CHAPTER 2

# BASIC SQL SELECT STATEMENTS

## LEARNING OBJECTIVES

**After completing this chapter, you should be able to do the following:**

- Distinguish between an RDBMS and an ORDBMS
- Identify keywords, mandatory clauses, and optional clauses in a SELECT statement
- Select and view all columns of a table
- Select and view one column of a table
- Display multiple columns of a table
- Use a column alias to clarify the contents of a particular column
- Perform basic arithmetic operations in the SELECT clause
- Remove duplicate lists using either the DISTINCT or UNIQUE keyword
- Use concatenation to combine fields, literals, and other data
- Insert a line break

## INTRODUCTION

In Chapter 1, you reviewed database structures and were introduced to the concept of using SQL statements to enter, manipulate, and retrieve data through a DBMS. (DBMS is a generic term that applies to software that allows users to interact with a database.) When you are working with relational databases, however, the DBMS software is considered to be a **relational database management system (RDBMS)**. The RDBMS is the software program used to create the database and allows you to enter, manipulate, and retrieve data. Most RDBMSs include capabilities to create forms for user input screens and to create reports to display output. When trying to retrieve data, most RDBMSs provide the user with an option to

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interact with the database through a graphical user interface (GUI) or through SQL statements. When a GUI is used, the RDBMS actually converts entries made by the user into SQL statements that are subsequently executed to perform the desired operation.

In this textbook, Oracle 10*g* Database is used to interact with the database for JustLee Books. Oracle 10*g* is an **object relational database management system (ORDBMS)** because it can be used to reference not only individual data elements but also objects (such as object fields and maps), which can be composed of individual data elements. However, because the data stored in the database for JustLee Books is composed of simple alphanumeric characters, the examples and concepts presented throughout this textbook also apply to traditional RDBMSs. The use of objects is usually addressed in advanced application development courses.

Oracle 10*g* Database comes in three editions: Enterprise, Standard, and Personal. All the concepts and examples presented in this textbook can be used with any of these editions. SQL*Plus is the tool used to enter and execute SQL statements. SQL*Plus can be used through a client connection or through an Internet connection (browser), and the Internet version is named iSQL*Plus. The screen captures displayed in this book show the iSQL*Plus interface, however either SQL*Plus interface can be used to accomplish all the examples in this book.

Review Appendix B, "SQL*Plus and iSQL*Plus User's Guide," to become familiar with the SQL*Plus interface you will be using. The appendix is separated into two sections: The first introduces the use of the Internet interface (iSQL*Plus), and the second covers the client interface (SQL*Plus).

In this chapter, you will begin learning how to retrieve data from a database by using SELECT statements. You need this basic understanding of querying a database before you can create a database. As you create the database, you will need to submit queries to verify what objects you have created or what data has been entered.

Figure 2-1 displays a list of all the commands covered in this chapter.

Before beginning this chapter, you need to create the JustLee Books database. The tables in this database are used in the examples and Hands-On Assignments. Work through the appropriate set of steps that follow for either the SQL*Plus or iSQL*Plus interface:

SQL*Plus:

1. Determine the location of the JustLee Database folder in your data files (these are the data files provided with this text). Verify that the bookscript.sql script file is in this folder.
2. Open your browser to the iSQL*Plus site provided by your instructor. Start SQL*Plus and log in.
3. To execute the script file, enter **start d:\JustLeeDatabase\bookscript.sql** at the SQL**>** prompt inside Oracle 10*g*. The ***d:\JustLeeDatabase*** should be substituted with the appropriate drive letter and pathname, if applicable. Then press **Enter**.
4. After running the script, you can verify and view the structure of each table by entering **describe *tablename*** (where *tablename* is substituted with the actual name of one of the tables presented in this chapter) at the SQL**>** prompt.



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| COMMAND DESCRIPTION | BASIC SYNTAX STRUCTURE | EXAMPLE |
|---|---|---|
| Command to view all columns of a table | SELECT *<br>FROM *tablename;* | **SELECT ***<br>**FROM books;** |
| Command to view one column of a table | SELECT *columnname*<br>FROM *tablename;* | **SELECT title**<br>**FROM books;** |
| Command to view multiple columns of a table | SELECT *columnname, columnname, ...*<br>FROM *tablename;* | **SELECT title, pubdate**<br>**FROM books;** |
| Command to assign an alias to a column during display | SELECT *columnname* [AS] *alias*<br>FROM *tablename;* | **SELECT title AS titles**<br>**FROM books;**<br>*or*<br>**SELECT title titles**<br>**FROM books;** |
| Command to perform arithmetic operations during retrieval | SELECT *arithmetic expression*<br>FROM *tablename;* | **SELECT retail – cost**<br>**FROM books;** |
| Command to eliminate duplication in output | SELECT DISTINCT *columnname*<br>FROM *tablename;*<br>*or*<br>SELECT UNIQUE *columnname* FROM *tablename;* | **SELECT DISTINCT state**<br>**FROM customers;**<br>*or*<br>**SELECT UNIQUE state**<br>**FROM customers;** |
| Command to perform concatenation of column contents during display | SELECT *columnname* \|\| *columnname*<br>FROM *tablename;* | **SELECT firstname \|\| lastname**<br>**FROM customers;** |
| Command to view the structure of a table | DESCRIBE *tablename* | **DESCRIBE books** |

**FIGURE 2-1** List of commands used in this chapter

**CAUTION**

The first time this script is executed, you will receive errors for the first eight statements of the script (all of these are DROP TABLE commands). If you need to rebuild the database for any reason, these statements will delete the existing tables so that they can be rebuilt. If you receive privilege errors, your user account has not been assigned the appropriate privileges to create tables.

iSQL*Plus:

1. Determine the location of the JustLee Database folder in your data files (these are the data files provided with this text). Verify that the bookscript.sql script file is in this folder.
2. Open a browser to the iSQL*Plus site and log in.



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3. To execute the script file, click the **Load Script** button below the workspace area. Use the Browse button to select the bookscript.sql file. Click **Load**. The contents of the script file now appear in the workspace area.
4. Click **Execute**. Messages confirming script processing appear below the workspace area. After running the script, you can verify and view the structure of each table by entering **describe *tablename*** (where *tablename* is substituted with the actual name of the table presented in this chapter).

**CAUTION**

The first time this script is executed, you will receive errors for the first eight statements of the script (all of these are DROP TABLE commands). If you need to rebuild the database for any reason, these statements will delete the existing tables so that they can be rebuilt. If you receive privilege errors, your user account has not been assigned the appropriate privileges to create tables.

If you want to see the contents of the script, it can be opened with any text editor or word-processing program.

**CAUTION**

If you open the bookscript.sql file with a word-processing program and then accidentally click **Save**, your word-processing program may save the file with a different extension than "sql," and Oracle 10*g* will be unable to use the script. The script file must have the extension "sql" to execute properly from a line command.

## SELECT STATEMENT SYNTAX

As mentioned in this chapter's introduction, the majority of the SQL operations performed on a database in the average organization are SELECT statements. **SELECT statements** allow the user to retrieve data from tables. The user can view all the fields and records within a table or specify only certain fields and records to be displayed. In essence, the SELECT statement asks the database a question, which is why it is also known as a **query**.

After querying a database, the results that are displayed can be based on certain conditions specified in the SELECT statement. In other words, what is displayed is basically the answer to the question asked by the user. For example, in this chapter, you will learn the basic structure of a SELECT statement and how to display only certain fields from a table. Later in the book, you will learn how to modify the SELECT statement to display only certain rows.

