INSTRUCTOR’S MANUAL
TO ACCOMPANY

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Database Processing

Fundamentals, Design, and Implementation
13th Edition

CHAPTER ONE
INTRODUCTION

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**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 **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, which is available in the 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 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.
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.

Answers to review questions 1.3 – 1.6 are contained in the database DBP-e13-IM-CH01-RQ.accdb, which is available on the Instructor’s Resource CD-ROM or the text’s Web site (www.pearsonhighered.com/kroenke).
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.

Answers to review questions 1.3 – 1.6 are contained in the database DBP-e13-IM-CH01-RQ.accdb, which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

1.5  Explain how the two tables you provided in question 1.3 are related. Which table contains the foreign key, and what is it 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.
Answers to review questions 1.3 – 1.6 are contained in the database DBP-e13-IM-CH01-RQ.accdb, which is available on the text’s Web site (www.pearsonhighered.com/kroenke).

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.

Answers to review questions 1.3 – 1.6 are contained in the database DBP-e13-IM-CH01-RQ.accdb, which is available on the text’s Web site (www.pearsonhighered.com/kroenke).
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 (http://www.sungardhe.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.

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—such as, what tables, columns, indexes and data types exist in the database.