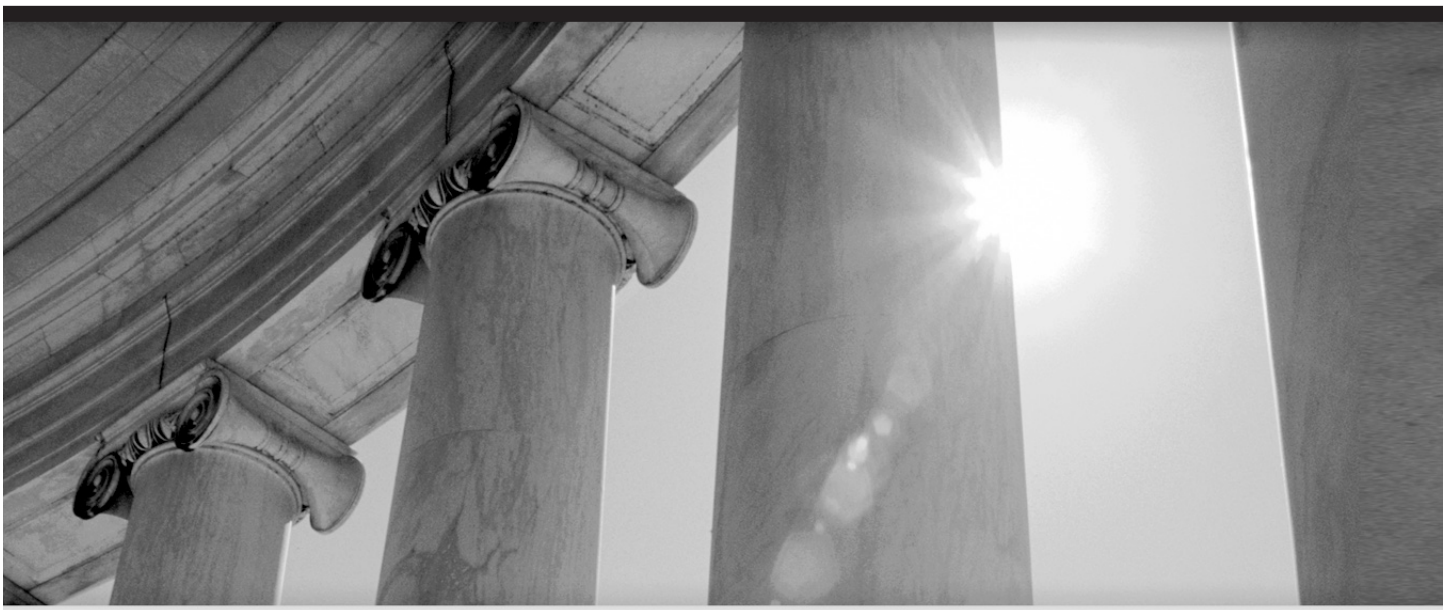
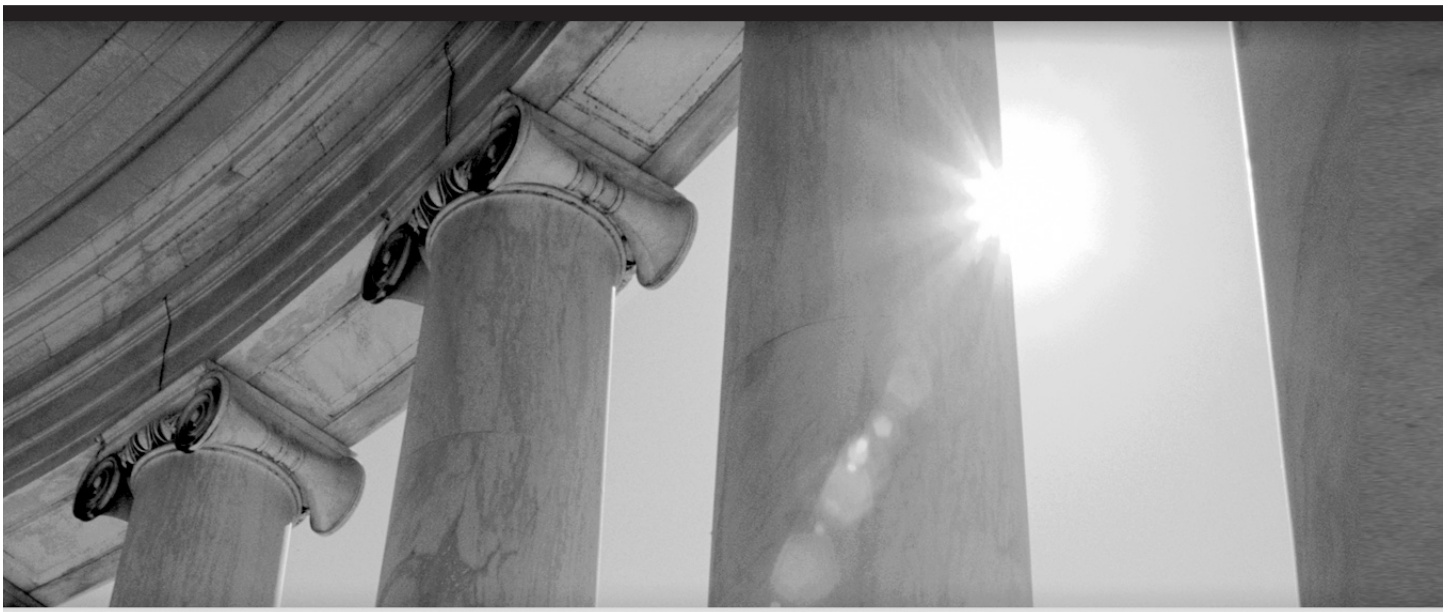


