	Miller

H. Determine the maximum and minimum TotalAmounts.

Solutions to Marcia's Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MDC-H *** */

SELECT MAX (TotalAmt) AS MaxTotalAmount,
MIN (TotalAmt) AS MinTotalAmount
FROM INVOICE;
```

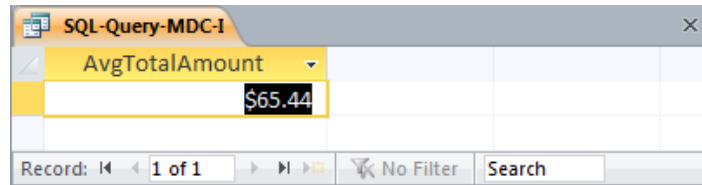
MaxTotalAmount	MinTotalAmount
\$158.50	\$7.00

I. Determine the average TotalAmount.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

Note that since ORDER is an SQL reserved word, it must be enclosed in delimiters (square brackets []).

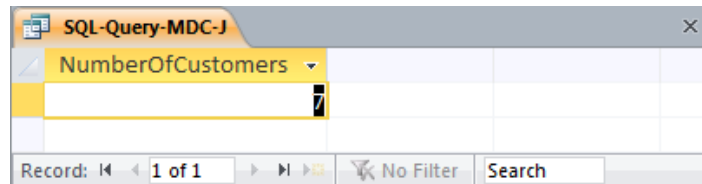
```
/* *** SQL-Query-MDC-I *** */  
  
SELECT     AVG (TotalAmt) AS AvgTotalAmount  
FROM       [ORDER];
```



J. Count the number of customers.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MDC-J *** */  
  
SELECT     Count (*) AS NumberOfCustomers  
FROM       CUSTOMER;
```



K. Group customers by LastName and then by FirstName.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MDC-K *** */

SELECT LastName, FirstName
FROM CUSTOMER
GROUP BY LastName, FirstName;
```

LastName	FirstName
Catnazaro	Brenda
Kaccaton	Nikki
LeCat	Bruce
Miller	Betsy
Miller	George
Miller	Kathy

L. Count the number of customers having each combination of LastName and FirstName.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MDC-L *** */

SELECT LastName, FirstName,
COUNT (*) AS Last_First_Combination_Count
FROM CUSTOMER
GROUP BY LastName, FirstName;
```

LastName	FirstName	Last_First_Combination_Count
Catnazaro	Brenda	1
Kaccaton	Nikki	1
LeCat	Bruce	1
Miller	Betsy	2
Miller	George	1
Miller	Kathy	1

- M. Show the *FirstName* and *LastName* of all customers who have had an order with *TotalAmount* greater than 100. Use a subquery. Present the results sorted by *LastName* in ascending order and then *FirstName* in descending order.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MDC-M *** */

SELECT  FirstName, LastName
FROM    CUSTOMER
WHERE   CustomerID IN
        (SELECT CustomerNumber
         FROM INVOICE
         WHERE TotalAmount > 100)
ORDER BY LastName, FirstName DESC;

```

FirstName	LastName
Nikki	Kaccaton
Bruce	LeCat
Betsy	Miller
*	

- N. Show the *FirstName* and *LastName* of all customers who have had an order with *TotalAmount* greater than 100. Use a join. Present the results sorted by *LastName* in ascending order and then *FirstName* in descending order.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MDC-N *** */

SELECT  FirstName, LastName
FROM    CUSTOMER, INVOICE
WHERE   CUSTOMER.CustomerID = INVOICE.CustomerNumber
        AND TotalAmount > 100
ORDER BY LastName, FirstName DESC;

```

FirstName	LastName
Nikki	Kaccaton
Bruce	LeCat
Betsy	Miller

- O. Show the *FirstName* and *LastName* of all customers who have had an order with an *Item* named “Dress Shirt”. Use a subquery. Present the results sorted by *LastName* in ascending order and then *FirstName* in descending order.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MDC-O *** */

