1

Retrieving Data Using the SQL SELECT Statement

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Objectives

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

- List the capabilities of SQL `SELECT` statements
- Execute a basic `SELECT` statement

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Objectives

To extract data from the database, you need to use the SQL `SELECT` statement. However, you may need to restrict the columns that are displayed. This lesson describes all the SQL statements that are needed to perform these actions. Further, you may want to create `SELECT` statements that can be used more than once.

Lesson Agenda

- Basic `SELECT` statement
- Arithmetic expressions and `NULL` values in the `SELECT` statement
- Column aliases
- Use of concatenation operator, literal character strings, alternative quote operator, and the `DISTINCT` keyword
- `DESCRIBE` command

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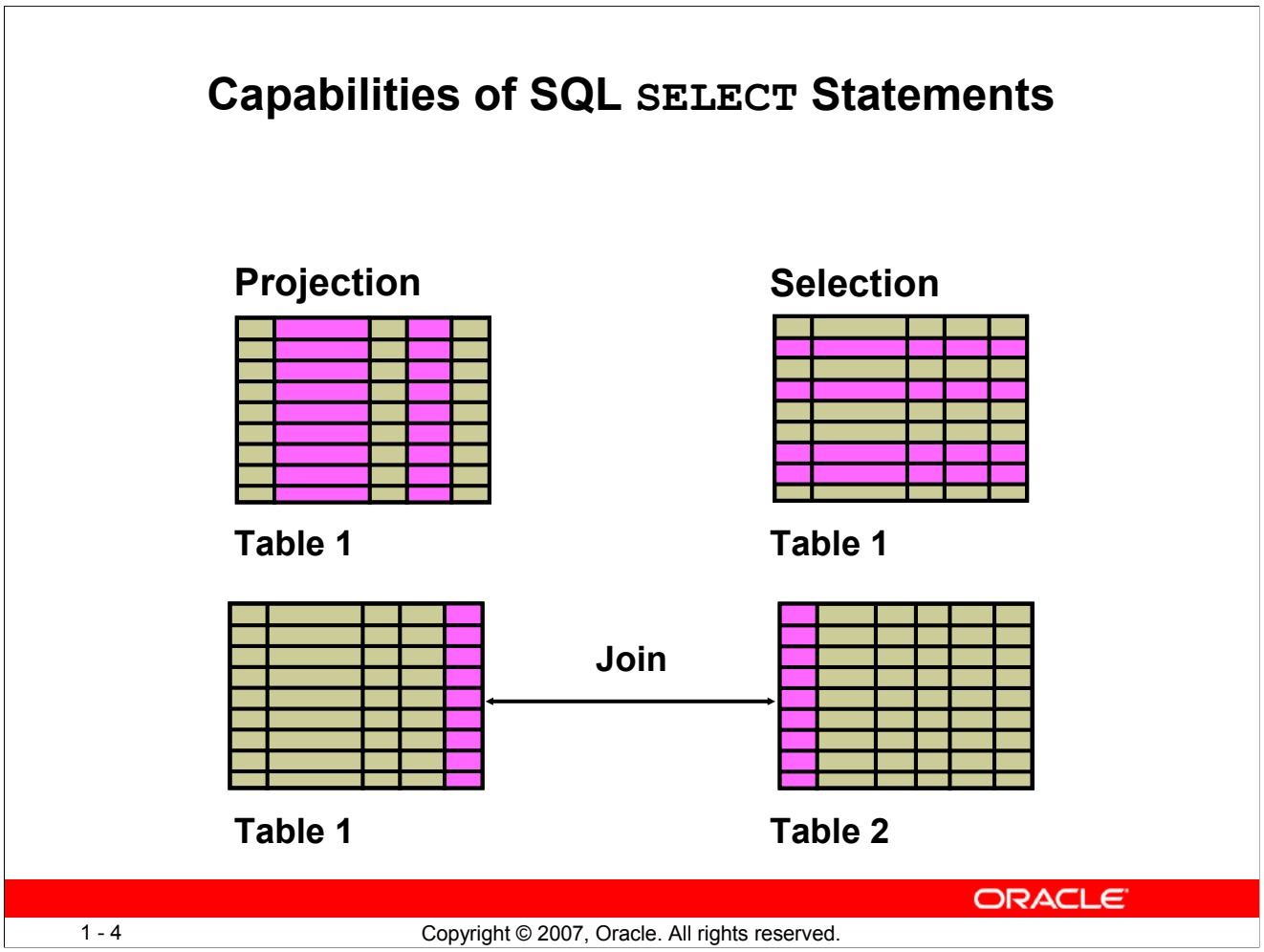
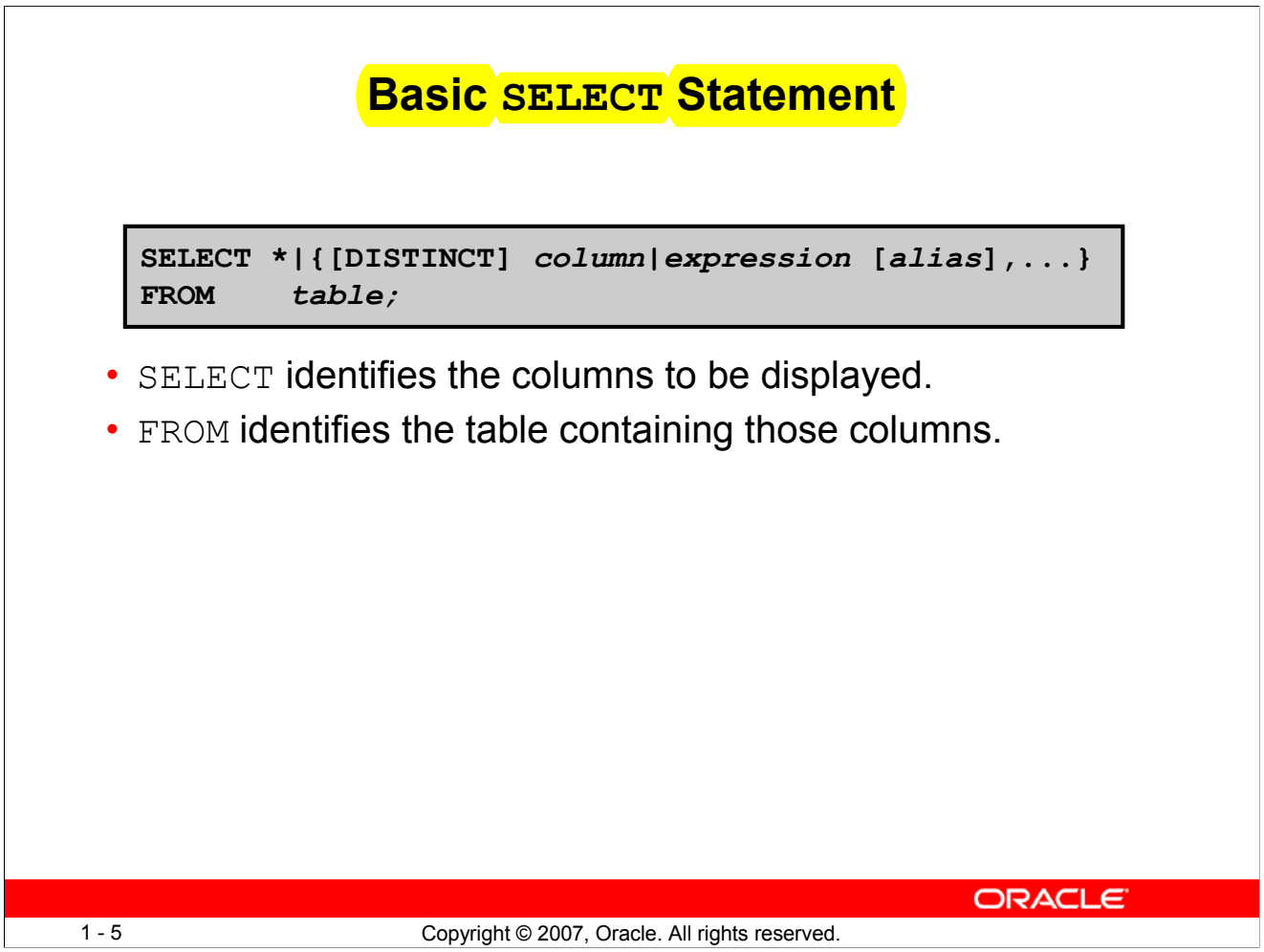


Capabilities of SQL `SELECT` Statements

A `SELECT` statement retrieves information from the database. With a `SELECT` statement, you can use the following capabilities:

- **Projection:** Select the columns in a table that are returned by a query. Select as few or as many of the columns as required.
- **Selection:** Select the rows in a table that are returned by a query. Various criteria can be used to restrict the rows that are retrieved.
- **Joining:** Bring together data that is stored in different tables by specifying the link between them. SQL joins are covered in more detail in the lesson titled “Displaying Data from Multiple Tables.”