The **syntax** for a SQL statement is the basic structure, or rules, required to execute the statement. The syntax for the SELECT statement is shown in Figure 2-2.



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```
SELECT  [DISTINCT | UNIQUE] (*, columnname [ AS alias], …)
        FROM      tablename
        [WHERE    condition]
        [GROUP BY group_by_expression]
        [HAVING   group_condition]
        [ORDER BY columnname];
```

**FIGURE 2-2** Syntax for the SELECT statement

The capitalized words (SELECT, FROM, WHERE, etc.) in Figure 2-2 are **keywords** (words that have a predefined meaning in Oracle 10*g*). Each section of the example that begins with a keyword is referred to as a **clause** (SELECT clause, FROM clause, WHERE clause, and so on). Note these important points about SELECT statements:

- The only clauses required for the SELECT statement are SELECT and FROM. (These are the only clauses in Figure 2-2 to be discussed in this chapter.)
- Square brackets are used to indicate portions of the statement that are optional. (Optional clauses are discussed in subsequent chapters.)
- SQL statements can be entered over several lines (as shown in Figure 2-2) or on one line. Most SQL statements are entered with each clause on a separate line to improve readability and make editing easier. As various SELECT commands are demonstrated in this chapter, you will see variations on spacing, number of lines used, and capitalization. These variations are pointed out as they are encountered within the text.
- To execute a SQL statement in SQL*Plus after it is entered, you have two options. Usually the end of a SQL statement is indicated by a semicolon (**;**) at the end of the statement (as given in the syntax example). If you forget to enter the semicolon and press the Enter key, you can still execute the statement by entering a slash (**/**) at the SQL**>** prompt. The iSQL*Plus interface assumes a semicolon to end the statement, so it is optional.

## Selecting All Data in a Table

To have the SELECT statement return *all* data from a specific table, type an asterisk (*) after SELECT, as shown in Figure 2-3.

```
SELECT *
FROM customers;
```

**FIGURE 2-3** Command to select all data within a table

The asterisk (*) is a symbol that instructs Oracle 10*g* to include all columns in the table. The symbol can be used only in the SELECT clause of a SELECT statement. If you need to view or display all columns in a table, it is much simpler to type an asterisk than to type the name of each column. The results of the SELECT statement should look like those shown in Figure 2-4.



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| CUSTOMER# | LASTNAME | FIRSTNAME | ADDRESS | CITY | STATE | ZIP | REFERRED |
|---|---|---|---|---|---|---|---|
| 1001 | MORALES | BONITA | P.O. BOX 651 | EASTPOINT | FL | 32328 | |
| 1002 | THOMPSON | RYAN | P.O. BOX 9835 | SANTA MONICA | CA | 90404 | |
| 1003 | SMITH | LEILA | P.O. BOX 66 | TALLAHASSEE | FL | 32306 | |
| 1004 | PIERSON | THOMAS | 69821 SOUTH AVENUE | BOISE | ID | 83707 | |
| 1005 | GIRARD | CINDY | P.O. BOX 851 | SEATTLE | WA | 98115 | |
| 1006 | CRUZ | MESHIA | 82 DIRT ROAD | ALBANY | NY | 12211 | |
| 1007 | GIANA | TAMMY | 9153 MAIN STREET | AUSTIN | TX | 78710 | 1003 |
| 1008 | JONES | KENNETH | P.O. BOX 137 | CHEYENNE | WY | 82003 | |
| 1009 | PEREZ | JORGE | P.O. BOX 8564 | BURBANK | CA | 91510 | 1003 |
| 1010 | LUCAS | JAKE | 114 EAST SAVANNAH | ATLANTA | GA | 30314 | |
| 1011 | MCGOVERN | REESE | P.O. BOX 18 | CHICAGO | IL | 60606 | |
| 1012 | MCKENZIE | WILLIAM | P.O. BOX 971 | BOSTON | MA | 02110 | |
| 1013 | NGUYEN | NICHOLAS | 357 WHITE EAGLE AVE. | CLERMONT | FL | 34711 | 1006 |
| 1014 | LEE | JASMINE | P.O. BOX 2947 | CODY | WY | 82414 | |
| 1015 | SCHELL | STEVE | P.O. BOX 677 | MIAMI | FL | 33111 | |
| 1016 | DAUM | MICHELL | 9851231 LONG ROAD | BURBANK | CA | 91508 | 1010 |
| 1017 | NELSON | BECCA | P.O. BOX 563 | KALMAZOO | MI | 49006 | |
| 1018 | MONTIASA | GREG | 1008 GRAND AVENUE | MACON | GA | 31206 | |
| 1019 | SMITH | JENNIFER | P.O. BOX 1151 | MORRISTOWN | NJ | 07962 | 1003 |
| 1020 | FALAH | KENNETH | P.O. BOX 335 | TRENTON | NJ | 08607 | |

20 rows selected.

**FIGURE 2-4** List of all customers in the CUSTOMERS table

**NOTE**

As previously mentioned, all SQL*Plus output will be shown in iSQL*Plus format, which displays an HTML style table by default. Your output format will be different if you are using the client SQL*Plus interface because output is displayed in pure text format. Appendix B includes example output from each of these interfaces.

When looking at the results of the SELECT statement, pay attention to the column headings. Depending on the SQL*Plus tool being used and the options set, some column headings (such as for the State field) might be truncated. Keep in mind that when you refer to a column in any SQL statement, you still need to specify the entire column name. Be sure you do not depend on the column headings for column names due to the possibility of the name being truncated.

**NOTE**

The exact name of each column can be viewed by entering **DESCRIBE *tablename***. To view the exact name of each column in the CUSTOMERS table, simply enter **DESCRIBE customers** and execute.



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## Selecting One Column from a Table

In the previous example, an asterisk was used to indicate that all columns in the table should be displayed. When displaying a table containing a large number of fields, the results may look cluttered. Or there may be sensitive data you do not want other users to see. In these situations, you can instruct Oracle 10g to return only specific columns in the results. Choosing specific columns in a SELECT statement is called **projection**. You can select one column—or as many as all the columns—contained within the table.

For example, suppose that you want to view the titles of all books in inventory. The data regarding books is stored in the BOOKS table. The name of the column you need is Title. As shown in Figure 2-5, you can list the name of the desired column after the SELECT keyword. Type the statement shown in Figure 2-5.

```
SELECT title
FROM books;
```

**FIGURE 2-5** Command to select a single column

**NOTE**

If you receive an error message rather than the results of the query, there may have been a typing error. The error message should display the line in which the error occurred. An asterisk beneath the line serves as an indicator of the error; however, it is not always the exact cause. If the error message indicates that the error is in the second line of the statement, then BOOKS may have been entered as BOOK. Simply retype the statement with the correction, and it should return the desired results.

Results returned from the query should look like those shown in Figure 2-6.

| TITLE |
|---|
| BODYBUILD IN 10 MINUTES A DAY |
| REVENGE OF MICKEY |
| BUILDING A CAR WITH TOOTHPICKS |
| DATABASE IMPLEMENTATION |
| COOKING WITH MUSHROOMS |
| HOLY GRAIL OF ORACLE |
| HANDCRANKED COMPUTERS |
| E-BUSINESS THE EASY WAY |
| PAINLESS CHILD-REARING |
| THE WOK WAY TO COOK |
| BIG BEAR AND LITTLE DOVE |
| HOW TO GET FASTER PIZZA |
| HOW TO MANAGE THE MANAGER |
| SHORTEST POEMS |

14 rows selected.

**FIGURE 2-6** List of all book titles



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The results display only the field specified, which was Title. You might want to practice some variations of the same SELECT statement. Try entering the examples shown in Figure 2-7 and notice that the results are the same.

