Database Processing 16th edition Kroenke Solutions Manual

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INSTRUCTOR'S MANUAL

TO ACCOMPANY

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DATABASE PROCESSING

Fundamentals, Design, and Implementation

16th Edition

Chapter 1

Introduction

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Instructor's Manual to accompany:

Database Processing: Fundamental, Design, and Implementation (16th Edition)

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❖ CHAPTER OBJECTIVES

- To understand the importance of databases in Internet Web applications and smartphone apps
- 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 redesign of an existing database
- To understand the history and development of database processing

❖ ERRATA

There are no known errors at this time. Any errors that are discovered in the future will be reported and corrected in the Online DBP e16 Errata document, which will be available at http://www.pearsonhighered.com/kroenke .

❖ 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 2019.
- Introduce the course by explaining the basic characteristics of a database and that database processing is the heart of all applications today, even for smartphones and tablets.
- Use the Microsoft Access database shown in Figures 1-4 and 1-5 to discuss the basic characteristics of a database. A copy of this database is available as the database DBP-e16-IM-CH01-Student-Class-Grade.accdb, which is available in the

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Instructor's Resource Center on the text's Web site (www.pearsonhighered.com/kroenke) if you want to use it in class.

- Use the examples in the Database Examples section (Figure 1-7) 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. New Web 2.0 applications, including social media, have created a strong demand for database developers.
- Make sure students understand the difference between the components of a Microsoft Access DBMS and the components of an enterprise-class DBMS such as SQL Server 2019, Oracle Database XE, or MySQL 8.0. Use Figures 1-8, 1-9, 1-17, and 1-19 which are also in the PowerPoint presentation for this chapter.
- Make sure students understand the difference between a database and the DBMS software that manages it.
- 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 1-23 (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 faulty 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 1-29 (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.

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❖ ANSWERS TO REVIEW QUESTIONS

1.1 Describe the historic development of Internet and smartphone technology from the early days of personal computers (PCs) to today's Internet Web application and smartphone app-based information systems environment.

In the late 70s and early 80s early personal computers became available that included the Apple II and the IBM PC. Xerox invented the Ethernet Local Area Network technology, allowing homes and businesses to share network resources inexpensively. The Internet grew out of work done at the government DARPA lab to create the first "network of networks." The Web and Web browsers became available in the early 90s that caused a dramatic increase in network use. Commercial sites proliferated, and users were able to easily create content using Web 2.0 features of Web sites. Cell phones became commercially available in the late 70s, and developed into a digital platform capable of transmitting data and connecting to the Web. These smartphones, which became widespread after the early 2000s, can now run applications that are downloaded from the net.

1.2 Why do today's Internet Web applications and smartphone apps need databases?

Many Web sites and smartphone apps connect to a database, usually residing on a server (although SQLite runs on smartphones). Popular e-commerce sites such as Amazon.com, and social media sites including Facebook and Twitter all use databases to store messages, pictures, videos, and other data. Some databases use non-SQL database technologies to store unstructured data and to improve query performance.

1.3 Read the description of the search process on the Pearson Web site. Using your own computer, find another retailer Web site (other than any of those discussed or mentioned in this chapter), and search for something of interest to you. Write up a description (with screen shots if possible) of your search.

Students can capture a screenshot by using the Print Screen (PrtScr) button, or by using the Snipping Tool (Start | Search) or another utility such as Screen Hunter. Using the L.L. Bean web site as an example, customers can enter items in the main Search box at the top center of the main screen, or use the category tabs. For example, Footwear. Then the Footwear screen appears, and customers can select types of footwear (Men's, then Boots), then filter by types of boots, and use different sort orders to obtain a listing by Recommended, Price, Rating, etc.

1.4 What is the purpose of a database?

The purpose of a database is to help people keep track of things.

1.5 What are the two categories of databases? What is the most commonly used type of database?

The two categories of DBMS are personal and enterprise-class. The relational database is the most commonly used type of database.

1.6 Give an example of two related tables other than one in this book. Use the STUDENT and GRADE tables in Figure 1-5 as an example pattern for your tables. Name the tables and columns using the conventions in this book.

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

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club or association, and PAYMENT, which records annual dues paid by the members over the years.

The two tables to be created are:

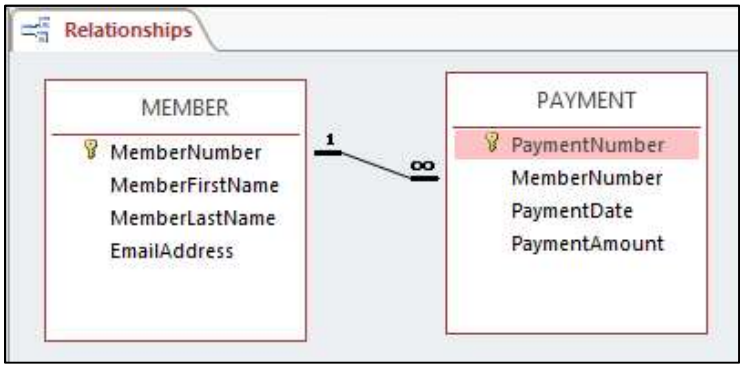
MEMBER (MemberNumber, MemberFirstName, MemberLastName, EmailAddress)

and

PAYMENT (PaymentNumber, *MemberNumber*, PaymentDate, PaymentAmount)

A screen shot of the database as created in Access is shown below and on the next page.

Answers to review questions 1.6 – 1.9 are contained in the database *DBP-e16-IM-CH01-RQ.accdb*, which is available on the text's Web site (www.pearsonhighered.com/kroenke).