SELECT  FirstName, LastName
FROM    CUSTOMER
WHERE   CustomerID IN
        (SELECT  CustomerNumber
         FROM    INVOICE
         WHERE   InvoiceNumber IN
                (SELECT  InvoiceNumber
                 FROM    INVOICE_ITEM
                 WHERE   Item = 'Dress Shirt'))
ORDER BY LastName, FirstName DESC;

```

FirstName	LastName
Brenda	Catnazaro
Nikki	Kaccaton
Bruce	LeCat
Kathy	Miller
Betsy	Miller
Betsy	Miller
*	

- P. Show the *FirstName* and *LastName* of all customers who have had an order with an *Item* named “Dress Shirt”. Use a join. Present the results sorted by *LastName* in ascending order and then *FirstName* in descending order.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MDC-P *** */

SELECT  FirstName, LastName
FROM    CUSTOMER, INVOICE, INVOICE_ITEM
WHERE   CUSTOMER.CustomerID = INVOICE.CustomerNumber
        AND  INVOICE.InvoiceNumber = INVOICE_ITEM.InvoiceNumber
        AND  INVOICE_ITEM.Item = 'Dress Shirt'
ORDER BY LastName, FirstName DESC;

```

FirstName	LastName
Brenda	Catnazaro
Nikki	Kaccaton
Bruce	LeCat
Kathy	Miller
Betsy	Miller
Betsy	Miller

- Q. Show the *FirstName*, *LastName* and *TotalAmount* of all customers who have had an order with an Item named “Dress Shirt”. Use a join with a subquery. Present results sorted by *LastName* in ascending order and then *FirstName* in descending order.

Solutions to Marcia’s Dry Cleaning questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MDC.accdb* which is available at the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

Since we want to display data in fields from two tables, these tables must be combined with a join. Data in a table without displayed fields can still be brought into the query with a subquery. Therefore, we will join *CUSTOMER* and *INVOICE*, while using a subquery with *INVOICE_ITEM*.

```

/* *** SQL-Query-MDC-Q *** */

SELECT  FirstName, LastName, TotalAmount
FROM    CUSTOMER, INVOICE
WHERE   CUSTOMER.CustomerID = INVOICE.CustomerNumber
        AND  INVOICE.InvoiceNumber IN
            (SELECT InvoiceNumber
             FROM INVOICE_ITEM
             WHERE Item = 'Dress Shirt')
ORDER BY LastName, FirstName DESC;
    
```

FirstName	LastName	TotalAmount
Brenda	Catnazaro	\$25.00
Nikki	Kaccaton	\$158.50
Bruce	LeCat	\$152.50
Kathy	Miller	\$12.00
Betsy	Miller	\$140.50
Betsy	Miller	\$17.50

❖ **ANSWERS TO MORGAN IMPORTING PROJECT QUESTIONS**

James Morgan owns and operates Morgan Importing, which purchases antiques and home furnishings in Asia, ships those items to a warehouse facility in Los Angeles, and then sells these items in the United States. James tracks the Asian purchases and subsequent shipments of these items to Los Angeles by using a database to keep a list of items purchased, shipments of the purchased items, and the items in each shipment. His database includes the following tables:

ITEM (ItemID, Description, PurchaseDate, Store, City, Quantity, LocalCurrencyAmt, ExchangeRate)

SHIPMENT (ShipmentID, ShipperName, ShipperInvoiceNumber, DepartureDate, ArrivalDate, InsuredValue)

SHIPMENT_ITEM (*ShipmentID*, *ShipmentItemID*, *ItemID*, Value)

In the database schema above, the primary keys are underlined and the foreign keys are shown in italics. The database that James has created is named MI, and the three tables in the MI database schema are shown in Figure 2-40.