```
SQL> SELECT TITLE FROM BOOKS;

SQL> select title from books;

SQL> SELECT title FROM books;

SQL> SELECT TITLE
     FROM BOOKS
     /
```

**FIGURE 2-7** The SELECT statement can be entered on one or more lines

As shown in these examples, the statement can be entered on one or more lines. *Keywords, table names, and column names are not case sensitive.* To distinguish between keywords and other parts of the SELECT statement, we capitalize the keywords. Keep in mind that this is *not* a requirement of Oracle 10*g*; it is simply a convention used to improve readability.

## Selecting Multiple Columns from a Table

In most cases, displaying only one column from a table is not sufficient output on which to base decisions. If you want to know the date on which each book was published, you could retrieve all the fields from the BOOKS table and manually extract the needed fields. As an alternative, you could issue one SELECT statement to retrieve the Title field, another to retrieve the Publication Date field, and then match up the two results. It is much more practical to issue a query requesting both the title and the publication date for each book, as shown in Figure 2-8.

```
SELECT title, pubdate
FROM books;
```

**FIGURE 2-8** Command to select multiple columns from a table

When specifying more than one column in the SELECT clause of the SELECT statement, commas should separate the columns listed. Although a space has been entered after the comma, it is not required. The space serves to improve the readability of the statement and is not part of the required syntax of the SELECT statement. The example shown in Figure 2-9 returns the same results.



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```
SELECT title,pubdate FROM books;
```

**FIGURE 2-9** Multiple clauses of the SELECT statement on one line



The data returned from the query should look like that shown in Figure 2-10.

| TITLE | PUBDATE |
|---|---|
| BODYBUILD IN 10 MINUTES A DAY | 21-JAN-01 |
| REVENGE OF MICKEY | 14-DEC-01 |
| BUILDING A CAR WITH TOOTHPICKS | 18-MAR-02 |
| DATABASE IMPLEMENTATION | 04-JUN-99 |
| COOKING WITH MUSHROOMS | 28-FEB-00 |
| HOLY GRAIL OF ORACLE | 31-DEC-01 |
| HANDCRANKED COMPUTERS | 21-JAN-01 |
| E-BUSINESS THE EASY WAY | 01-MAR-02 |
| PAINLESS CHILD-REARING | 17-JUL-00 |
| THE WOK WAY TO COOK | 11-SEP-00 |
| BIG BEAR AND LITTLE DOVE | 08-NOV-01 |
| HOW TO GET FASTER PIZZA | 11-NOV-02 |
| HOW TO MANAGE THE MANAGER | 09-MAY-99 |
| SHORTEST POEMS | 01-MAY-01 |

14 rows selected.

**FIGURE 2-10** Display of title and publication date for all books

When looking at the results of this query, notice the order in which the columns are listed in the output. In this case, Title is listed first, followed by Pubdate. Oracle 10*g* sequences the columns in the display in the same order that the user sequences them in the SELECT clause of the SELECT statement. To change the order and display the Pubdate column first, simply reverse the order of the columns listed in the SELECT statement, as shown in Figure 2-11.



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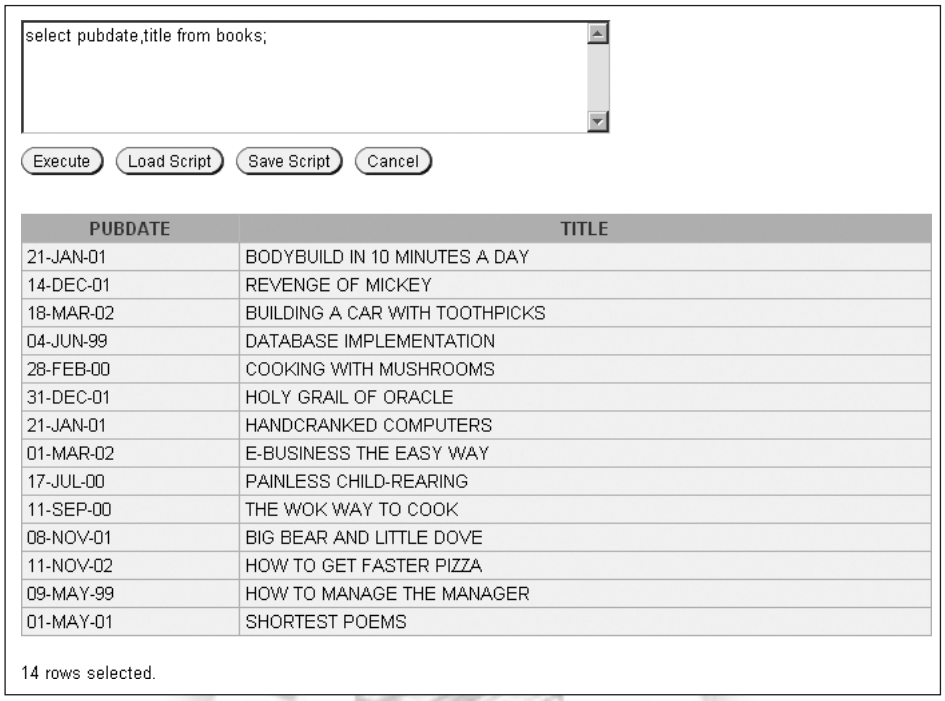


| PUBDATE | TITLE |
|---|---|
| 21-JAN-01 | BODYBUILD IN 10 MINUTES A DAY |
| 14-DEC-01 | REVENGE OF MICKEY |
| 18-MAR-02 | BUILDING A CAR WITH TOOTHPICKS |
| 04-JUN-99 | DATABASE IMPLEMENTATION |
| 28-FEB-00 | COOKING WITH MUSHROOMS |
| 31-DEC-01 | HOLY GRAIL OF ORACLE |
| 21-JAN-01 | HANDCRANKED COMPUTERS |
| 01-MAR-02 | E-BUSINESS THE EASY WAY |
| 17-JUL-00 | PAINLESS CHILD-REARING |
| 11-SEP-00 | THE WOK WAY TO COOK |
| 08-NOV-01 | BIG BEAR AND LITTLE DOVE |
| 11-NOV-02 | HOW TO GET FASTER PIZZA |
| 09-MAY-99 | HOW TO MANAGE THE MANAGER |
| 01-MAY-01 | SHORTEST POEMS |

14 rows selected.

**FIGURE 2-11** Reversed column sequence in the SELECT clause

## OPERATIONS WITHIN THE SELECT STATEMENT

Now that you've selected columns from tables, let's look at some other operations. In this section, you'll learn how to use column aliases, employ arithmetic operations, eliminate duplicate output, and display rows on multiple lines.

### Using Column Aliases

In some cases, a column name can be a vague indicator of the data displayed in a particular column. To better describe the data listed, you can substitute a **column alias** for the column name in the results of a query. For example, if you are presenting a list of all books stored in the database, you might want the column heading to read Title of Books. To instruct the software to use a column alias, simply list the column alias next to the column name in the SELECT clause. Figure 2-12 shows the title and category for each book in the BOOKS table, but it adds a column alias for the title. The **optional keyword** of **AS** has been included in this example to distinguish between the column name and the column alias.



