
INSTRUCTOR’S MANUAL TO ACCOMPANY

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Database Processing

Fundamentals, Design, and Implementation
13th Edition

CHAPTER ONE
INTRODUCTION
CHAPTER OBJECTIVES

- To understand the nature and characteristics of databases
- To survey some important and interesting database applications
- To gain a general understanding of tables and relationships
- To describe the components of a Microsoft Access database system and explain the functions they perform
- To describe the components of an enterprise-class database system and explain the functions they perform
- To define the term database management system (DBMS) and describe the functions of a DBMS
- To define the term database and describe what is contained within the database
- To define the term metadata and provide examples of metadata
- To define and understand database design from existing data
- To define and understand database design as new systems development
- To define and understand database design in database redesign
- To understand the history and development of database processing

ERRATA

- Page 19. [6-NOV-2013] The first line of the second complete paragraph repeats the word “have” The corrected text is:

  Note that we have just given a second meaning ...

TEACHING SUGGESTIONS

- A basic knowledge of Microsoft Access is necessary for this chapter—particularly for the Project Questions at the end of the chapter. If your students need an introduction to Microsoft Access, either teach or have them work through Appendix A – Getting Started with Microsoft Access 2013.
- Introduce the course by explaining the basic characteristics of a database and that database processing is the heart of all applications today.
- Use the Microsoft Access database shown in Figures 1-3 and 1-4 to discuss the basic characteristics of a database. A copy of this database is available as the database DBP-e13-IM-CH01-Student-Class-Grade.accdb,
• Use the examples in Database Examples section to discuss the types of database uses from single-user applications to complex e-commerce applications. The demand for knowledgeable people (both users and technicians) still exists. The knowledge gained in this course will be valuable at job-hunting time. Internet technology has tremendously amplified the need for database knowledge – that technology can be used inside organizations as well as outside for e-commerce applications. The dot-com bust has not had much of a depressing effect on the demand for database expertise.

• Make sure students understand the difference between the components of a Microsoft Access database system and the components of an enterprise-class database system such as one based on SQL Server 2012, Oracle Database 11g Release 2, or MySQL 5.6. Use Figures 1-6, 1-7, 1-15 and 1-16 which are also in the PowerPoint presentation for this chapter.

• Make sure students understand the difference between the database and the DBMS.

• The book is structured around the three types of database design. Be sure your students understand these three types of design problems, and relate them to future chapters. You can use Figure 1-18 (also in the PowerPoint presentation) to illustrate this part of your lecture.

• This is a good place to start separating the concepts of design and the concepts of implementation. The history of most students is that they spend about 10% of their time in design and 90% in implementation and testing (debugging). Now is the time to convince them that about 75% of their time should be spent in database design and 25% in implementation. History tells us that systems do not fail because of implementation, they fail because of poor design.

• Cover the section on What You Need to Learn to give your students a good perspective on the roles they may have in working with databases. Use Figure 1-24 (also in the PowerPoint presentation) to tie these roles to the content of the book, emphasizing those chapters you will be teaching if you are not covering the entire book.

• Cover the section on A Brief History of Database Processing to help students understand the historical context of today’s DBMSs.
ANSWERS TO REVIEW QUESTIONS

1.1 What is the purpose of a database?
The purpose of a database is to help people keep track of things.

1.2 What is the most commonly used type of database?
The relational database is the most commonly used type of database.

1.3 Give an example of two related tables other than one in this book. Use the STUDENT and GRADE tables in Figure 1-1 as an example pattern for your tables. Name the tables and columns using the conventions in this book.

This problem calls for only two tables, not three. Your student’s answers will vary as each creates his or her own example.

One example is a database to record membership information for a club or association. The two tables will be MEMBER, which records information about the person who is a member of the club or association, and PAYMENT, which records annual dues paid by the members over the years.

The two tables to be created are:

MEMBER (MemberNumber, MemberFirstName, MemberLastName, EmailAddress)

and

EMPLOYEE (PaymentNumber, MemberNumber, PaymentDate, PaymentAmount)

A screen shot of the database as created in Access is shown below and on the next page.
1.4 For the tables you created in Review Question 1.3., what are the primary keys of each table? Do you think that any of these primary keys could be surrogate keys?