MEMBER

MemberNumber	MemberFirstName	MemberLastName	EmailAddress
1	John	Smith	John.Smith@somewhere.net
2	Mary	Smith	Mary.Smith@somewhere.net
3	Mike	Jones	Mike.Jones@somewhere.net
0			

Record: 1 of 3 No Filter Search

PAYMENT

PaymentNumber	MemberNumber	PaymentDate	PaymentAmount
1	1	4/12/2018	$10.00
2	2	4/12/2018	$10.00
3	3	4/14/2018	$10.00
4	1	4/15/2019	$10.00
5	2	4/15/2019	$10.00
6	3	4/16/2019	$10.00
7	1	4/14/2020	$10.00
8	2	4/14/2020	$10.00
0	0		$0.00

Record: 1 of 8 No Filter Search

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1.7 For the tables you created in Review Question 1.6, what are the primary keys of each table? Do you think that any of these primary keys could be surrogate keys? Are any of these keys composite 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. Neither of the keys are composite keys in this example.

1.8 Explain how the two tables you provided in Review Question 1.6 are related. Which table contains the foreign key, and what is the foreign key?

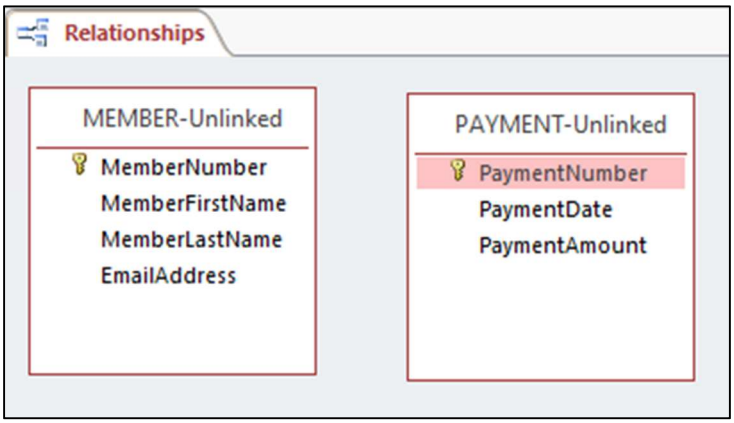
Your student's answers will vary as each creates his or her own example.

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.

1.9 Show your two tables from question 1.6 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.



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MEMBER-Unlinked

MemberNumber	MemberFirstName	MemberLastName	EmailAddress
1	John	Smith	John.Smith@somewhere.net
2	Mary	Smith	Mary.Smith@somewhere.net
3	Mike	Jones	Mike.Jones@somewhere.net
0			

Record: 1 of 3 No Filter Search

PAYMENT-Unlinked

PaymentNumber	PaymentDate	PaymentAmount
1	4/12/2018	$10.00
2	4/12/2018	$10.00
3	4/14/2018	$10.00
4	4/15/2019	$10.00
5	4/15/2019	$10.00
6	4/16/2019	$10.00
7	4/14/2020	$10.00
8	4/14/2020	$10.00
0		$0.00

Record: 1 of 8 No Filter Search

*1.10 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.

1.11 Give an example of information that could be determined using the two tables you provided in your answer to question 1.6.

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?

1.12 Give examples of a single-user database application and a multiuser database application other than ones shown in Figure 1-7.

Your student's answers will vary as each creates his or her own examples.

The membership database discussed in 1.6-1.9 and 1.11 will probably be a single-user database.

A database used in a campus bookstore that is used by several employees is a good example of a multiuser database.

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1.13 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 Enterprise Databases.

1.14 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 1-7.

A collegiate administration system, such as one composed of modules offered by Ellucian Student Information Systems (https://www.ellucian.com) in use at a large university is an example of a multiuser database application with hundreds of users and a very large, complicated database. Ellucian sells Banner, which manages university databases using Oracle.

1.15 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.

1.16 How do the e-commerce companies use the databases discussed in Review Question 1.15?

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.

1.17 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.

1.18 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.

1.19 Explain the components in Figure 1-9.

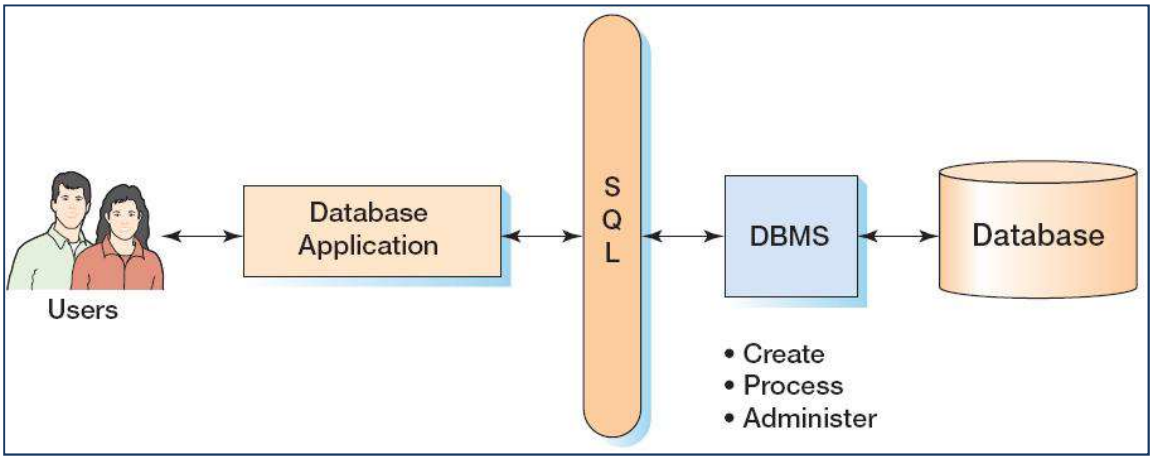

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Figure 1-9 shows the components in a database system with SQL. The components are:

- Users – The people who interact with database applications.
- Database applications – These consist of Data Entry Forms, Reports, Web pages, 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 relational (and some other) DBMS products.
- DBMS – The program that creates, processes, and administers databases.
- Database – Where the data and metadata are stored.

1.20 What are the functions of application programs?

As shown in Figure 1-10, the functions are:

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

1.21 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 relational database management systems. SQL will be covered in-depth in Chapter 2 and Chapter 7.

1.22 What does DBMS stand for?

DBMS stands for database management system.

1.23 What are the functions of the DBMS?

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

1.24 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.

1.25 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.

1.26 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.

1.27 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.