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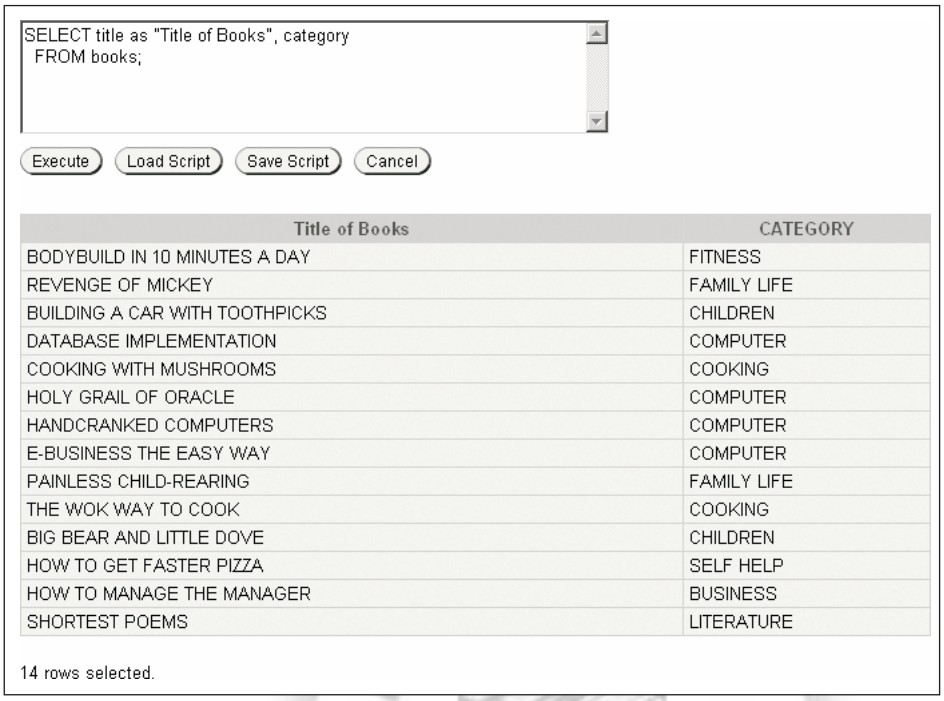


| Title of Books | CATEGORY |
|---|---|
| BODYBUILD IN 10 MINUTES A DAY | FITNESS |
| REVENGE OF MICKEY | FAMILY LIFE |
| BUILDING A CAR WITH TOOTHPICKS | CHILDREN |
| DATABASE IMPLEMENTATION | COMPUTER |
| COOKING WITH MUSHROOMS | COOKING |
| HOLY GRAIL OF ORACLE | COMPUTER |
| HANDCRANKED COMPUTERS | COMPUTER |
| E-BUSINESS THE EASY WAY | COMPUTER |
| PAINLESS CHILD-REARING | FAMILY LIFE |
| THE WOK WAY TO COOK | COOKING |
| BIG BEAR AND LITTLE DOVE | CHILDREN |
| HOW TO GET FASTER PIZZA | SELF HELP |
| HOW TO MANAGE THE MANAGER | BUSINESS |
| SHORTEST POEMS | LITERATURE |

14 rows selected.

**FIGURE 2-12** Using a column alias

You need to keep some guidelines in mind when using a column alias. If the column alias contains spaces, special symbols, or if you do not want it to appear in all capital letters, *it must be enclosed in double quotation marks* (" "). By default, the column headings shown in the results of queries are capitalized. The use of the double quotation marks overrides the default for the column heading. However, notice that the case of the data displayed *within* the column is not altered.

**NOTE**

As shown in the SELECT statement, *you must separate the list of field names with commas*. If you forget a comma, Oracle 10*g* interprets the subsequent field name as a column alias, and you do not receive the intended results.

If the column alias consists of only one word without special symbols, it does not need to be enclosed in double quotation marks. In Figure 2-13, the Retail field is assigned the column alias of Price. Also note that the optional keyword AS used in Figure 2-12 is not included. Because a comma does not separate the words *retail* and *price*, Oracle 10*g* assumes that Price is the column alias for the Retail column.



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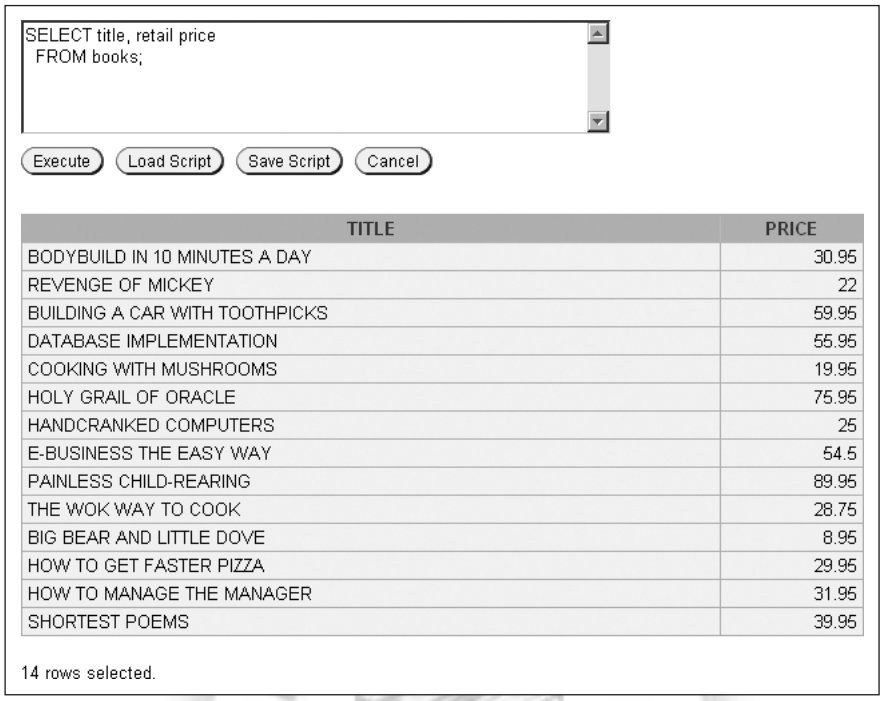


| TITLE | PRICE |
|---|---|
| BODYBUILD IN 10 MINUTES A DAY | 30.95 |
| REVENGE OF MICKEY | 22 |
| BUILDING A CAR WITH TOOTHPICKS | 59.95 |
| DATABASE IMPLEMENTATION | 55.95 |
| COOKING WITH MUSHROOMS | 19.95 |
| HOLY GRAIL OF ORACLE | 75.95 |
| HANDCRANKED COMPUTERS | 25 |
| E-BUSINESS THE EASY WAY | 54.5 |
| PAINLESS CHILD-REARING | 89.95 |
| THE WOK WAY TO COOK | 28.75 |
| BIG BEAR AND LITTLE DOVE | 8.95 |
| HOW TO GET FASTER PIZZA | 29.95 |
| HOW TO MANAGE THE MANAGER | 31.95 |
| SHORTEST POEMS | 39.95 |

14 rows selected.

**FIGURE 2-13** Using a column alias without the AS keyword

As you look at the results in Figure 2-13, notice the alignment of the column headings:

- By default, the data for text, or character, fields is left-aligned.
- Data for numeric fields is right-aligned.
- Notice that Oracle 10g does not display insignificant zeros (zeros that do not affect the value of the number being displayed). The retail price of the book *Handcranked Computers* is $25.00. Because the zeros in the two decimal positions are insignificant, Oracle 10g does not display them. To force Oracle 10g to display a specific number of decimal positions, formatting codes are required. These are presented later in the text.