Your student’s answers will vary as each creates his or her own example.

In the example above, the primary key of MEMBER is MemberNumber, and the primary key of payment is PaymentNumber.

Both of these keys can be surrogate keys, and in the tables as shown they are surrogate keys starting at 1 and incrementing by 1.

1.5 Explain how the two tables you provided in question 1.3 are related. Which table contains the foreign key, and what is the foreign key?

Your student’s answers will vary as each creates his or her own example.

In the example above, the tables MEMBER and PAYMENT are related by the field MemberNumber. This field is a unique identifier, or primary key, in MEMBER, and serves as a non-unique identifier or foreign key in PAYMENT where it is identified by which row in MEMBER is associated with that specific row in PAYMENT. One row in MEMBER can be associated with many rows in PAYMENT, since each MEMBER pays dues each year. This is shown in the Relationships window in the screen shot above.

1.6 Show your two tables from question 1.3 without the columns that represent the relationships. Explain how the value of your two tables is diminished without the relationships.

The revised tables are shown in the screen shots below.

Without the MemberNumber column in PAYMENT, it is impossible to determine who made which payment. Therefore we do not know which MEMBERs have paid their annual dues in the various years.
1.7 Define the terms data and information. Explain how the two terms differ.

Data are facts and figures. Information is defined as knowledge derived from data, or as data presented in a meaningful context. Data is simply recorded in the database, but the data must be manipulated in some way to produce information.

1.8 Give an example of information that could be determined using the two tables you provided in your answer to question 1.3.

Your student’s answers will vary as each creates his or her own example.

In the example above, information that could be determined from the membership database would include:

- Who is a current member of the club or association?
- Who was a member in previous years, but has not paid his or her dues this year?
- Who has been a member of the association for every year of the club or association’s existence?

1.9 Give an example of a single-user database application and a multiuser database application other than ones shown in Figure 1-5.

Your student’s answers will vary as each creates his or her own example.

The membership database discussed in 1.3-1.6 and 1.8 will probably be a single-user database.

A database used in a Video/DVD rental store that is used by several employees is a good example of a multiuser database.

1.10 What problem can occur when a database is processed by more than one user?

When a database is processed by more than one user, there is a chance that one user’s work may interfere with the work of another user. This problem is discussed in detail in Chapter 9 — Managing Multiuser Databases.

1.11 Give an example of a database application that has hundreds of users and a very large and complicated database. Use an example other than one in Figure 1-5.

A collegiate administration system, such as one composed of modules offered by SunGard Higher Education in use at a large university is an example of a multiuser database application with hundreds of users and a very large, complicated database.

1.12 What is the purpose of the largest databases used by e-commerce companies such as Amazon.com?

The largest databases used by e-commerce companies are Web-activity databases used to track customer behavior.
1.13 How do the e-commerce companies use these databases?

The e-commerce companies’ Web-activity databases are used to determine which Web page items are popular and successful, and to test if certain variations in Web page design will generate more orders.

1.14 How do digital dashboard and data mining applications differ from transaction processing applications?

Digital dashboard and data mining applications do not generate new data, but instead are used to summarize existing data to provide information to management.

1.15 Explain why a small database is not necessarily simpler than a large one.

While small databases vary from large databases in terms of the amount of data they store, they can still have the same structures and components (types of data, number of tables, and complexity of data relationships) as a large database. A small database is not necessarily a simple database.

1.16 Explain the components in Figure 1-7.

Figure 1-7 shows the components in a database system with SQL. The components are:

- Users – The people who interact with database applications.
- Database applications – These consist of Data Entry Forms, Reports and Queries that are used by the users as their means of interacting with the database.
- Structured Query Language (SQL) – The universal language used to communicate with DBMS products.
- DBMS – The program that creates, processes and administers databases.
- Database – Where the data and metadata are stored.
1.17 What are the functions of application programs?

As shown in Figure 1-8, the functions are:

- Create and process forms
- Process end user queries
- Create and process reports
- Execute application logic
- Control the application

1.18 What is Structured Query Language (SQL), and why is it important?

Structured Query Language (SQL) is an internationally recognized standard language used and understood by all commercial database management systems. SQL will be covered in-depth in Chapter 2 and Chapter 7.