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1.28 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:

A. Indexes;

B. Stored procedures;

C. Triggers;

D. Security data; and

E. Backup/recovery data.

1.29 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 (forms, reports, etc.).

1.30 Describe the components in Figure 1-17.

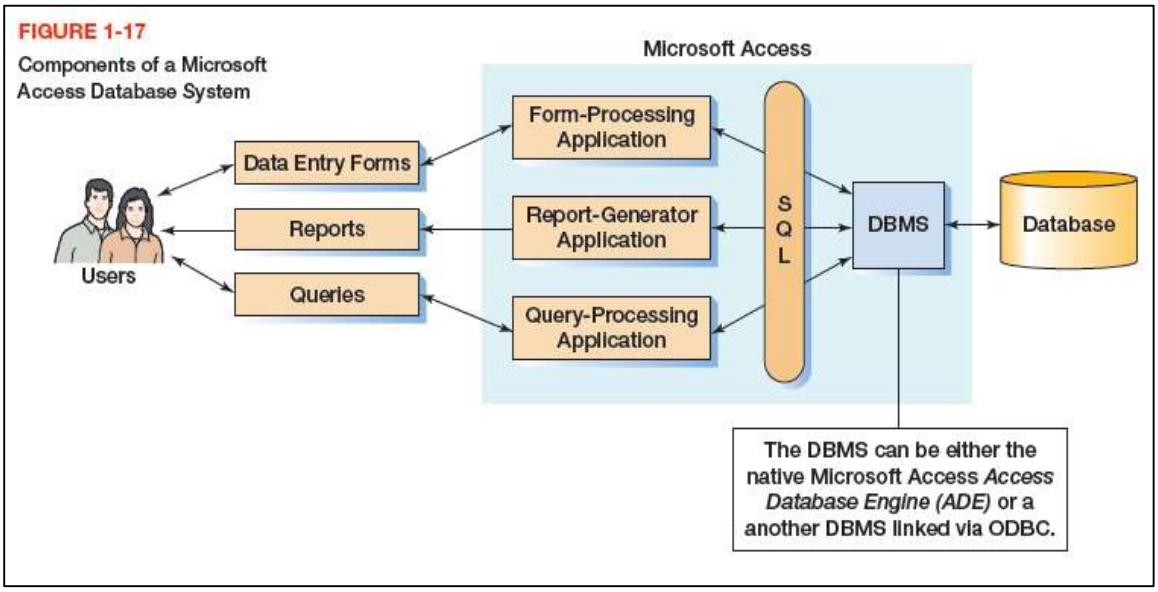

Figure 1-17 shows the components in a database system as created by Microsoft Access. The components are:

- 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.

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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 1-17) and a DBMS (database management system). SQL (Structured Query Language) forms the basis for communication between the application generator and the DBMS.

1.31 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.

1.32 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.

1.33 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.

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

Using ODBC, we could effectively 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).

1.35 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 invoke 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 DBMS-maintained database.

1.36 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 Edge, Google Chrome, or Mozilla Firefox) as a client to connect to a database on a database server.

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- Reporting applications – The user uses a Web browser (such as MS Edge, 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 Edge, 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 database servers.

1.37 How do database applications read and write database data?

All relational database applications read and write database data by sending SQL statements to a DBMS, which performs the actual database file input and output.

1.38 Name the three most popular enterprise-class DBMS products described in this chapter. Where does Microsoft Access rank? Given that Microsoft Access is not an enterprise-class DBMS product, what accounts for this ranking?

The three most popular enterprise-class DBMS products described in this chapter are (in order of popularity) Oracle Database, MySQL, and Microsoft SQL Server. Microsoft Access is usually in the top ten, in part because it is one of the few (and the most popular) personal database systems.

1.39 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.

1.40 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.

1.41 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.

1.42 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.

1.43 What does the term <u>database migration</u> 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:

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

1.44 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.

1.45 What job functions does a knowledge worker perform?

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

1.46 What job functions does a database administrator perform?

A database administrator designs, constructs, and manages databases.

1.47 Explain the meaning of the domains in Figure 1-28.

Figure 1-28 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.

1.48 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 often processed by different applications. Users needed the ability to relate the data in one file to the data in another file.

1.49 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 CODASYL committee created the alternative CODASYL DBTG model, which used data structures called networks to represent data relationships. The database application processed the links or "chains" between entities. The Cullinane Corporation's IDMS product successfully implemented this model.

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

1.50 Who was E.F. Codd?

Edgar F. "Ted" Codd (see http://en.wikipedia.org/wiki/Edgar_F._Codd) was an IBM engineer who created the mathematical theory of relational databases (and the process of normalization, which is discussed in Chapter 3).

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1.51 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.

1.52 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.

1.53 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, (3) it has many useful features, (4) it can manage large databases, and (5) the Oracle Corporation was excellent at sales and marketing.

1.54 Name three early personal computer DBMS products.

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

1.55 What happened to the products in your answer to Review Question 1.54?

In 1991, Microsoft Access was introduced at such a low price point ($99.00) that the other vendors could not compete.

1.56 What was the purpose of OODBMS products? State 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.

1.57 What is a data warehouse? Why are data warehouses needed? What are online transaction processing (OLTP) and online analytical processing (OLAP), and what are the differences between them?

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. OLTP refers to the recording of business transaction data in a database. OLAP refers to gathering information from a database to inform business decisions. OLTP uses an operational DBMS to query and update the database. OLAP typically uses a data warehouse to provide analysis, and it only reads, but does not update, the data.

1.58 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.

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1.59 What is 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 (www.mysql.com/) is an open source DBMS product.

1.60 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 products has been to offer freely downloadable limited editions of their main products. Two examples are Microsoft's SQL Server 2019 Express (https://www.microsoft.com/en-us/sql-server/sql-server-downloads) and Oracle's Oracle Database Express Edition (www.oracle.com/technology/products/database/xe/index.html).

1.61 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."

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

The NoSQL movement is really a "not only relational database" movement, because it advocates an alternate database design different from the relational model. Facebook and Twitter use NoSQL databases. Many organizations use both SQL and NoSQL databases.