## Using Arithmetic Operations

If needed, simple arithmetic operations such as multiplication (*), division (/), addition (+), and subtraction (-) can be used in the SELECT clause of a query. Keep in mind that Oracle 10g adheres to the standard order of operations:

1. Moving from left to right within the arithmetic equation, any required multiplication and division operations are solved first.
2. Any addition and subtraction operations are solved after multiplication and division, again moving from left to right within the equation.

To override the order of operations, you can use parentheses to enclose any portion of the equation that should be completed first.



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**NOTE**

Oracle 10*g* does not explicitly support an exponent operator in the SELECT statement. For example, in some programs, you can enter *number*^3 to raise a number to the power of three. (A number raised to the power of three means to multiply a number by itself three times; for example, $5^3$ equals *5 * 5 * 5*.) With Oracle 10*g*, if you need to use an exponential operation in the SELECT statement, either break it down into its multiplication equivalent or use the POWER function, which is introduced later in this text.

Next, you want to determine the profit generated by the sale of each book. The BOOKS table contains two fields you can use to derive the profit: Cost and Retail. A book's profit is the difference (subtraction) between the amount paid for the book by the bookstore (cost) and the selling price of the book (retail). To clarify the contents of the column, assign the column alias "profit" to the calculated field, as shown in Figure 2-14.

```
SELECT title, retail-cost profit
  FROM books;
```

Execute | Load Script | Save Script | Cancel

| TITLE | PROFIT |
|---|---|
| BODYBUILD IN 10 MINUTES A DAY | 12.2 |
| REVENGE OF MICKEY | 7.8 |
| BUILDING A CAR WITH TOOTHPICKS | 22.15 |
| DATABASE IMPLEMENTATION | 24.55 |
| COOKING WITH MUSHROOMS | 7.45 |
| HOLY GRAIL OF ORACLE | 28.7 |
| HANDCRANKED COMPUTERS | 3.2 |
| E-BUSINESS THE EASY WAY | 16.6 |
| PAINLESS CHILD-REARING | 41.95 |
| THE WOK WAY TO COOK | 9.75 |
| BIG BEAR AND LITTLE DOVE | 3.63 |
| HOW TO GET FASTER PIZZA | 12.1 |
| HOW TO MANAGE THE MANAGER | 16.55 |
| SHORTEST POEMS | 18.1 |

14 rows selected.

**FIGURE 2-14** Using a column alias for an arithmetic expression

## Using DISTINCT and UNIQUE

Suppose that you want to know the states in which your customers reside so you can focus a marketing campaign on a particular region of the country. You want a list to identify only the states, not customer names, addresses, and so on. One option is to select the State column from the CUSTOMERS table. You will quickly notice that some states are listed



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more than once if more than one customer lives in that particular state. If you are working with only 20 records, it is not a problem to simply cross out any duplicate states on a printout. However, if you are dealing with thousands of records, that is a cumbersome task.

To eliminate duplicate listings, you can use the DISTINCT option in your SELECT statement. For example, suppose that you have five customers living in Texas (TX). Without the DISTINCT option, TX appears in your results five times. If you include the DISTINCT option, TX appears only once. To use the DISTINCT option, use the keyword DISTINCT between the SELECT keyword and the first column of the column list, as shown in Figure 2-15.

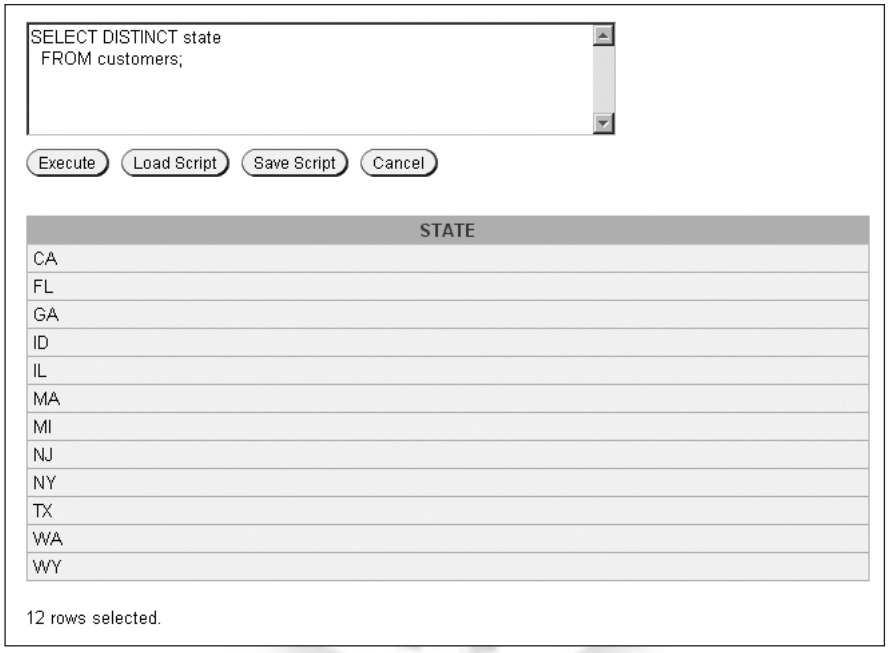


**FIGURE 2-15** List of unduplicated states for customers

In Figure 2-15, the database was queried to determine the states in which customers live. Although there are 20 customers in the CUSTOMERS table, they live in only 12 states. You could use this information to determine where you are most likely to attract more customers, or to identify geographical areas that are not responding to a current, nationwide marketing effort.

The DISTINCT keyword is applied to all columns listed in the SELECT clause, even though it is stated directly after the SELECT keyword. In the previous example, if you had also included CITY in the SELECT clause, each different combination of city and state would have been listed only once in the output. In other words, if no two customers in the database live in the same city and state, you still would have had 20 rows of output—one row for each customer.



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**NOTE**

You can also use the UNIQUE keyword to eliminate duplicates. It works the same way as the DISTINCT keyword. The following returns the same results as the example in Figure 2–15:

```
SELECT UNIQUE state
FROM customers;
```

## Using Concatenation

In previous examples, if an output list contained more than one field, each field was placed in a separate column. In some situations, however, you might want the contents of each field to be displayed next to each other, without much blank space. For example, for a list of customer names, you might prefer to have them combined to appear as a single column, rather than as separate first name and last name columns.

Combining the contents of two or more columns is known as **concatenation**. To instruct Oracle 10g to concatenate the output of a query, use two vertical bars or pipes (||). On a keyboard, this symbol is located above the backslash ( \ ). In the following example, the goal is to have the last name of the customer listed immediately after the first name, rather than in a separate column.

As you look at the results in Figure 2-16, the first thing you should notice is that the first name and last name of each customer run together, and it is difficult to tell where one name ends and the other begins. To make the results more readable, you need to include a blank space between the Firstname and Lastname fields.

To have Oracle 10g insert a blank space, you must concatenate, or combine, the Firstname and Lastname fields with a **string literal**. A string literal instructs Oracle 10g to interpret the characters you have entered "literally" and not to consider it as a keyword or command. *A string literal must be enclosed within single quotation marks ('').* When you use a string literal, the character or set of characters that you type should appear in the output exactly as you have typed them. In this instance, the string literal is a blank space. Figure 2-17 shows how the customer's list looks after including a blank space in the output.