1.19 What does DBMS stand for?

DBMS stands for database management system.

1.20 What is the function of the DBMS?

A DBMS creates, processes and administers databases under the control of the DBMS.

1.21 Name three vendors of DBMS products.

Three vendors of DBMS products are Microsoft (Microsoft Access and SQL Server), Oracle Corporation (Oracle Database and MySQL), and IBM (DB2).

1.22 Define the term database.

A database is a self-describing collection of integrated tables, which means that the tables store both data and the relationships between the data.

1.23 Why is a database considered to be self-describing?

A database is considered to be self-describing because it contains a description of itself—such as what tables are in the database, which columns are in each table and what kind of data is stored in each column.

1.24 What is metadata? How does this term pertain to a database?

Metadata is data about data. Metadata in databases allow them to be self-describing.

1.25 What advantage is there in storing metadata in tables?

The advantage of storing metadata in tables is that we can query the metadata to determine the structure of the database—for example, what tables, columns, indexes and data types exist in the database.
1.26 List the components of a database other than user tables and metadata.

The components of a database in addition to user tables and metadata are:

- Indexes;
- Stored procedures;
- Triggers;
- Security data; and
- Backup/recovery data.

1.27 Is Microsoft Access a DBMS? Why or why not?

It is more appropriate to say that while Microsoft Access contains a DBMS, it is not just a DBMS—it combines a DBMS and an application generator.

1.28 Explain the components in Figure 1-15.

Figure 1-15 shows the components in a database system as created by Microsoft Access. The components are:

- Users – The people who interact with database applications created in MS Access.
- Database applications – These consist of Data Entry Forms, Reports and Queries that are used by the users as their means of interacting with the database.
- Microsoft Access – Access actually contains several components that are hidden from the user to simplify the user’s experience when using Access—See the discussion below.
- Database – Each MS Access database application is typically run against one MS Access created and maintained database.

MS Access actually consists of an application generator (which is shown as the form-processing application, the report-generator application and query-processing application in Figure 1-15) and...
a DBMS (database management system). SQL (Structured Query Language) forms the basis for communication between the application generator and the DBMS.

1.29 **What is the function of the application generator in Microsoft Access?**

The function of the application generator in Microsoft Access is to create and manage forms, reports and queries.

1.30 **What is the name of the DBMS engine within Microsoft Access? Why do we rarely hear about that engine?**

The name of the current Microsoft Access DBMS engine is the **Access Database Engine (ADE)**, which is a Microsoft Office specific version of the Microsoft **Joint Engine Technology (JET or Jet)** database engine. We rarely hear about ADE or Jet because they are not sold as separate products.

1.31 **Why does Microsoft Access hide important database technology?**

Microsoft hides important database technology to make it easier for beginning users to create and work with small database applications and their underlying databases.

1.32 **Why would someone choose to replace the native Microsoft Access DBMS engine with SQL Server?**

We would replace the Microsoft Access ADE DBMS engine with MS SQL Server if we needed to use a large database or if we needed advanced functions and features of SQL Server not found in ADE (although not stated in Chapter 1, these features include stored procedures and triggers which are discussed in Chapters 7, 10, 10A, 10B and 10C).

1.33 **Name the components of an enterprise-class database system.**

The four components of an enterprise-class database system are:

- **Users** – The people who interact with database applications.
- **Database applications** – These are the programs or applications that the users actually use as an interface to the underlying databases.
- **The DBMS** – The DBMS creates, processes and administers databases.
- **Databases** – Each database application is run against one or more DBMS created and maintained database.

1.34 **Name and explain the four categories of database applications that would use an enterprise-class database system.**

The four categories of database applications are:

- **Client/Server applications** – Client software on the user’s computer connects over a network to a database on a database server.
- **E-Commerce Web-based applications** – The user uses a Web browser (such as MS Internet Explorer, Google Chrome or Mozilla Firefox) as a client to connect to a database on a database server.
- **Reporting applications** – The user uses a Web browser (such as MS Internet Explorer, Google Chrome, or Mozilla Firefox) as a client to connect to a Web Portal or similar Web site, which then connects to a database on a database server.
• XML Web Services applications – The user uses a Web browser (such as Microsoft Internet Explorer, Google Chrome, or Mozilla Firefox,) as a client to connect to Web pages that connect to XML-based Web service servers, which then connect to databases on a database servers.