1.63 What is a document database?

A document database is a type of NoSQL database that is a collection of documents usually stored using XML or JSON.

1.64 What is JSON?

JSON is JavaScript Object Notation, a structured way to store related data.

1.65 What is cloud computing? Name three of the major vendors of cloud platforms.

Cloud computing refers to using computing resources somewhere on the Internet (cloud) other than your own computer. These resources may be processing, storage, software, or some combination of those. Some major venders are Amazon, Microsoft, Google, and Oracle.

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❖ ANSWERS TO EXERCISES

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 Wedgewood Pacific (WP). Founded in 1987 in Seattle, Washington, the company manufactures and sells consumer drone aircraft. This is an innovative and rapidly developing market. In October 2020, the Federal Aviation Administration (FAA) said that over 1,700,000 drones had been registered under the new FAA drone registration rules. Of these, only about 500,000 were commercial drones, and the rest were drones for recreational use! The FAA also reported that over 198,000 remote pilots had been certified.

WP currently produces three drone models: the Alpha III, the Bravo III, and the Delta IV. These products are created by WP's Research and Development group and produced at WP's production facilities. WP manufactures some of the parts used in the drones, but also purchases some parts from other suppliers.

The company is located in two buildings. One building houses the Administration, Legal, Finance, Accounting, Human Resources, and Sales and Marketing departments, and the second houses the Information Systems, Research and Development, and Production departments. The company database contains data about employees, departments, projects, assets (such as finished goods inventory, parts inventory, and computer equipment), and other aspects of company operations.

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

DEPARTMENT (DepartmentName, BudgetCode, OfficeNumber, DepartmentPhone)

EMPLOYEE (EmployeeNumber, FirstName, LastName, *Department*, Position, *Supervisor*, OfficePhone, EmailAddress)

Where

Department in EMPLOYEE must exist in DepartmentName in DEPARTMENT
Supervisor in EMPLOYEE must exist in EmployeeNumber in EMPLOYEE

Note the second referential integrity constraint shows two columns in the EMPLOYEE table. This indicates that this is a recursive relationship. Recursive relationships are discussed in Chapters 2, 5, and 6.

1.66 Create a Microsoft Access database named WP.accdb.

Answers to the Project Questions 1.66– 1.75 are contained in the database *DBP-e16-IM-CH01-WP.accdb*, which is available on the text's Web site (www.pearsonhighered.com/kroenke).

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

DEPARTMENT (DepartmentName, BudgetCode, OfficeNumber, DepartmentPhone)

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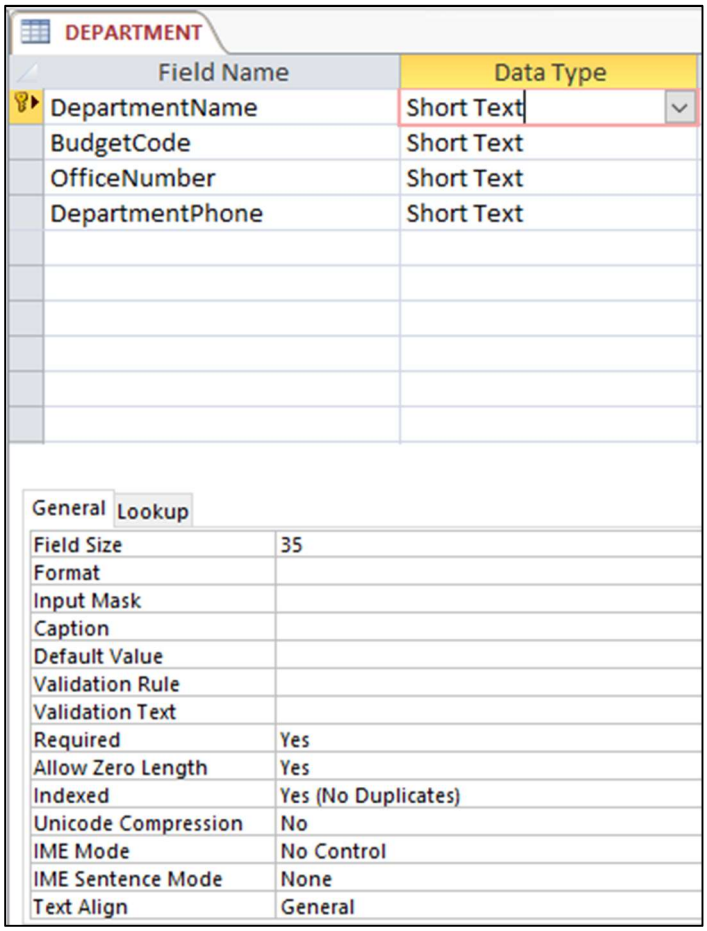
EMPLOYEE (EmployeeNumber, FirstName, LastName, *Department*, Position, *Supervisor*, OfficePhone, EmailAddress)

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.

1.67 Figure 1-34 shows the column characteristics for the WP DEPARTMENT table. Using the column characteristics, create the DEPARTMENT table in the WP.accdb database.

Column Name	Type	Key	Required	Remarks
DepartmentName	Short Text (35)	Primary Key	Yes	
BudgetCode	Short Text (30)	No	Yes	
OfficeNumber	Short Text (15)	No	Yes	
DepartmentPhone	Short Text (12)	No	Yes	



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1.68 Figure 1-35 shows the data for the WP DEPARTMENT table. Using Datasheet view, enter the data shown in Figure 1-35 into your DEPARTMENT table.