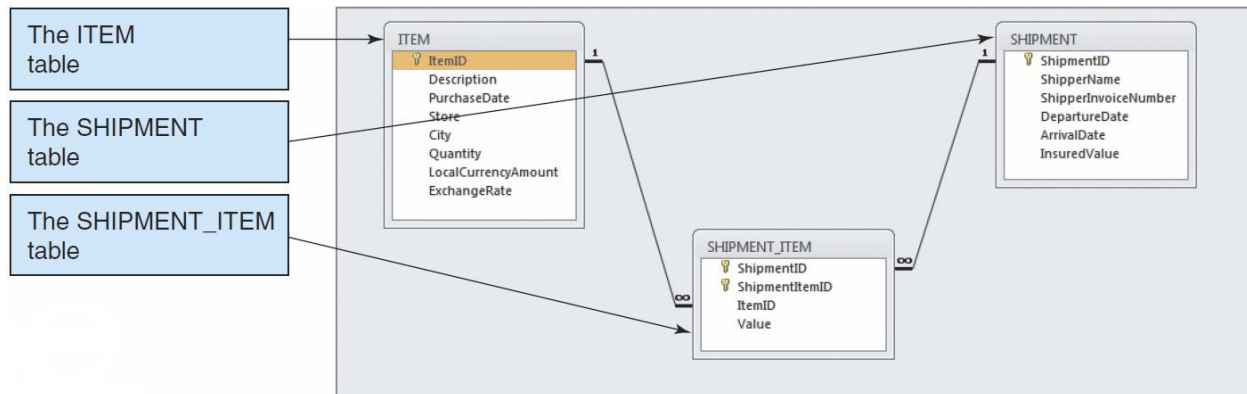


Figure 2-40 – The MI Database

The column characteristics for the tables are shown in Figures 2-41, 2-42, and 2-43. The data for the tables are shown in Figures 2-44, 2-45, and 2-46. The relationship between ITEM and SHIPMENT_ITEM should enforce referential integrity, and although it should cascade updates, it should not cascade deletions. The relationship between SHIPMENT and SHIPMENT_ITEM should enforce referential integrity and cascade both updates and deletions.

We recommend that you create a Microsoft Access 2010 database named MI-Ch02.accdb using the database schema, column characteristics, and data shown above, and then use this database to test your solutions to the questions in this section. Alternatively, SQL scripts for creating the MI-CH02 database in SQL Server, Oracle Database, and MySQL are available on our Web site at www.pearsonhighered.com/kroenke.

ITEM

Column Name	Type	Key	Required	Remarks
ItemID	AutoNumber	Primary Key	Yes	Surrogate Key
Description	Text (255)	No	Yes	Long Integer
PurchaseDate	Date/Time	No	Yes	
Store	Text (50)	No	Yes	
City	Text (35)	No	Yes	
Quantity	Number	No	Yes	Long Integer
LocalCurrencyAmount	Number	No	Yes	Decimal, 18 Auto
ExchangeRate	Number	No	Yes	Decimal, 12 Auto

Figure 2-41 - Column Characteristics for the ITEM Table

SHIPMENT

Column Name	Type	Key	Required	Remarks
ShipmentID	AutoNumber	Primary Key	Yes	Surrogate Key
ShipperName	Text (35)	No	Yes	
ShipperInvoiceNumber	Number	No	Yes	Long Integer
DepartureDate	Date/Time	No	No	
ArrivalDate	Date/Time	No	No	
InsuredValue	Currency	No	No	Two Decimal Places

Figure 2-42 - Column Characteristics for the SHIPMENT Table

SHIPMENT_ITEM				
Column Name	Type	Key	Required	Remarks
ShipmentID	Number	Primary Key, Foreign Key	Yes	Long Integer
ShipmentItemID	Number	Primary Key	Yes	Long Integer
ItemID	Number	Foreign Key	Yes	Long Integer
Value	Currency	No	Yes	Two Decimal Places

Figure 2-43 - Column Characteristics for the SHIPMENT_ITEM Table

ItemID	Description	PurchaseDate	Store	City	Quantity	LocalCurrencyAmount	ExchangeRate
1	QE Dining Set	07-Apr-11	Eastern Treasures	Manila	2	403405	0.01774
2	Willow Serving Dishes	15-Jul-11	Jade Antiques	Singapore	75	102	0.5903
3	Large Bureau	17-Jul-11	Eastern Sales	Singapore	8	2000	0.5903
4	Brass Lamps	20-Jul-11	Jade Antiques	Singapore	40	50	0.5903