1.35 How do database applications get and put database data?
All database applications get and put database data by sending SQL statements to a DBMS.

1.36 Name the five DBMS products described in this chapter, and compare in terms of power, features, and ease of use.
The five DBMS products described in this chapter are:
• Microsoft’s Access 2013
• Microsoft’s SQL Server 2012
• Oracle Corporation’s Oracle Database 11g release 2
• Oracle Corporation’s MySQL 5.6, and
• IBM’s DB2.
Microsoft Access is by far the easiest to use, but is also the least powerful and has the least features—it is intended as a simple database for beginning database users. MySQL, SQL Server, DB2 and Oracle Database are all powerful commercial products with advanced features, but they are also more difficult to use. Difficulty of use seems to be a function of increasing power and features.

Ranked from least powerful to most powerful we have: MySQL, SQL Server, DB2 and Oracle Database.

Ranked from fewest features to most features we have: MySQL, SQL Server, DB2 and Oracle Database.

Ranked from easiest to use to most difficult to use we have: MySQL, SQL Server, DB2 and Oracle Database.

1.37 List several consequences of a poorly designed database.
Poorly designed databases have poor performance. As a result, the databases may require application developers to write overly complex SQL statements, or they may be difficult to revise and adapt to changing circumstances, or they may fail in some other manner.

1.38 Explain two ways that a database can be designed from existing data.
A database can be designed from existing data by:
• Using data from non-database sources such as spreadsheets and text files, or
• Using data extracts from existing databases.
1.39 **What is a data warehouse? What is a data mart?**

A data warehouse is a database that uses data extracted from operational systems such as CRM or ERP applications for study and analysis (non-operational) purposes. A data mart is a smaller, usually more subject specific, version of a data warehouse.

1.40 **Describe the general process for designing a database for a new information system.**

To design a database for a new information system:

- System requirements are generated from forms, reports, user requirement statements, use cases and other systems development documents.
- A data model is created.
- The data model is transformed into a database design.
- The database design is implemented in a DBMS as a database.

1.41 **Explain two ways that databases can be redesigned.**

A database can be redesigned from existing data by:

- Adopting an existing database to updated database requirements; or
- Integrating two or more existing databases.

1.42 **What does the term database migration mean?**

Database migration is a term used to describe the process of redesigning an existing database to meet new or changing database requirements. In this process:

- Tables may be created, modified or deleted.
- Relationships may be altered.
- Data constraints may be changed.
- Other changes may be made as needed.

1.43 **Summarize the various ways that you might work with database technology.**

You might work with database technology as a user (also called a knowledge worker), as an application programmer, or as a database administrator.

1.44 **What job functions does a knowledge worker perform?**

A knowledge worker prepares reports, does data mining, and performs other types of data analysis.

1.45 **What job functions does a database administrator perform?**

A database administrator designs, constructs and manages databases.

1.46 **Explain the meaning of the domains in Figure 1-23.**

Figure 1-23 shows the working domains of knowledge workers, programmers and database administrators. Knowledge workers interact with applications created by programmers, while database administrators work with the DBMS and the databases created and maintained by the DBMS. SQL is the bridge that connects applications to the DBMS.
1.47 What need drove the development of the first database technology?
The development of the first database technology was driven by the need for data integration. In
the early days of computer technology, data was stored in separate files, and users needed the
ability to relate the data in one file to the data in another file.

1.48 What are Data Language/I and CODASYL DBTG?
Data Language/I (DL/I) was an early method of using hierarchies or trees to represent data
relationships. IBM’s IMS product was based on this model.

The Database Task Group (DBTG) of the CODASAL committee created the alternative
CODASYL DBTG model, which used data structures called networks to represent data
relationships. The Cullinane Corporation’s IDMS product successfully implemented this model.

Both hierarchy/tree data structures and network data structures are discussed in Appendix H.