PART I

Getting Started



CHAPTER 1

Introduction to Databases and Oracle

ost everyone has heard the cliché, "information is power." And is this ever true. When you think about it, one of the most important assets of any institution is its information. For example, a typical business must keep track of its customers, orders, product inventory, and employee information, for obvious reasons. Additionally, the analysis of pertinent business information can help make a company more competitive. For example, a sales analyst can use current and historical sales data to forecast future sales and identify trends that might help to improve overall business profitability.

This chapter provides you with a brief introduction to the following topics:

- Databases
- Database management systems
- Database applications
- Oracle Database 10*g*
- Oracle database instances
- Tables
- SQL
- Oracle Application Express

Information Management

In today's world of high technology, computers manage most information because they make it easy to organize, store, and protect valuable data. The proliferation of powerful personal computers and networks has made it possible for all businesses, large and small alike, to quickly and safely make information readily available to people that require access to it. This section introduces the basic concepts of a database, database management systems, database applications, and Oracle.

Databases

Computers typically store and organize large amounts of information within a database. A *database*, whether or not a computer manages it, is nothing more than an orderly collection of related information. A database is a tool that you can use to safely store information and properly organize it for fast retrieval. For example, a business can use a database to store tables of customer records, corresponding

sales orders, product parts, and employee lists. Various workers can then use the database to efficiently perform their jobs. For example, salespeople can quickly enter or look up sales orders, advertising executives can study and forecast product sales, and warehouse personnel can efficiently manage product inventories.

Databases come in many varieties. *Inverted list*, *hierarchic*, and *network* database models are older types of database systems designed primarily for prescribed transactions that input data; they are not suitable for dynamic environments in which interactive data analysis is critical.

The very weaknesses of these earlier systems are exactly why *relational* databases now dominate newer information management systems. Relational databases are easy to understand, design, and build. Relational databases store and present all information in tables, an easily understood concept. Furthermore, relational databases hide the complexities of data access from the user, making application development relatively simple when compared to other types of database systems.

Database Management Systems

A *database management system (DBMS)* is computer software that manages access to databases. A typical multiuser DBMS performs the following tasks, and more:

- A DBMS safely manages shared access to a single database among multiple concurrent users. For example, a DBMS locks data as users add and update information so that users do not destructively interfere with one another's work.
- A DBMS uses computer resources wisely so that a large number of application users can access the database and perform work with fast response times for maximum productivity.
- A DBMS protects database information in such a way that it can reconstruct work lost due to anything from a simple power outage, to a disk failure, to even a complete site disaster in some cases.

You can purchase any one of several commercially available DBMSs to build and manage databases. The market-leading DBMS in use today is Oracle Corporation's Oracle Database, also known simply as *Oracle*. The latest version of Oracle is Oracle Database 10*g*. Two goals of this book are to teach you how Oracle works and provide you with hands-on experience using the software's most typically used features.