Although you now have a readable list of all customer names, the display has an unusual column heading. The column heading shown in the results is exactly what you entered for the field list—including the concatenation symbols and the literal. If this list is for management or some individual who is not familiar with Oracle 10g, you might want to give your output a more professional appearance. Rather than have this unusual and unappealing column heading, you can have Oracle 10g substitute a column alias, as you did previously. The query in Figure 2-18 substitutes Customer Name as the column heading in the results.

**NOTE**

If you get an error message, make sure the blank space is in single quotation marks and the column alias is in double quotation marks.



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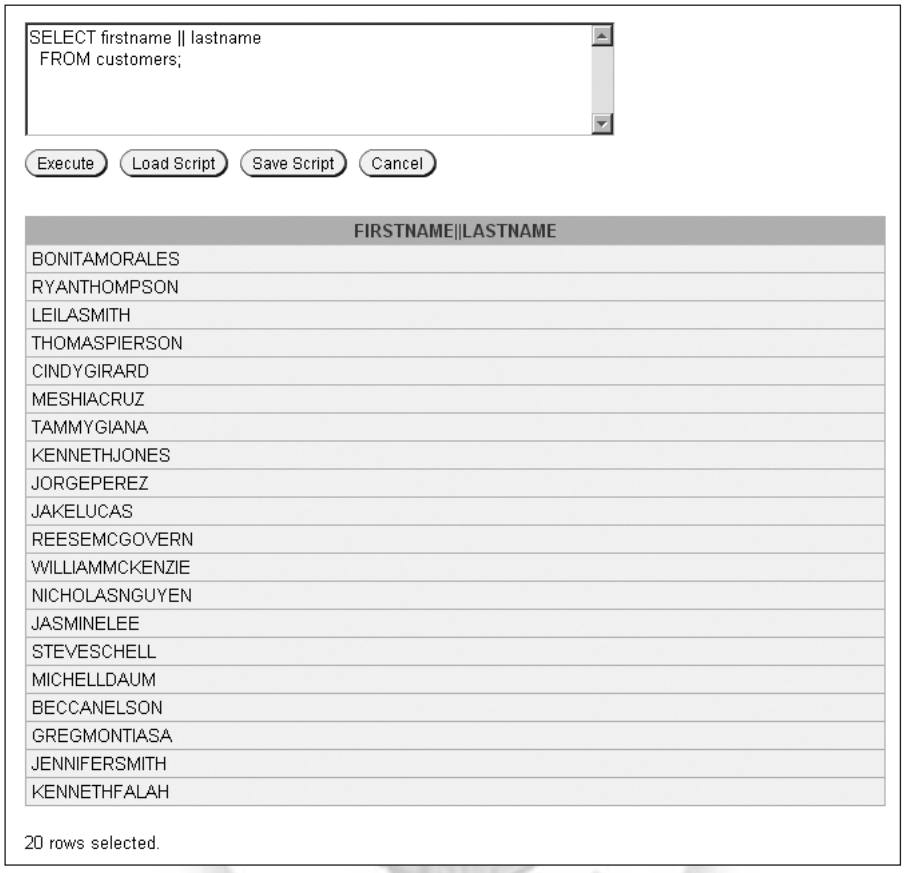


**FIGURE 2-16** Concatenation of two columns

## Inserting a Line Break

Suppose that management needs a list of all customers showing each customer's number and name on separate lines. Also, management requests that the customer names appear as "last name, first name." To display customer names this way, modify the query used in Figure 2-18 to switch the order of the columns and include a comma in the string literal. To have the customer number and name appear on separate lines, include **CHR(10)** after the customer number to instruct Oracle 10g to insert a line break. The CHR(10) code indicates to the computer that a line break should occur at that location. Anything listed after the CHR(10) code is displayed on the next line.



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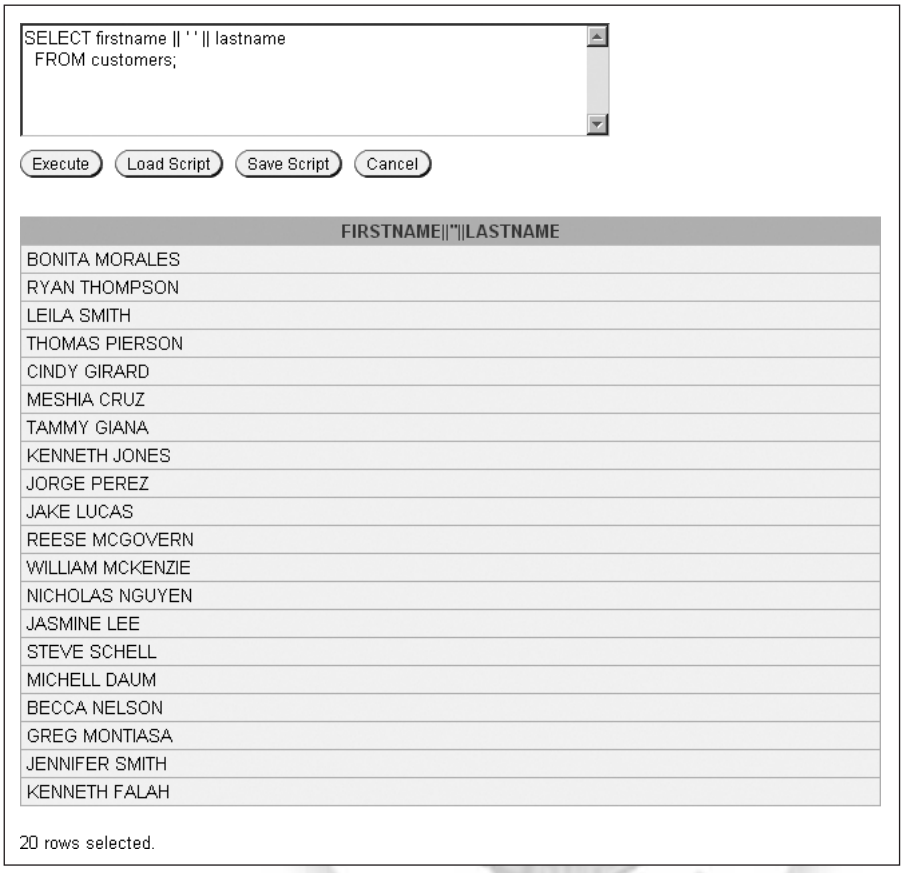


**FIGURE 2-17** Using a string literal within concatenation

**NOTE**

The CHR(10) code works properly only with pure text output. The default output format for iSQL*Plus is an HTML table. To change to pure text, click the **Preferences** button and choose the **Script Formatting** link. Set the **Preformatted Output** setting to **On** and click the **Apply** button. Move back to the workspace area and execute your statement. The output from the statement will now be in text format. The client SQL*Plus tool displays output in text format by default. Figure 2-19 displays only this first page of output.

You can use the CHR(10) code whenever you want output results to be displayed over several lines. As shown in Figure 2-19, concatenation (the vertical bars) is used to include the line break in the column. The CHR(10) code must be used in a concatenation operation.