1.49 Who was E.F. Codd?
Edgar F. “Ted” Codd was an IBM engineer who created the mathematical theory of relational
databases (and the process of normalization, which is discussed in Chapter 3).

1.50 What were the early objections to the relational model?
Early objections: (1) too theoretical for practical implementation, (2) too slow, and (3) so much
storage required that the model would never be useful in the commercial world.

1.51 Name two early relational DBMS products.
Two early relational DBMS products were IBM’s DB2 and Oracle Corporation’s Oracle (now
called Oracle Database). Current versions of both products are still major DBMS products today.

1.52 What are some of the reasons for the success of Oracle Database?
Oracle is successful because (1) it will run on many operating systems, (2) it has an elegant and
efficient design, and (3) the Oracle Corporation was excellent at sales and marketing.

1.53 Name three early personal computer DBMS products.
Three early personal computer DBMS products were dBase, R:base and Paradox.

1.54 What happened to the products in your answer to question 1.53?
In 1991 Microsoft Access was introduced at such a low price point ($99.00) that the other
vendors could not compete.
1.55 What was the purpose of OODBMS products? Describe two reasons that OODBMS products were not successful.

The purpose of object-oriented DBMS (OODBMS) products is to easily store data encapsulated in object-oriented programming (OOP) objects.

OODBMS products were not successful because of (1) the costs of converting data stored in a relational format to an object-oriented format, and (2) the lack of a substantial advantage of OODBMS products over relational DBMS products for commercial data processing.

1.56 What characteristic of HTTP was a problem for some database processing applications?

HTTP is a stateless protocol, which means that network connections between an HTTP client and server are not maintained. Many database interactions are multistage and require a continuous connection between the client and server.

1.57 What is an open source DBMS product? Which of the five DBMS products that you named in answering Review Question 1.36 is historically an open source DBMS product?

The source code of open source DBMS products are generally made widely available so that a group of programmers not working for a single company can help develop the product. The DBMS is then made available in some format for free download and use. MySQL is an open source DBMS product.

1.58 What has been the response of companies that sell proprietary DBMS products to the open source DBMS products? Include two examples in your answer.

The response of companies that sell proprietary DBMS process has been to offer freely downloadable limited editions of their main products. Two examples are Microsoft’s SQL Server 2012 Express (www.microsoft.com/express/Database/) and Oracle’s Oracle Database 11g Release 2 Express Edition (www.oracle.com/technology/products/database/xe/index.html).

1.59 What is XML? What comment did Bill Gates make regarding XML?

XML is a variant of HTML designed to overcome problems inherent in the use of HTML to exchange business documents. Bill Gates said that “XML is the lingua-franca of the Internet Age.”

1.60 What is the NoSQL movement? Name two applications that rely on NoSQL databases.

The NoSQL movement is really a “no relational database” movement, because it advocates a database design different than the relational mode. Facebook and Twitter use NoSQL databases.
ANSWERS TO PROJECT QUESTIONS

To perform the following projects you will need a computer that has Microsoft Access installed. If you have no experience working with Access, read Appendix A before you proceed.

For this set of project questions, we will create 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 (for example, computer equipment), and other aspects of company operations.

In the following project questions, we will start by creating the WPC.accdb database with the following two tables:

DEPARTMENT (DepartmentName, BudgetCode, OfficeNumber, Phone)

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

1.61  Create a Microsoft Access database named WPC.accdb.

The database is created as described in Appendix A. The two tables to be created are:

DEPARTMENT (DepartmentName, BudgetCode, OfficeNumber, Phone)

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

where an underlined column name indicates the table key (primary key) of the table, and an italicized column indicates a foreign key linking two tables.
Figure 1-26 shows the column characteristics for the WPC DEPARTMENT table. Using the column characteristics, create the DEPARTMENT table in the WPC.accdb database.

DEPARTMENT

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Type</th>
<th>Key</th>
<th>Required</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>DepartmentName</td>
<td>Text (35)</td>
<td>Primary Key</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>BudgetCode</td>
<td>Text (30)</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>OfficeNumber</td>
<td>Text (15)</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Text (12)</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.
1.63  Figure 1-27 shows the data for the WPC DEPARTMENT table. Using Datasheet view, enter the data shown in Figure 1-27 into your DEPARTMENT table.