Database Applications

Oracle Database 10*g*'s many features make it a potent database server for all types of common database applications, including:

- **Online transaction processing (OLTP)** Applications that process many small update transactions, such as banking, reservation, and order-entry systems
- **Decision support systems (DSSs)** Applications that query targeted information from a database for the purposes of data analysis
- **Data warehousing** Applications that access large, read-only databases that are specifically optimized for fast access to even the most esoteric bits of information

For example, consider the databases that a large online retailer might use to manage its business. When you go to the company's online store to browse and order products, you are using the company's OLTP database system. When you request information about your sales invoices and recommendations for future purchases that match your profile, you are using the company's DSS. Internally, the company offloads and transforms transactional information from its OLTP system into a read-only data warehouse so that it can analyze sales trends and make wise choices about future product offerings and marketing campaigns.

Oracle Database 10*g*

Oracle Database 10*g* is available in several different license formats:

- **Oracle Database 10*g* Standard Edition One** An entry-level version of Oracle that includes the most commonly used options and features available with Oracle and supports two-processor systems.
- **Oracle Database 10*g* Standard Edition** Similar to Standard Edition One, except this version supports four-processor systems.
- **Oracle Database 10*g* Enterprise Edition** The complete version of Oracle that provides multiuser access to all features, including features for high-end database processing, data warehousing, and large, multiprocessor systems.
- **Oracle Database 10*g* Personal Edition** A single-user development database license that provides access to most of the Oracle Database 10*g* Enterprise Edition features.

- **Oracle Database 10*g* Lite** An Oracle-compatible database designed for use in mobile computing environments. Oracle Lite is not discussed in this book.
- **Oracle Database 10*g* Express Edition** A free version of Oracle that supports most popular Oracle database features. Also called and henceforth referred to in this book as Oracle XE, you can use Express Edition to design, build, deploy, and support Oracle-based applications that run on one-processor systems with databases of 4 gigabytes (GB) or less. Oracle XE is very easy to install and automatically includes powerful application development tools that you can use to begin using Oracle quickly. This book's CD contains a free copy of Oracle XE, but you can always download the latest version from Oracle's website.

The various editions of Oracle Database 10*g* are available on most popular operating systems such as Microsoft Windows, Linux, and various Unix platforms. In this book, you will use Oracle XE to get started using Oracle while it operates on top of one of the most popular server operating systems in use today, Microsoft Windows. This book teaches you about the operating system–independent features of Oracle, as well as several Oracle features available only with Microsoft Windows.

NOTE
For the most part, Oracle operates the same way no matter what operating system or edition of Oracle that you choose. Therefore, the large majority of this book is useful, no matter what operating system or edition of Oracle you are using.

Oracle Fundamentals

Before proceeding to the next chapter to install Oracle XE for Microsoft Windows on your computer, you should understand some of the basic terms related to Oracle and relational database systems. If you already have experience working with Oracle, the following sections contain information that you might already know.

Databases and Instances

An *Oracle database* is a collection of related operating system files that Oracle uses to store and manage a set of related information. Structurally, an Oracle database has three primary types of files: data files, log files, and control files. Subsequent chapters of this book will explain more about the purpose and management of each type of database file.

NOTE
This book will also teach you about several other types of files that Oracle uses along with a database such as parameter files, an alert log, trace files, and a password file; however, these types of files are not actually part of a database's physical structure.

A *database instance* or *database server* is the Oracle software that manages physical database access. No one can use the data in an Oracle database until after you "start up" an instance. An instance's operating system processes and memory areas "mount" (associate) and "open" the physical database files to facilitate data access.

NOTE
Be aware that people commonly mix and match terms like database, instance, and DBMS that have different technical meanings.

Figure 1-1 is a simple illustration that identifies the relationship between a physical database and a database instance.

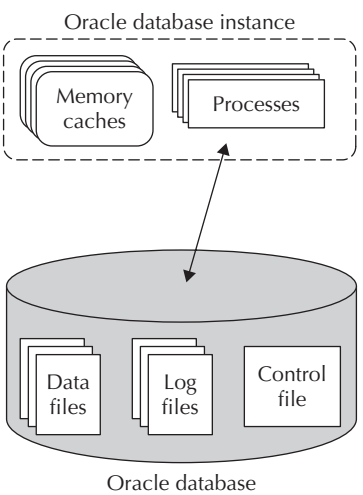


FIGURE 1-1. *An Oracle database instance provides access to the physical files that constitute a database. Together, a database instance and database make up an Oracle DBMS.*

For now, this is all that you need to understand about Oracle databases and instances. You'll learn more about databases and instances in the next chapter of this book.

Tables

Tables are the basic data structure in any relational database. A *table* is nothing more than an organized collection of *records*, or *rows*, that all have the same *attributes*, or *columns*. Figure 1-2 illustrates a typical CUSTOMERS table in a relational database. Notice that each customer record in the example CUSTOMERS table has the same attributes, including an ID, a company name, a last name, a first name, and so on.