Figure 2-44 - Sample Data for the ITEM Table

ShipmentID	ShipperName	ShipperInvoiceNumber	DepartureDate	ArrivalDate	InsuredValue
1	ABC Trans-Oceanic	2008651	10-Dec-11	15-Mar-11	\$15,000.00
2	ABC Trans-Oceanic	2009012	10-Jan-11	20-Mar-11	\$12,000.00
3	Worldwide	49100300	05-May-11	17-Jun-11	\$20,000.00
4	International	399400	02-Jun-11	17-Jul-11	\$17,500.00
5	Worldwide	84899440	10-Jul-11	28-Jul-11	\$25,000.00
6	International	488955	05-Aug-11	11-Sep-11	\$18,000.00

Figure 2-45 - Sample Data for the SHIPMENT Table

ShipmentID	ShipmentItemID	ItemID	Value
3	1	1	\$15,000.00
4	1	4	\$1,200.00
4	2	3	\$9,500.00
4	3	2	\$4,500.00

Figure 2-46 - Sample Data for the SHIPMENT_ITEM Table

Write SQL statements and show the results based on the *MI* data for each of the following:

A. Show all data in each of the tables.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MI-A-ITEM *** */

SELECT *
FROM ITEM;
    
```

ItemID	Description	PurchaseDate	Store	City	Quantity	LocalCurrencyAmount	ExchangeRate
1	QE Dining Set	4/7/2011	Eastern Treasures	Manila	2	403405	0.01774
2	Willow Serving Dishes	7/15/2011	Jade Antiques	Singapore	75	102	0.5903
3	Large Bureau	7/17/2011	Eastern Sales	Singapore	8	2000	0.5903
4	Brass Lamps	7/20/2011	Jade Antiques	Singapore	40	50	0.5903

```

/* *** SQL-Query-MI-A-SHIPMENT *** */

SELECT *
FROM SHIPMENT;
    
```

ShipmentID	ShipperName	ShipperInvoiceNumber	DepartureDate	ArrivalDate	InsuredValue
1	ABC Trans-Oceanic	2008651	12/10/2010	3/15/2011	\$15,000.00
2	ABC Trans-Oceanic	2009012	1/10/2011	3/20/2011	\$12,000.00
3	Worldwide	49100300	5/5/2011	6/17/2011	\$20,000.00
4	International	399400	6/2/2011	7/17/2011	\$17,500.00
5	Worldwide	84899440	7/10/2011	7/28/2011	\$25,000.00
6	International	488955	8/5/2011	9/11/2011	\$18,000.00

```
/* *** SQL-Query-MI-A-SHIPMENT-ITEM *** */
```

```
SELECT *
FROM SHIPMENT_ITEM;
```

ShipmentID	ShipmentItemID	ItemID	Value
3	1	1	\$15,000.00
4	1	4	\$1,200.00
4	2	3	\$9,500.00
4	3	2	\$4,500.00

B. List the ShipmentID, ShipperName, and ShipperInvoiceNumber of all shipments.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-B *** */
```

```
SELECT ShipmentID, ShipperName, ShipperInvoiceNumber
FROM SHIPMENT;
```

ShipmentID	ShipperName	ShipperInvoiceNumber
1	ABC Trans-Oceanic	2008651
2	ABC Trans-Oceanic	2009012
3	Worldwide	49100300
4	International	399400
5	Worldwide	84899440
6	International	488955

C. List the ShipmentID, ShipperName, and ShipperInvoiceNumber for all shipments with an insured value greater than \$10,000.00.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-C *** */
```