<table>
<thead>
<tr>
<th>DepartmentName</th>
<th>BudgetCode</th>
<th>OfficeNumber</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>BC-100-10</td>
<td>BLDG01-300</td>
<td>360-285-8100</td>
</tr>
<tr>
<td>Legal</td>
<td>BC-200-10</td>
<td>BLDG01-200</td>
<td>360-285-8200</td>
</tr>
<tr>
<td>Accounting</td>
<td>BC-300-10</td>
<td>BLDG01-100</td>
<td>360-285-8300</td>
</tr>
<tr>
<td>Finance</td>
<td>BC-400-10</td>
<td>BLDG01-140</td>
<td>360-285-8400</td>
</tr>
<tr>
<td>Human Resources</td>
<td>BC-500-10</td>
<td>BLDG01-180</td>
<td>360-285-8500</td>
</tr>
<tr>
<td>Production</td>
<td>BC-600-10</td>
<td>BLDG02-100</td>
<td>360-287-8600</td>
</tr>
<tr>
<td>Marketing</td>
<td>BC-700-10</td>
<td>BLDG02-200</td>
<td>360-287-8700</td>
</tr>
<tr>
<td>InfoSystems</td>
<td>BC-800-10</td>
<td>BLDG02-270</td>
<td>360-287-8800</td>
</tr>
</tbody>
</table>

![Datasheet view of the DEPARTMENT table](image_url)
1.64 *Figure 1-28 shows the column characteristics for the WPC EMPLOYEE table. Using the column characteristics, create the EMPLOYEE table in the WPC.accdb database.*

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Type</th>
<th>Key</th>
<th>Required</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>EmployeeNumber</td>
<td>AutoNumber</td>
<td>Primary Key</td>
<td>Yes</td>
<td>Surrogate Key</td>
</tr>
<tr>
<td>FirstName</td>
<td>Text (25)</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>LastName</td>
<td>Text (25)</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Department</td>
<td>Text (35)</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>Text (12)</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td>Text (100)</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 1-28: EMPLOYEE table characteristics.*

Field Name | Data Type | Description (Optional)
---|-----------|-------------------------
EmployeeNumber | AutoNumber | Long Integer Increment General
FirstName | Short Text | Yes (No Duplicates)
LastName | Short Text | Yes (No Duplicates)
Department | Short Text |
Phone | Short Text |
Email | Short Text |

Field Properties:
- **General**
  - Field Size: Long Integer
  - New Values: Increment
  - Format
  - Caption
  - Indexed: Yes (No Duplicates)
  - Text Align: General

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.
1.65 Create the relationship and referential integrity constraint between DEPARTMENT and EMPLOYEE. Enable enforcing of referential integrity and cascading of data updates, but do not enable cascading of data from deleted records.
1.66 Figure 1-29 shows the data for the WPC EMPLOYEE table. Using Datasheet view, enter the first three rows of the data shown in Figure 1-29 into your EMPLOYEE table.