DepartmentName	BudgetCode	OfficeNumber	DepartmentPhone
Administration	BC-100-10	BLDG01-210	360-285-8100
Legal	BC-200-10	BLDG01-220	360-285-8200
Human Resources	BC-300-10	BLDG01-230	360-285-8300
Finance	BC-400-10	BLDG01-110	360-285-8400
Accounting	BC-500-10	BLDG01-120	360-285-8405
Sales and Marketing	BC-600-10	BLDG01-250	360-285-8500
InfoSystems	BC-700-10	BLDG02-210	360-285-8600
Research and Development	BC-800-10	BLDG02-250	360-285-8700
Production	BC-900-10	BLDG02-110	360-285-8800

DEPARTMENT

DepartmentName	BudgetCode	OfficeNumber	Department
Administration	BC-100-10	BLDG01-210	360-285-8100
Legal	BC-200-10	BLDG01-220	360-285-8200
Human Resources	BC-300-10	BLDG01-230	360-285-8300
Finance	BC-400-10	BLDG01-110	360-285-8400
Accounting	BC-500-10	BLDG01-120	360-285-8405
Sales and Marketing	BC-600-10	BLDG01-250	360-285-8500
InfoSystems	BC-700-10	BLDG02-210	360-285-8600
Research and Developr	BC-800-10	BLDG02-250	360-285-8700
Production	BC-900-10	BLDG02-110	360-285-8800

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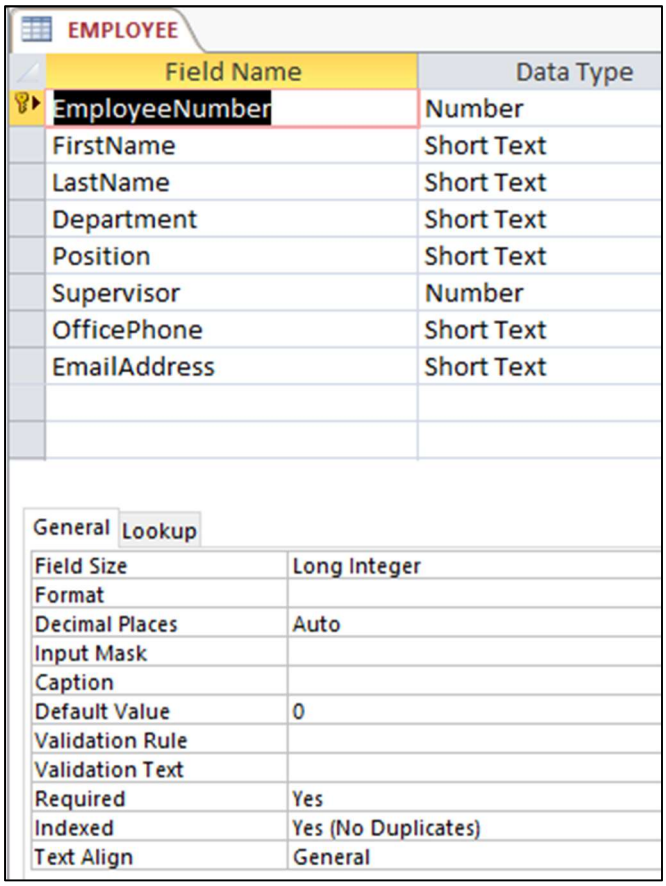
1.69 Figure 1-36 shows the column characteristics for the WP EMPLOYEE table. Using the column characteristics, create the EMPLOYEE table in the WP.accdb database.

EMPLOYEE

Column Name	Type	Key	Required	Remarks
EmployeeNumber	AutoNumber	Primary Key	Yes	Surrogate Key
FirstName	Short Text (25)	No	Yes	
LastName	Short Text (25)	No	Yes	
Department	Short Text (35)	No	Yes	
Position	Short Text (35)	No	No	
Supervisor	Number	No	No	Long Integer
OfficePhone	Short Text (12)	No	No	
EmailAddress	Short Text (100)	No	Yes	



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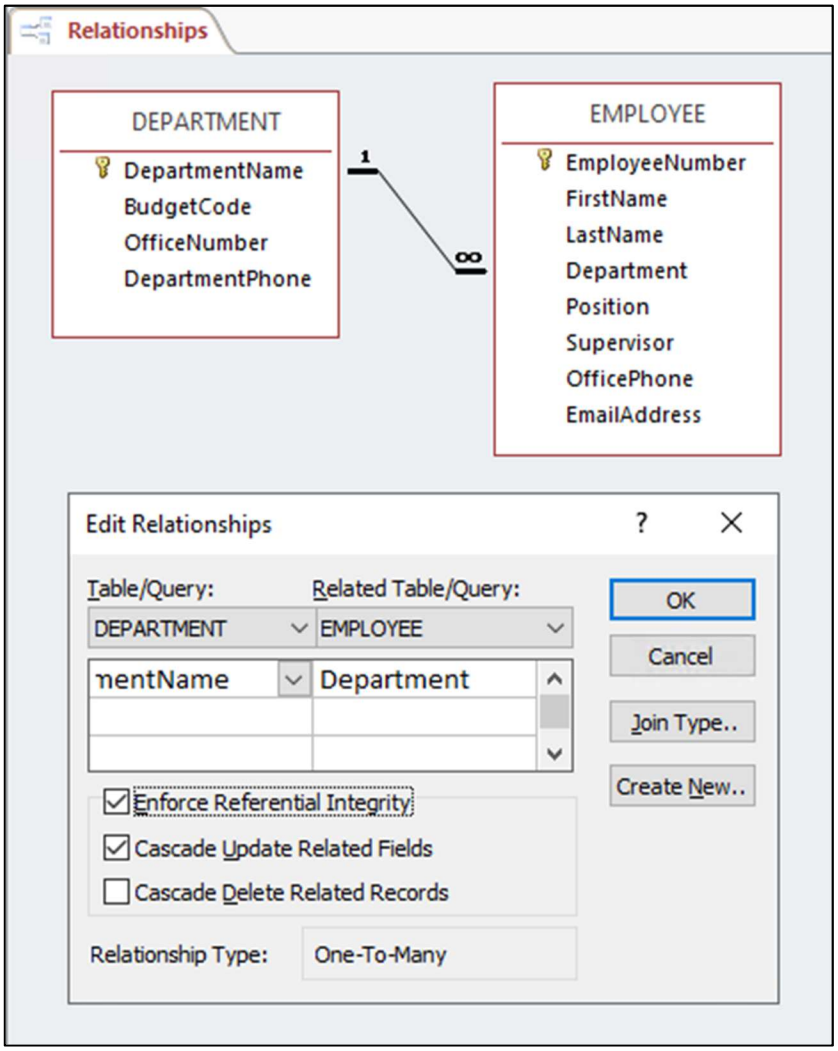
1.70 Create the relationship and referential integrity constraint between DEPARTMENT and EMPLOYEE. Enable enforcing of referential integrity and cascading of data updates, but do not enable cascading of data from deleted records.