For now, this is all that you need to understand about tables. Subsequent chapters will teach you more about building and using tables in an Oracle database.

SQL and Data Access

To work with a commercial relational database system, such as Oracle, applications use *Structured Query Language (SQL)* commands. SQL (pronounced both "sequel" and "ess-que-ell") is a simple command language that allows database administrators, developers, and application users to do the following:

- Retrieve, enter, update, and delete database data
- Create, alter, and drop database objects, such as tables

In fact, the only way that an application can interact with an Oracle database is to issue a SQL command. Easy-to-use graphical user interfaces (GUIs) might hide the complexities of SQL commands from users, but under the covers, an application always communicates with Oracle by using SQL.

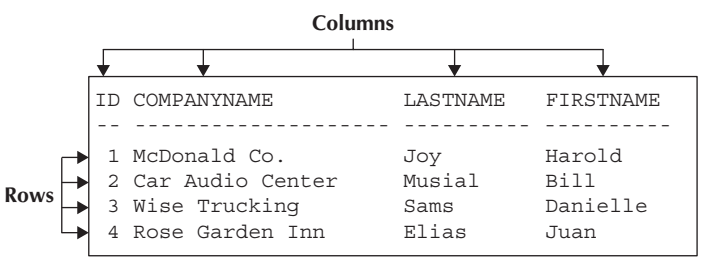


FIGURE 1-2. *A table is a set of records with the same attributes.*

If you currently do not have any experience with SQL, don't panic. SQL is a relatively simple language to learn because you build SQL commands by combining intuitive keywords and clauses that ask Oracle to perform specific tasks. For example, the following SQL statement is a simple query that retrieves specific columns of all rows in the PARTS table:

```
SELECT id, description, unitprice FROM parts;

       ID DESCRIPTION          UNITPRICE
--------- -------------------- ---------
        1 Fax Machine                299
        2 Copy Machine              4895
        3 Laptop PC                 2100
        4 Desktop PC                1200
        5 Scanner                     99
```

At this point, you do not need to know much more about SQL. In almost every other chapter of this book, you will use SQL statements to access Oracle and perform tasks. Chapter 3 provides you with a complete introduction to the basics of the most commonly used SQL commands.

Database Users and Sessions

Oracle is a DBMS that manages shared access to a database among one or more users. To provide database access to someone, you or an administrator must create a *database user account* for the person. To perform work with Oracle, you must start an application and establish a connection to Oracle using your account's username and password. A *database session* starts when you establish a connection to an Oracle database and ends when you disconnect.

You will learn more about database users and database security later in this book.

SQL*Plus

One type of application that you can use to enter SQL commands and interact with an Oracle database system is an *ad hoc query tool*, such as Oracle's SQL*Plus. *SQL*Plus* provides you with a very simple command-line interface that you can use to enter SQL statements and then view the results of each statement execution. In effect, SQL*Plus lets you talk with an Oracle database server so that you can either query the database for information or input, update, or delete data in the database. For example, the following commands demonstrate a simple SQL*Plus session that connects to an Oracle database, retrieves some data from the CUSTOMERS table, and then terminates the session by disconnecting from the database:

```
SQL> CONNECT hr/hr;
Connected.
SQL> SELECT job_title
```

```
  2   FROM jobs
  3   WHERE min_salary > 10000;

JOB_TITLE
-----------------------------------
President
Administration Vice President

SQL> DISCONNECT;
Disconnected from Oracle Database 10g Express Edition
```

Many of the examples and practice exercises throughout the chapters in this book use SQL*Plus to communicate with Oracle.

Oracle Application Express

Oracle Application Express (formerly Oracle HTML DB) is a *rapid application development (RAD)* tool that you can use to design, develop, and deploy applications for Oracle. Even with minimal knowledge of SQL and other programming concepts, you can use Application Express to quickly build robust web browser–based applications. Application Express also contains a limited set of administration tools, including utilities for database system configuration, user management, data loading, and more. Application Express is a standard feature of Oracle that you can use for no additional cost. Subsequent chapters in this section of the book teach you how to quickly begin using Oracle Application Express.

Chapter Summary

Oracle XE is a powerful product that you will use to manage information. Now that you have a general idea of what Oracle XE is all about, the remaining chapters in this book present essential Oracle concepts and corresponding practice exercises so that you can quickly become proficient using Oracle XE on Microsoft Windows for information management.