<table>
<thead>
<tr>
<th>EmployeeNumber</th>
<th>FirstName</th>
<th>LastName</th>
<th>Department</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>[AutoNumber]</td>
<td>Mary</td>
<td>Jacobs</td>
<td>Administration</td>
<td>360-285-8110</td>
<td><a href="mailto:Mary.Jacobs@WPC.com">Mary.Jacobs@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Rosalie</td>
<td>Jackson</td>
<td>Administration</td>
<td>360-285-8120</td>
<td><a href="mailto:Rosalie.Jackson@WPC.com">Rosalie.Jackson@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Richard</td>
<td>Bandalone</td>
<td>Legal</td>
<td>360-285-8210</td>
<td><a href="mailto:Richard.Bandalone@WPC.com">Richard.Bandalone@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Tom</td>
<td>Caruthers</td>
<td>Accounting</td>
<td>360-285-8310</td>
<td><a href="mailto:Tom.Caruthers@WPC.com">Tom.Caruthers@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Heather</td>
<td>Jones</td>
<td>Accounting</td>
<td>360-285-8320</td>
<td><a href="mailto:Heather.Jones@WPC.com">Heather.Jones@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Mary</td>
<td>Abernathy</td>
<td>Finance</td>
<td>360-285-8410</td>
<td><a href="mailto:Mary.Abernathy@WPC.com">Mary.Abernathy@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>George</td>
<td>Smith</td>
<td>Human Resources</td>
<td>360-285-8510</td>
<td><a href="mailto:George.Smith@WPC.com">George.Smith@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Tom</td>
<td>Jackson</td>
<td>Production</td>
<td>360-287-8610</td>
<td><a href="mailto:Tom.Jackson@WPC.com">Tom.Jackson@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>George</td>
<td>Jones</td>
<td>Production</td>
<td>360-287-8620</td>
<td><a href="mailto:George.Jones@WPC.com">George.Jones@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Ken</td>
<td>Numoto</td>
<td>Marketing</td>
<td>360-287-8710</td>
<td><a href="mailto:Ken.Numoto@WPC.com">Ken.Numoto@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>James</td>
<td>Nestor</td>
<td>InfoSystems</td>
<td></td>
<td><a href="mailto:James.Nestor@WPC.com">James.Nestor@WPC.com</a></td>
</tr>
<tr>
<td>[AutoNumber]</td>
<td>Rick</td>
<td>Brown</td>
<td>InfoSystems</td>
<td>360-287-8820</td>
<td><a href="mailto:Rick.Brown@WPC.com">Rick.Brown@WPC.com</a></td>
</tr>
</tbody>
</table>
1.67 Using the Microsoft Access form wizard, create a data input form for the EMPLOYEE table and name it WPC Employee Data Form. Make any adjustments necessary to the form so that all data display properly. Use this form to enter the rest of the data in the EMPLOYEE table shown in Figure 1-29 into your EMPLOYEE table.
Using the Access report wizard, create a report named Wedgewood Pacific Corporation Employee Report that presents the data contained in your EMPLOYEE table sorted first by employee last name and then by employee first name. Make any adjustments necessary to the report so that all headings and data display properly. Print a copy of this report.

To produce the report as shown below, some work in the Report Design view is necessary—take the time to show your students how to modify report formats in Report Design view.

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Employee Number</th>
<th>Department</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abernathy</td>
<td>Mary</td>
<td>6</td>
<td>Finance</td>
<td>360-285-8410</td>
<td><a href="mailto:Mary.Abernathy@WPC.com">Mary.Abernathy@WPC.com</a></td>
</tr>
<tr>
<td>Bandalone</td>
<td>Richard</td>
<td>3</td>
<td>Legal</td>
<td>360-285-8210</td>
<td><a href="mailto:Richard.Bandalone@WPC.com">Richard.Bandalone@WPC.com</a></td>
</tr>
<tr>
<td>Brown</td>
<td>Rick</td>
<td>12</td>
<td>InfoSystems</td>
<td>360-287-8820</td>
<td><a href="mailto:Rick.Brown@WPC.com">Rick.Brown@WPC.com</a></td>
</tr>
<tr>
<td>Caruthers</td>
<td>Tom</td>
<td>4</td>
<td>Accounting</td>
<td>360-285-8010</td>
<td><a href="mailto:Tom.Caruthers@WPC.com">Tom.Caruthers@WPC.com</a></td>
</tr>
<tr>
<td>Jackson</td>
<td>Rosalia</td>
<td>2</td>
<td>Administration</td>
<td>360-285-8120</td>
<td><a href="mailto:Rosalia.Jackson@WPC.com">Rosalia.Jackson@WPC.com</a></td>
</tr>
<tr>
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<td><a href="mailto:Tom.Jackson@WPC.com">Tom.Jackson@WPC.com</a></td>
</tr>
<tr>
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<td>Administration</td>
<td>360-285-8110</td>
<td><a href="mailto:Mary.Jacobs@WPC.com">Mary.Jacobs@WPC.com</a></td>
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<tr>
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<td>George</td>
<td>9</td>
<td>Production</td>
<td>360-287-8620</td>
<td><a href="mailto:George.Jones@WPC.com">George.Jones@WPC.com</a></td>
</tr>
<tr>
<td>Jones</td>
<td>Heather</td>
<td>5</td>
<td>Finance</td>
<td>360-285-8420</td>
<td><a href="mailto:Heather.Jones@WPC.com">Heather.Jones@WPC.com</a></td>
</tr>
<tr>
<td>Nestor</td>
<td>James</td>
<td>11</td>
<td>InfoSystems</td>
<td></td>
<td><a href="mailto:James.Nestor@WPC.com">James.Nestor@WPC.com</a></td>
</tr>
<tr>
<td>Numoto</td>
<td>Ken</td>
<td>10</td>
<td>Marketing</td>
<td>360-287-8710</td>
<td><a href="mailto:Ken.Numoto@WPC.com">Ken.Numoto@WPC.com</a></td>
</tr>
<tr>
<td>Smith</td>
<td>George</td>
<td>7</td>
<td>Human Resources</td>
<td>360-285-8010</td>
<td><a href="mailto:George.Smith@WPC.com">George.Smith@WPC.com</a></td>
</tr>
</tbody>
</table>
1.69 Using the Microsoft Access form wizard, create a form that has all of the data from both tables. When asked how you want to view your data, select by DEPARTMENT. Choose the default options for other questions that the wizard asks. Open your form and page through your departments.