■ *NOTE: We will not create the recursive relationship and referential integrity constraint between Supervisor and EmployeeNumber in EMPLOYEE at this time. We will do this in the Chapter 2 Wedgewood Pacific Exercises after we have discussed queries on recursive relationships.*



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1.71 Figure 1-37 shows the data for the WP EMPLOYEE table. Using Datasheet view, enter the first three rows of the data shown in Figure 1-37 into your EMPLOYEE table.

Employee Number	FirstName	LastName	Department	Position	Super-visor	OfficePhone	EmailAddress
1	Mary	Jacobs	Administration	CEO		360-285-8110	Mary.Jacobs@WP.com
2	Rosalie	Jackson	Administration	Admin Assistant	1	360-285-8120	Rosalie.Jackson@WP.com
3	Richard	Bandalone	Legal	Attorney	1	360-285-8210	Richard.Bandalone@WP.com
4	George	Smith	Human Resources	HR3	1	360-285-8310	George.Smith@WP.com
5	Alan	Adams	Human Resources	HR1	4	360-285-8320	Alan.Adams@WP.com
6	Ken	Evans	Finance	CFO	1	360-285-8410	Ken.Evans@WP.com
7	Mary	Abernathy	Finance	FA3	6	360-285-8420	Mary.Abernathy@WP.com
8	Tom	Caruthers	Accounting	FA2	6	360-285-8430	Tom.Caruthers@WP.com
9	Heather	Jones	Accounting	FA2	6	360-285-8440	Heather.Jones@WP.com
10	Ken	Numoto	Sales and Marketing	SM3	1	360-285-8510	Ken.Numoto@WP.com
11	Linda	Granger	Sales and Marketing	SM2	10	360-285-8520	Linda.Granger@WP.com
12	James	Nestor	InfoSystems	CIO	1	360-285-8610	James.Nestor@WP.com
13	Rick	Brown	InfoSystems	IS2	12		Rick.Brown@WP.com
14	Mike	Nguyen	Research and Development	CTO	1	360-285-8710	Mike.Nguyen@WP.com
15	Jason	Sleeman	Research and Development	RD3	14	360-285-8720	Jason.Sleeman@WP.com
16	Mary	Smith	Production	OPS3	1	360-285-8810	Mary.Smith@WP.com
17	Tom	Jackson	Production	OPS2	16	360-285-8820	Tom.Jackson@WP.com
18	George	Jones	Production	OPS2	17	360-285-8830	George.Jones@WP.com
19	Julia	Hayakawa	Production	OPS1	17		Julia.Hayakawa@WP.com
20	Sam	Stewart	Production	OPS1	17		Sam.Stewart@WP.com

EMPLOYEE

EmployeeNumb	FirstName	LastName	Department	Position	Supervisor	OfficePhone	EmailAddress
1	Mary	Jacobs	Administration	CEO		360-285-8110	Mary.Jacobs@WP.com
2	Rosalie	Jackson	Administration	Admin Assistant	1	360-285-8120	Rosalie.Jackson@WP.com
3	Richard	Bandalone	Legal	Attorney	1	360-285-8210	Richard.Bandalone@WP.com

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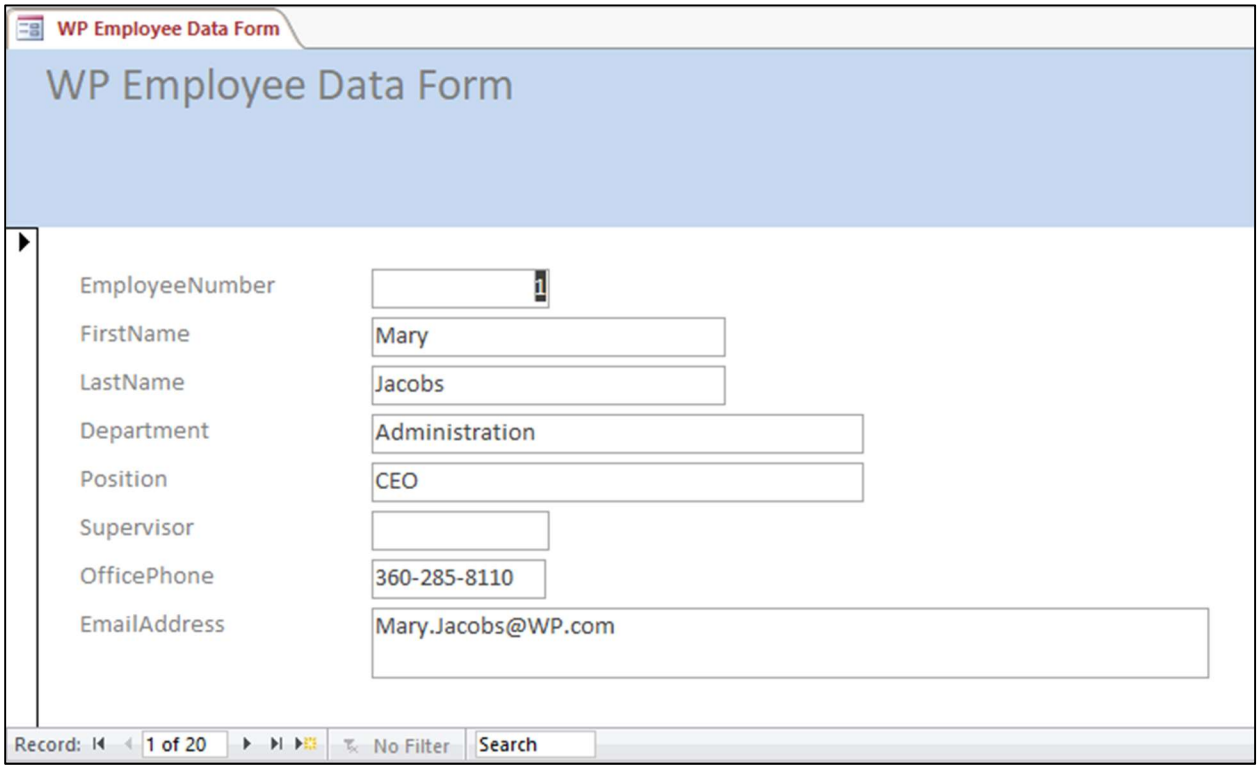
1.72 Using the Microsoft Access form wizard, create a data input form for the EMPLOYEE table and name it WP Employee Data Form. Make any adjustments necessary to the form so that all data display properly. Use this form to enter the rest of the data in the EMPLOYEE table shown in Figure 1-37 into your EMPLOYEE table.