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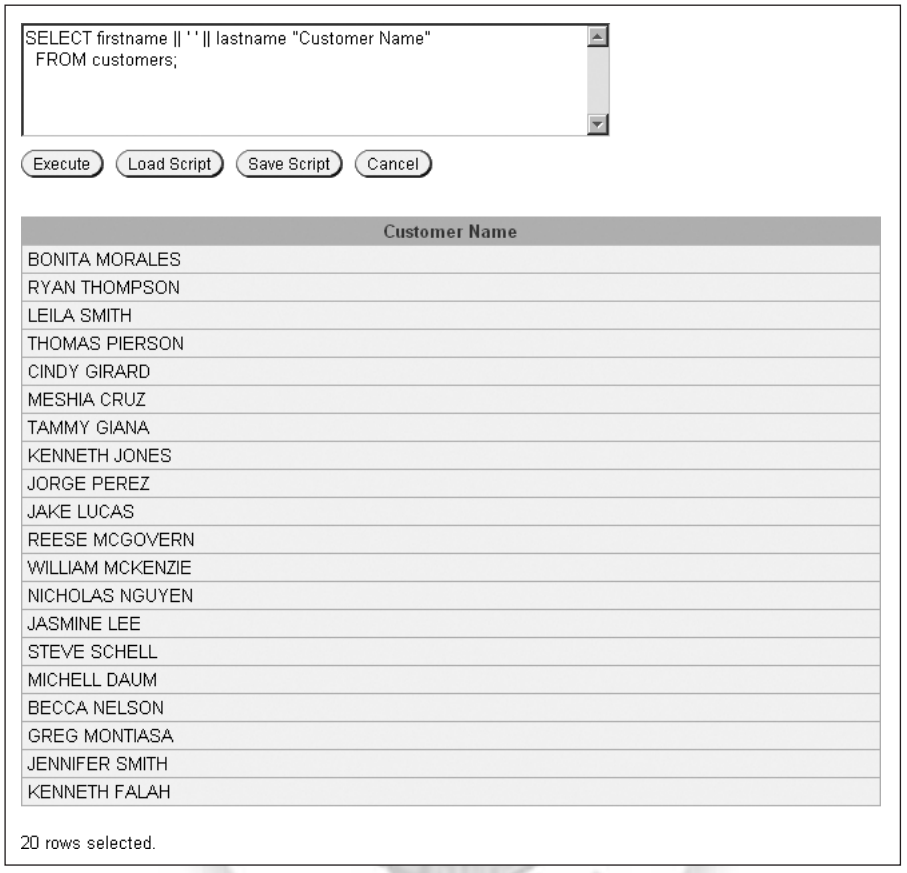


**FIGURE 2-18** Using a column alias for concatenated values



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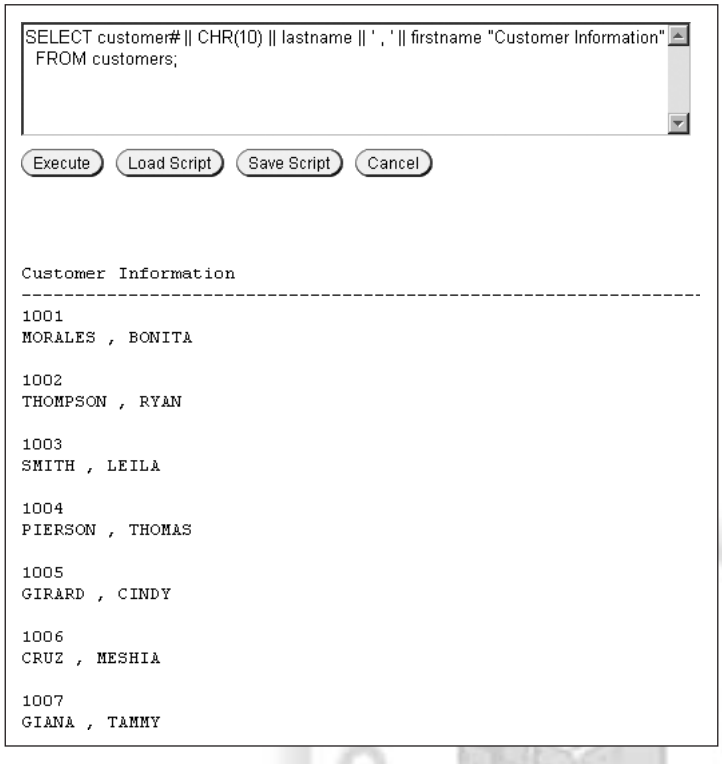


**FIGURE 2-19** First screen of the customer list using line breaks



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## Chapter Summary

- Oracle 10*g* is an ORDBMS.
- A basic query in Oracle 10*g* SQL includes the SELECT and FROM clauses, the only mandatory clauses in a SELECT statement.
- To view all columns in the table, specify an asterisk (*) or list all the column names individually in the SELECT clause.
- To display a specific column or set of columns, list the column names in the SELECT clause (in the order in which you want them to appear).
- When listing column names in the SELECT clause, a comma must separate column names.
- A column alias can be used to clarify the contents of a particular column. If the alias contains spaces or special symbols, or if you want to display the column with any lowercase letters, you must enclose the column alias in double quotation marks (" ").
- Basic arithmetic operations can be performed in the SELECT clause.
- To remove duplicate listings, include either the DISTINCT or UNIQUE keyword.
- To specify which table contains the desired columns, you must list the name of the table after the keyword FROM.
- Use vertical bars (||) to combine, or concatenate, fields, literals, and other data.
- A line break code of CHR(10) can be used to format output on multiple lines. The output must be formatted as text output in SQL*Plus for the line break command to operate properly.

## Chapter 2 Syntax Summary

*The following table presents a summary of the syntax that you have learned in this chapter. You can use the table as a study guide and reference.*

| SYNTAX GUIDE | | |
|---|---|---|
| Element | Description | Example |
| **SELECT** clause | Identify the column(s) for retrieval in a SELECT command | `SELECT title` |
| **FROM** clause | Identify the table containing selected columns | `FROM books` |
| **SELECT** statement | View column(s) in a table | `SELECT title`<br>`FROM books;` |
| , | Separate column names in a list when retrieving multiple columns from a table | `SELECT title,`<br>`pubdate`<br>`FROM books;` |



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## SYNTAX GUIDE

| Element | Description | Example |
|---|---|---|
| * | Return all data in a table when used in a SELECT clause | `SELECT *FROM books;` |
| **AS** | Indicate a column alias to change the heading of a column in output | `SELECT title AS titles, pubdate FROM books;` |
| | Create a column alias to change the heading of a column in output *without* using AS | `SELECT title titles, pubdate FROM books;` |
| " " | Preserve spaces, symbols, or case in an output column heading alias | `SELECT title AS "Book Name" FROM books;` |
| *** multiplication**<br>**/ division**<br>**+ addition**<br>**- subtraction** | Solve arithmetic operations (Oracle 10g first solves * and /, then solves + and -, unless parentheses are used) | `SELECT title, retail-cost profit FROM books;` |
| **DISTINCT** | Eliminate duplicate lists | `SELECT DISTINCT state FROM customers;` |
| **UNIQUE** | Eliminate duplicate lists | `SELECT UNIQUE state FROM customers;` |
| \|\| (concatenation) | Combine display of content from multiple columns into a single column | `SELECT city \|\| state FROM customers;` |
| ' '(string literal) | Indicate the exact set of characters, including spaces, to be displayed | `SELECT city \|\| ' ' \|\| state FROM customers;` |
| **CHR(10)** | Insert a line break | `SELECT customer# \|\| CHR(10) \|\| city \|\| ' ' \|\| state FROM customers;` |



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| SYNTAX GUIDE | | |
|---|---|---|
| Element | Description | Example |
| **DESCRIBE** | Display structure of a table | `DESCRIBE books` |
| ; *or* / | Execute a SQL statement | `SELECT Zip`<br>`FROM customers;`<br>*or*<br>`FROM customers/` |

## Review Questions

1. What is an RDBMS? An ORDBMS?
2. What are the two required clauses for a SELECT statement?
3. What is the purpose of the SELECT statement?
4. What does an asterisk (*) in the SELECT clause of a SELECT statement represent?
5. What is the purpose of a column alias?
6. How do you indicate that a column alias should be used?
7. When is it appropriate to use a column alias?
8. What are the guidelines to keep in mind when using a column alias?
9. How can you concatenate columns in a query?
10. How do you indicate that a line break should occur in the output of a query?