To produce the report as shown below, some work in the Form Design view is necessary—take the time to show your students how to modify report formats in Form Design view.
1.70 Using the Microsoft Access report wizard, create a report that has all of the data from both tables. When asked how you want to view your data, select by DEPARTMENT. For the data contained in your EMPLOYEE table in the report, specify that it will be sorted first by employee last name and then by employee first name. Make any adjustments necessary to the report so that all headings and data display properly. Print a copy of this report.

To produce the report as shown below, some work in the Report Design view is necessary—take the time to show your students how to modify report formats in Report Design view.

<table>
<thead>
<tr>
<th>Department Name</th>
<th>Budget Code</th>
<th>Office Number</th>
<th>Phone</th>
<th>Last Name</th>
<th>First Name</th>
<th>Employee Number</th>
<th>Phone</th>
<th>Email</th>
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</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>BC-300-10</td>
<td>BLDG01-100</td>
<td>360-285-8300</td>
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<td>Tom</td>
<td>4</td>
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<td><a href="mailto:Tom.Caruthers@WPC.com">Tom.Caruthers@WPC.com</a></td>
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<td>BC-100-10</td>
<td>BLDG01-300</td>
<td>360-285-8100</td>
<td>Jackson</td>
<td>Rosalie</td>
<td>2</td>
<td>360-285-8120</td>
<td><a href="mailto:Rosalie.Jackson@WPC.com">Rosalie.Jackson@WPC.com</a></td>
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<tr>
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<td>360-285-8500</td>
<td>Abernathy</td>
<td>Mary</td>
<td>6</td>
<td>360-285-9410</td>
<td><a href="mailto:Mary.Abernathy@WPC.com">Mary.Abernathy@WPC.com</a></td>
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<tr>
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<td>BLDG02-270</td>
<td>360-287-8800</td>
<td>Smith</td>
<td>George</td>
<td>7</td>
<td>360-285-8100</td>
<td><a href="mailto:George.Smith@WPC.com">George.Smith@WPC.com</a></td>
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<tr>
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<td>360-285-8200</td>
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<td>360-287-8700</td>
<td>Bandalone</td>
<td>Richard</td>
<td>3</td>
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<td><a href="mailto:Richard.Bandalone@WPC.com">Richard.Bandalone@WPC.com</a></td>
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<tr>
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<td>360-287-8000</td>
<td>Numoto</td>
<td>Ken</td>
<td>10</td>
<td>360-287-8710</td>
<td><a href="mailto:Ken.Numoto@WPC.com">Ken.Numoto@WPC.com</a></td>
</tr>
</tbody>
</table>

1.71 Explain, to the level of detail in this chapter, what is going on within Microsoft Access in Project Questions 1.67, 1.68, 1.69, and 1.70. What subcomponent created the form and report? Where is the data stored? What role do you think SQL is playing?

Access uses SQL SELECT statements to query the database tables for the data to be displayed in the forms and the report. The results of the query are stored in a temporary table created to hold this data, and this table is the source of the data displayed in the form and the report. SQL is used to gather the data needed for display in the form and report.