EMPLOYEE

EmployeeNumb	FirstName	LastName	Department	Position	Supervisor	OfficePhone	EmailAddress
1	Mary	Jacobs	Administration	CEO		360-285-8110	Mary.Jacobs@WP.com
2	Rosalie	Jackson	Administration	Admin Assistant	1	360-285-8120	Rosalie.Jackson@WP.com
3	Richard	Bandalone	Legal	Attorney	1	360-285-8210	Richard.Bandalone@WP.com
4	George	Smith	Human Resources	HR3	1	360-285-8310	George.Smith@WP.com
5	Alan	Adams	Human Resources	HR1	4	360-285-8320	Alan.Adams@WP.com
6	Ken	Evans	Finance	CFO	1	360-285-8410	Ken.Evans@WP.com
7	Mary	Abernathy	Finance	FA3	6	360-285-8420	Mary.Abernathy@WP.com
8	Tom	Caruthers	Accounting	FA2	6	360-285-8430	Tom.Caruthers@WP.com
9	Heather	Jones	Accounting	FA2	6	360-285-8440	Heather.Jones@WP.com
10	Ken	Numoto	Sales and Marketing	SM3	1	360-285-8510	Ken.Numoto@WP.com
11	Linda	Granger	Sales and Marketing	SM2	10	360-285-8520	Linda.Granger@WP.com
12	James	Nestor	InfoSystems	CIO	1	360-285-8610	James.Nestor@WP.com
13	Rick	Brown	InfoSystems	IS2	12		Rick.Brown@WP.com
14	Mike	Nguyen	Research and Developme	CTO	1	360-285-8710	Mike.Nguyen@WP.com
15	Jason	Sleeman	Research and Developme	RD3	14	360-285-8720	Jason.Sleeman@WP.com
16	Mary	Smith	Production	OPS3	1	360-285-8810	Mary.Smith@WP.com
17	Tom	Jackson	Production	OPS2	16	360-285-8820	Tom.Jackson@WP.com
18	George	Jones	Production	OPS2	17	360-285-8830	George.Jones@WP.com
19	Julia	Hayakawa	Production	OPS1	17		Julia.Hayakawa@WP.com
20	Sam	Stewart	Production	OPS1	17		Sam.Stewart@WP.com

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1.73 Using the Microsoft Access report wizard, create a report named Wedgewood Pacific 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 may be necessary: you may need to unselect a grouping level, set to landscape, and adjust the widths of fields in Layout View.

EMPLOYEE Report

Wedgewood Pacific Employee Report

LastName	FirstName	EmployeeNumber	Department	Position	Supervisor	OfficePhone	EmailAddress
Abernathy	Mary	7	Finance	FA3	6	360-285-8420	Mary.Abernathy@WP.com
Adams	Alan	5	Human Resources	HR1	4	360-285-8320	Alan.Adams@WP.com
Bandalone	Richard	3	Legal	Attorney	1	360-285-8210	Richard.Bandalone@WP.com
Brown	Rick	13	InfoSystems	IS2	12		Rick.Brown@WP.com
Caruthers	Tom	8	Accounting	FA2	6	360-285-8430	Tom.Caruthers@WP.com
Evans	Ken	6	Finance	CFO	1	360-285-8410	Ken.Evans@WP.com
Granger	Linda	11	Sales and Marketing	SM2	10	360-285-8520	Linda.Granger@WP.com
Hayakawa	Julia	19	Production	OPS1	17		Julia.Hayakawa@WP.com
Jackson	Rosalie	2	Administration	Admin Assistant	1	360-285-8120	Rosalie.Jackson@WP.com
Jackson	Tom	17	Production	OPS2	16	360-285-8820	Tom.Jackson@WP.com
Jacobs	Mary	1	Administration	CEO		360-285-8110	Mary.Jacobs@WP.com
Jones	George	18	Production	OPS2	17	360-285-8830	George.Jones@WP.com
Jones	Heather	9	Accounting	FA2	6	360-285-8440	Heather.Jones@WP.com
Nestor	James	12	InfoSystems	CIO	1	360-285-8610	James.Nestor@WP.com
Nguyen	Mike	14	Research and Developm	CTO	1	360-285-8710	Mike.Nguyen@WP.com
Numoto	Ken	10	Sales and Marketing	SM3	1	360-285-8510	Ken.Numoto@WP.com
Sleeman	Jason	15	Research and Developm	RD3	14	360-285-8720	Jason.Sleeman@WP.com
Smith	George	4	Human Resources	HR3	1	360-285-8310	George.Smith@WP.com
Smith	Mary	16	Production	OPS3	1	360-285-8810	Mary.Smith@WP.com
Stewart	Sam	20	Production	OPS1	17		Sam.Stewart@WP.com