```
SELECT ShipmentID, ShipperName, ShipperInvoiceNumber
FROM SHIPMENT
WHERE InsuredValue > 10000;
```

ShipmentID	ShipperName	ShipperInvoiceNumber
1	ABC Trans-Oceanic	2008651
2	ABC Trans-Oceanic	2009012
3	Worldwide	49100300
4	International	399400
5	Worldwide	84899440
6	International	488955

D. List the ShipmentID, ShipperName, and ShipperInvoiceNumber of all shippers whose name starts with “AB”.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

The correct SQL-92 statement, which uses the wildcard %, is:

```

/* *** SQL-Query-MI-D *** */

SELECT  ShipmentID, ShipperName, ShipperInvoiceNumber
FROM    SHIPMENT
WHERE   Shipper LIKE 'AB%';
    
```

However, Microsoft Access uses the wildcard *, which give the following SQL statement:

```

/* *** SQL-Query-MI-D-Access *** */

SELECT  ShipmentID, ShipperName, ShipperInvoiceNumber
FROM    SHIPMENT
WHERE   Shipper LIKE 'AB*';
    
```

ShipmentID	ShipperName	ShipperInvoiceNumber
1	ABC Trans-Oceanic	2008651
2	ABC Trans-Oceanic	2009012

- E. Assume *DepartureDate* and *ArrivalDate* are in the format *MM/DD/YY*. List the *ShipmentID*, *ShipperName*, and *ShipperInvoiceNumber* and *ArrivalDate* of all shipments that departed in December.

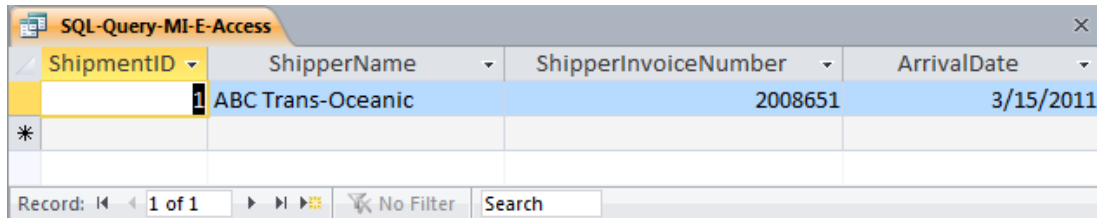
Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

The correct SQL-92 statement, which uses the wildcard %, is:

```
/* *** SQL-Query-MI-E *** */  
  
SELECT ShipmentID, ShipperName, ShipperInvoiceNumber, ArrivalDate  
FROM SHIPMENT  
WHERE DepartureDate LIKE '12%';
```

However, Microsoft Access uses the wildcard *, which gives the following SQL statement:

```
/* *** SQL-Query-MI-E-Access *** */  
  
SELECT ShipmentID, ShipperName, ShipperInvoiceNumber, ArrivalDate  
FROM SHIPMENT  
WHERE DepartureDate LIKE '12*';
```



ShipmentID	ShipperName	ShipperInvoiceNumber	ArrivalDate
	ABC Trans-Oceanic	2008651	3/15/2011
*			

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- F. Assume *DepartureDate* and *ArrivalDate* are in the format *MM/DD/YY*. List the *ShipmentID*, *ShipperName*, and *ShipperInvoiceNumber* and *ArrivalDate* of all shipments that departed on the 10th of any month.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

The correct SQL-92 statement, which uses the wildcards % and _, is:

```
/* *** SQL-Query-MI-F *** */  
  
SELECT ShipmentID, ShipperName, ShipperInvoiceNumber, ArrivalDate  
FROM SHIPMENT  
WHERE DepartureDate LIKE '___10%';
```

However, Microsoft Access uses the wildcards * and ?, which give the following SQL statement:

```
/* *** SQL-Query-MI-F-Access-A *** */

SELECT ShipmentID, ShipperName, ShipperInvoiceNumber, ArrivalDate
FROM SHIPMENT
WHERE DepartureDate LIKE '???10*';
```

Further, Microsoft Access does NOT show the leading zero in MM, so we must add a compound WHERE clause to get months without the leading zeros:

```
/* *** SQL-Query-MI-F-Access-B *** */

SELECT ShipmentID, ShipperName, ShipperInvoiceNumber, ArrivalDate
FROM SHIPMENT
WHERE DepartureDate LIKE '???10*'
OR DepartureDate LIKE '??10*';
```

ShipmentID	ShipperName	ShipperInvoiceNumber	ArrivalDate
1	ABC Trans-Oceanic	2008651	3/15/2011
2	ABC Trans-Oceanic	2009012	3/20/2011
5	Worldwide	84899440	7/28/2011

G. Determine the maximum and minimum InsuredValue.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-G *** */

SELECT MAX (InsuredValue) AS MaxInsuredValue,
MIN (InsuredValue) AS MinInsuredValue,
FROM SHIPMENT;
```

MaxInsuredValue	MinInsuredValue
\$25,000.00	\$12,000.00

H. Determine the average InsuredValue.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-H *** */  
  
SELECT    AVG (InsuredValue) AS AvgInsuredValue  
FROM      SHIPMENT;
```

AvgInsuredValue
\$17,916.67

I. Count the number of shipments.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-I *** */  
  
SELECT    COUNT (*) AS NumberOfShipments  
FROM      SHIPMENT;
```

NumberOfShipments
1

J. Show ItemID, Description, Store, and a calculated column named StdCurrencyAmount that is equal to LocalCurrencyAmt times the ExchangeRate for all rows of ITEM.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-J *** */  
  
SELECT    Item, Store,  
          LocalCurrencyAmt * ExchangeRate AS StdCurrencyAmount  
FROM      ITEM;
```

Description	Store	StdCurrencyAmount
QE Dining Set	Eastern Treasures	7156.4047
Willow Serving Dishes	Jade Antiques	60.2106
Large Bureau	Eastern Sales	1180.6
Brass Lamps	Jade Antiques	29.515

K. Group item purchases by City and Store.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-K *** */
```

```
SELECT      City, Store
FROM        ITEM
GROUP BY    City, Store;
```

City	Store
Manila	Eastern Treasures
Singapore	Eastern Sales
Singapore	Jade Antiques

L. Count the number of purchases having each combination of City and Store.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```
/* *** SQL-Query-MI-L *** */
```

```
SELECT      City, Store
            COUNT (*) AS City_Store_Combination_Count
FROM        ITEM
GROUP BY    City, Store;
```

City	Store	City_Store_Combination_Count
Manila	Eastern Treasures	1
Singapore	Eastern Sales	1
Singapore	Jade Antiques	2

- M. Show the ShipperName and DepartureDate of all shipments that have an item with a value of 1000 or more. Use a subquery. Present results sorted by ShipperName in ascending order and then DepartureDate in descending order.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MI-M *** */

SELECT    ShipperName, DepartureDate
FROM      SHIPMENT
WHERE     ShipmentID IN
         (SELECT ShipmentID
          FROM   SHIPMENT_ITEM
          WHERE  Value = 1000
               OR Value > 1000)
ORDER BY  ShipperName, DepartureDate DESC;
    
```

ShipperName	DepartureDate
International	6/2/2011
Worldwide	5/5/2011

- N. Show the ShipperName and DepartureDate of all shipments that have an item with a value of 1000 or more. Use a join. Present results sorted by ShipperName in ascending order and then DepartureDate in descending order.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

This question is a little more complicated than it appears. Note how the following three queries determine that there are actually only two shipments that meet the criteria.

```

/* *** SQL-Query-MI-N-A *** */

SELECT    ShipperName, DepartureDate
FROM      SHIPMENT, SHIPMENT_ITEM
WHERE     SHIPMENT.ShipmentID = SHIPMENT_ITEM.ShipmentID
         AND (Value = 1000 OR Value > 1000)
ORDER BY  ShipperName, DepartureDate DESC;
    
```

ShipperName	DepartureDate
International	6/2/2011
International	6/2/2011
International	6/2/2011
Worldwide	5/5/2011