### Multiple Choice

*To determine the exact name of the fields used in the tables for these questions, refer either to Appendix A or use the* **DESCRIBE *tablename*** *command to view the structure of the appropriate table.*

1. Which of the following SELECT statements will provide a list of customer names from the CUSTOMERS table?
   a. SELECT customer names FROM customers;
   b. SELECT "Names" FROM customers;
   c. SELECT firstname, lastname FROM customers;
   d. SELECT firstname, lastname, FROM customers;
   e. SELECT firstname, lastname, "Customer Names" FROM customers;
2. Which clause is required in a SELECT statement?
   a. WHERE
   b. ORDER BY
   c. GROUP BY
   d. FROM
   e. all of the above



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3. Which of the following is *not* a valid SELECT statement?
   a. SELECT lastname, firstname FROM customers;
   b. SELECT * FROM orders;
   c. Select FirstName NAME from CUSTOMERS;
   d. SELECT lastname Last Name FROM customers;
4. Which of the following symbols is used to represent concatenation?
   a. *
   b. ||
   c. [ ]
   d. ' '
5. Which of the following SELECT statements will return all the fields in the ORDERS table?
   a. SELECT customer#, order#, orderdate, shipped, address FROM orders;
   b. SELECT * FROM orders;
   c. SELECT ? FROM orders;
   d. SELECT ALL FROM orders;
6. Which of the following symbols is used for a column alias that contains spaces?
   a. ' '
   b. ||
   c. " "
   d. / /
7. Which of the following is a valid SELECT statement?
   a. SELECT TITLES *TITLE! FROM BOOKS;
   b. SELECT "customer#" FROM books;
   c. SELECT title AS "Book Title" from books;
   d. all of the above
8. Which of the following symbols is used in a SELECT clause to display all columns from a table?
   a. /
   b. &
   c. *
   d. ''
9. Which of the following is *not* a valid SELECT statement?
   a. SELECT Cost-Retail FROM books;
   b. SELECT Retail+Cost FROM books;
   c. SELECT retail*retail*retail FROM books;
   d. SELECT retail^3 from books;



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10. When must a comma be used in the SELECT clause of a query?
    a. when a field name is followed by a column alias
    b. to separate the SELECT clause and the FROM clause when only one field is selected
    c. It is never used in the SELECT clause.
    d. when listing more than one field name and the fields are not concatenated
    e. when an arithmetic expression is being included in the SELECT clause
11. Which of the following commands will display a listing of the category for each book in the BOOKS table?
    a. SELECT title books, category FROM books;
    b. SELECT title, books, and category FROM books;
    c. SELECT title, cat FROM books;
    d. SELECT books, ||category "Categories" FROM books;
12. Which clause is *not* required in a SELECT statement?
    a. SELECT
    b. FROM
    c. WHERE
    d. All of the above clauses are required.
13. Which of the following lines of the SELECT statement contains an error?
    1. SELECT title, isbn,
    2. Pubdate "Date of Publication"
    3. FROM books;
    a. line 1
    b. line 2
    c. line 3
    d. There are no errors.
14. Which of the following lines of the SELECT statement contains an error?
    1. SELECT ISBN,
    2. retail-cost
    3. FROM books;
    a. line 1
    b. line 2
    c. line 3
    d. There are no errors.



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15. Which of the following lines of the SELECT statement contains an error?

    1. SELECT title, cost,
    2. cost*2
    3. 'With 200% MarkUp'
    4. FROM books;

    a. line 1
    b. line 2
    c. line 3
    d. line 4
    e. There are no errors.

16. Which of the following lines of the SELECT statement contains an error?

    1. SELECT name, contact,
    2. "Person to Call", phone
    3. FROM publisher;

    a. line 1
    b. line 2
    c. line 3
    d. There are no errors.

17. Which of the following lines of the SELECT statement contains an error?

    1. SELECT ISBN, || ' is the ISBN for the book named ' ||
    2. title
    3. FROM books;

    a. line 1
    b. line 2
    c. line 3
    d. There are no errors.

18. Which of the following lines of the SELECT statement contains an error?

    1. SELECT title, category
    2. FORM books;

    a. line 1
    b. line 2
    c. There are no errors.



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19. Which of the following lines of the SELECT statement contains an error?

    1. SELECT name, contact, CHR(10),
    2. "Person to Call", phone
    3. FROM publisher;

    a. line 1
    b. line 2
    c. line 3
    d. There are no errors.

20. Which of the following lines of the SELECT statement contains an error?

    1. SELECT *
    2. FROM publishers;

    a. line 1
    b. line 2
    c. There are no errors.

## Hands-On Assignments

*To determine the exact name of the fields used in the tables for these exercises, refer to Appendix A or use the* **DESCRIBE *tablename*** *command to view the structure of the appropriate table.*

1. Display a list of all data contained within the BOOKS table.
2. List the title only of all the books available in inventory, using the BOOKS table.
3. List the title and publication date for each book in the BOOKS table. Use the column heading of Publication Date for the Pubdate field.
4. List the customer number for each customer in the CUSTOMERS table, along with the city and state in which they reside.
5. Create a list containing the name of each publisher, the person usually contacted, and the telephone number of the publisher. Rename the contact column Contact Person in the displayed results. (*Hint*: Use the PUBLISHER table.)
6. Determine which categories are represented by the current book inventory. List each category only once.
7. List the customer number from the ORDERS table for each customer who has placed an order with the bookstore. List each customer number only once.
8. Create a list of each book title stored in the BOOKS table and the category in which each book belongs. Reverse the sequence of the columns so the category of each book is listed first.
9. List the first and last name of each author in the AUTHORS table.
10. Create a list of authors that displays the last name followed by the first name for each author. The last names and first names should be separated by a comma and a blank space.



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## Advanced Challenge

The management of JustLee Books has submitted two requests. The first is for a mailing list of all customers stored in the CUSTOMERS table. The second is for a list of the percentage of profit generated by each book in the BOOKS table. The requests are as follows:

1. Create a mailing list from the CUSTOMERS table. The mailing list should display the name, address, city, state, and zip code for each customer. The name of each customer should be listed in order of first name followed by last name. The name of the customer should appear on the first line, the address on the second line, and the city, state, and zip code on the third line.
2. To determine the percentage of profit for a particular item, subtract the cost for the item from the retail price to obtain the dollar amount of profit, and then divide the profit by the cost of the item. The solution is then multiplied by 100 to determine the profit percentage for each book. Use a SELECT statement to display the title of each book and its percentage of profit. For the column displaying the percentage markup, use Profit % as the column heading.

**Required:** Determine the SQL statements needed to perform the two required tasks. Each statement should be tested to ensure its validity. Submit the appropriate documentation of the commands and their results using the format specified by your instructor.

## Case Study*: City Jail*

The case study resumes in Chapter 3.



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