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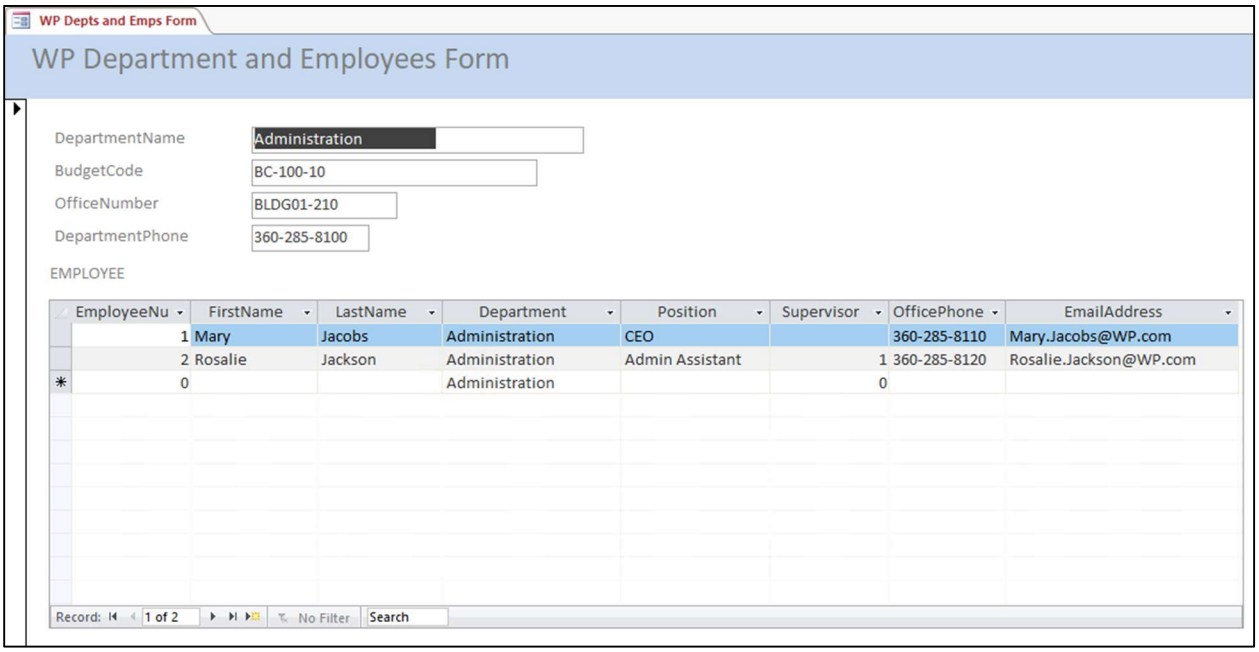
1.74 Using the Microsoft Access form wizard, create a form that has all of the data from both tables. When asked how you want to view your data, select by DEPARTMENT. Choose the default options for other questions that the wizard asks. Open your form and page through your departments.

To produce the report as shown below, some work in the Form Layout view is necessary—take the time to show your students how to modify forms and reports in Layout view. In this case, we used Layout view to edit the title and to adjust the field sizes so they would all display.



1.75 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 use landscape orientation, add department first, and do some work in the Report Layout view—take the time to show your students how to modify report formats in Report Layout view. We had to do some creative squeezing and truncating to fit all the data in.

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Depts and Emps Report

Departments with Employees Report

DepartmentName / LastName	FirstName	BudgetCode / EmployeeNumber	OfficeNumber / Department	DepartmentPhone / Position	Supervisor	OfficePhone	EmailAddress
Accounting		BC-500-10	BLDG01-120	360-285-8405			
Caruthers	Tom	8	Accounting	FA2	6	360-285-8430	Tom.Caruthers@WP.com
Jones	Heather	9	Accounting	FA2	6	360-285-8440	Heather.Jones@WP.com
Administration		BC-100-10	BLDG01-210	360-285-8100			
Jackson	Rosalie	2	Administration	Admin Assistant	1	360-285-8120	Rosalie.Jackson@WP.com
Jacobs	Mary	1	Administration	CEO		360-285-8110	Mary.Jacobs@WP.com
Finance		BC-400-10	BLDG01-110	360-285-8400			
Abernathy	Mary	7	Finance	FA3	6	360-285-8420	Mary.Abernathy@WP.com
Evans	Ken	6	Finance	CFO	1	360-285-8410	Ken.Evans@WP.com
Human Resources		BC-300-10	BLDG01-230	360-285-8300			
Adams	Alan	5	Human Resourc	HR1	4	360-285-8320	Alan.Adams@WP.com
Smith	George	4	Human Resourc	HR3	1	360-285-8310	George.Smith@WP.com
InfoSystems		BC-700-10	BLDG02-210	360-285-8600			
Brown	Rick	13	InfoSystems	IS2	12		Rick.Brown@WP.com
Nestor	James	12	InfoSystems	CIO	1	360-285-8610	James.Nestor@WP.com
Legal		BC-200-10	BLDG01-220	360-285-8200			
Bandalone	Richard	3	Legal	Attorney	1	360-285-8210	Richard.Bandalone@WP.com
Production		BC-900-10	BLDG02-110	360-285-8800			
Hayakawa	Julia	19	Production	OPS1	17		Julia.Hayakawa@WP.com
Jackson	Tom	17	Production	OPS2	16	360-285-8820	Tom.Jackson@WP.com
Jones	George	18	Production	OPS2	17	360-285-8830	George.Jones@WP.com
Smith	Mary	16	Production	OPS3	1	360-285-8810	Mary.Smith@WP.com
Stewart	Sam	20	Production	OPS1	17		Sam.Stewart@WP.com
Research and Devel		BC-800-10	BLDG02-250	360-285-8700			
Nguyen	Mike	14	Research and D	CTO	1	360-285-8710	Mike.Nguyen@WP.com
Sleeman	Jason	15	Research and D	RD3	14	360-285-8720	Jason.Sleeman@WP.com
Sales and Marketing		BC-600-10	BLDG01-250	360-285-8500			
Granger	Linda	11	Sales and Mark	SM2	10	360-285-8520	Linda.Granger@WP.com
Numoto	Ken	10	Sales and Mark	SM3	1	360-285-8510	Ken.Numoto@WP.com

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1.76 Explain, to the level of detail in this chapter, what is going on within Microsoft Access in Project Questions 1.72, 1.73, 1.74, and 1.75. 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 reports. 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. The Form and Report generator applications within Access created the forms and reports.

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