We'll add some more details to confirm the fact that the three lines for International are actually only one shipment. Note that we can use the *greater than or equal to* operator `>=` to simplify the WHERE clause:

```

/* *** SQL-Query-MI-N-B *** */

SELECT  SHIPMENT.ShipmentID, ShipmentItemID, Description,
        ShipperName, DepartureDate
FROM    SHIPMENT, SHIPMENT_ITEM, ITEM
WHERE   SHIPMENT.ShipmentID = SHIPMENT_ITEM.ShipmentID
        AND SHIPMENT_ITEM.ItemID = ITEM.ItemID
        AND Value >= 1000
ORDER BY ShipperName, DepartureDate DESC;
    
```

ShipmentID	ShipmentItemID	Description	ShipperName	DepartureDate
4	1	Brass Lamps	International	6/2/2011
4	2	Large Bureau	International	6/2/2011
4	3	Willow Serving Dishes	International	6/2/2011
3	1	QE Dining Set	Worldwide	5/5/2011

Now that we can see that all three lines for International are for ShipmentID 4, we'll get the proper results from the revised query by adding the DISTINCT keyword:

```

/* *** SQL-Query-MI-N-C *** */

SELECT  DISTINCT ShipperName, DepartureDate
FROM    SHIPMENT, SHIPMENT_ITEM
WHERE   SHIPMENT.ShipmentID = SHIPMENT_ITEM.ShipmentID
        AND Value >= 1000
ORDER BY ShipperName, DepartureDate DESC;
    
```

ShipperName	DepartureDate
International	6/2/2011
Worldwide	5/5/2011

- O. Show the ShipperName and DepartureDate of all shipments that have an item that was purchased in Singapore. Use a subquery. Present results sorted by ShipperName in ascending order and then DepartureDate in descending order.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MI-O *** */

SELECT  ShipperName, DepartureDate
FROM    SHIPMENT
WHERE   ShipmentID IN
        (SELECT  ShipmentID
         FROM    SHIPMENT_ITEM
         WHERE   ItemID IN
                (SELECT  ItemID
                 FROM    ITEM
                 WHERE   City = 'Singapore'))
ORDER BY ShipperName, DepartureDate DESC;

```

ShipperName	DepartureDate
International	6/2/2011

- P. Show the ShipperName and DepartureDate of all shipments that have an item that was purchased in Singapore. Use a join. Present results sorted by ShipperName in ascending order and then DepartureDate in descending order.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor’s Resource Center on the text’s Web site (www.pearsonhighered.com/kroenke).

As in question N, we will have to use a DISTINCT keyword to get the appropriate answer.

```

/* *** SQL-Query-MI-P *** */

SELECT  DISTINCT ShipperName, DepartureDate
FROM    SHIPMENT, SHIPMENT_ITEM, ITEM
WHERE   SHIPMENT.ShipmentID = SHIPMENT_ITEM.ShipmentID
        AND SHIPMENT_ITEM.ItemID = ITEM.ItemID
        AND City = 'Singapore'
ORDER BY ShipperName, DepartureDate DESC;

```

ShipperName	DepartureDate
International	6/2/2011

Q. Show the ShipperName, DepartureDate of shipment, and Value for items that were purchased in Singapore. Use a combination of a join and a subquery. Present results sorted by ShipperName in ascending order and then DepartureDate in descending order.

Solutions to Morgan Importing questions are contained in the Microsoft Access database *DBP-e12-IM-CH02-MI.accdb* which is available in the Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke).

```

/* *** SQL-Query-MI-Q *** */

SELECT  ShipperName, DepartureDate, Value
FROM    SHIPMENT, SHIPMENT_ITEM
WHERE   SHIPMENT.ShipmentID = SHIPMENT_ITEM.ShipmentID
        AND ItemID IN
        (SELECT ItemID
         FROM   ITEM
         WHERE  City = 'Singapore')
ORDER BY ShipperName, DepartureDate DESC;

```

ShipperName	DepartureDate	Value
International	6/2/2011	\$1,200.00
International	6/2/2011	\$9,500.00
International	6/2/2011	\$4,500.00

Record: 1 of 3 | No Filter | Search