Basic SELECT Statement

In its simplest form, a SELECT statement must include the following:

- A SELECT clause, which specifies the columns to be displayed
- A FROM clause, which identifies the table containing the columns that are listed in the SELECT clause

In the syntax:

SELECT	is a list of one or more columns
*	selects all columns
DISTINCT	suppresses duplicates
column|expression	selects the named column or the expression
alias	gives the selected columns different headings
FROM *table*	specifies the table containing the columns

Note: Throughout this course, the words *keyword*, *clause*, and *statement* are used as follows:

- A *keyword* refers to an individual SQL element.
  For example, SELECT and FROM are keywords.
- A *clause* is a part of a SQL statement.
  For example, SELECT employee_id, last_name, and so on is a clause.
- A *statement* is a combination of two or more clauses.
  For example, SELECT * FROM employees is a SQL statement.

Selecting All Columns

```
SELECT *
FROM   departments;
```

	DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
1	10	Administration	200	1700
2	20	Marketing	201	1800
3	50	Shipping	124	1500
4	60	IT	103	1400
5	80	Sales	149	2500
6	90	Executive	100	1700
7	110	Accounting	205	1700
8	190	Contracting	(null)	1700

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Selecting All Columns

You can display all columns of data in a table by following the `SELECT` keyword with an asterisk (`*`). In the example in the slide, the department table contains four columns: `DEPARTMENT_ID`, `DEPARTMENT_NAME`, `MANAGER_ID`, and `LOCATION_ID`. The table contains eight rows, one for each department.

You can also display all columns in the table by listing all the columns after the `SELECT` keyword. For example, the following SQL statement (like the example in the slide) displays all columns and all rows of the `DEPARTMENTS` table:

```
SELECT  department_id, department_name, manager_id, location_id
FROM    departments;
```

Note: In SQL Developer, you can enter your SQL statement in a SQL Worksheet and click the "Execute Statement" icon or press [F9] to execute the statement. The output displayed in the Results tabbed page appears as shown in the slide.

Selecting Specific Columns

```
SELECT department_id, location_id
FROM   departments;
```

	DEPARTMENT_ID	LOCATION_ID
1	10	1700
2	20	1800
3	50	1500
4	60	1400
5	80	2500
6	90	1700
7	110	1700
8	190	1700

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Selecting Specific Columns

You can use the `SELECT` statement to display specific columns of the table by specifying the column names, separated by commas. The example in the slide displays all the department numbers and location numbers from the `DEPARTMENTS` table.

In the `SELECT` clause, specify the columns that you want in the order in which you want them to appear in the output. For example, to display location before department number (from left to right), you use the following statement:

```
SELECT location_id, department_id
FROM   departments;
```

	LOCATION_ID	DEPARTMENT_ID
1	1700	10
2	1800	20
3	1500	50
4	1400	60

...

Writing SQL Statements

- SQL statements are not case-sensitive.
- SQL statements can be entered on one or more lines.
- Keywords cannot be abbreviated or split across lines.
- Clauses are usually placed on separate lines.
- Indents are used to enhance readability.
- In SQL Developer, SQL statements can optionally be terminated by a semicolon (;). Semicolons are required when you execute multiple SQL statements.
- In SQL*Plus, you are required to end each SQL statement with a semicolon (;).

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Writing SQL Statements

By using the following simple rules and guidelines, you can construct valid statements that are both easy to read and edit:

- SQL statements are not case-sensitive (unless indicated).
- SQL statements can be entered on one or many lines.
- Keywords cannot be split across lines or abbreviated.
- Clauses are usually placed on separate lines for readability and ease of editing.
- Indents should be used to make code more readable.
- Keywords typically are entered in uppercase; all other words, such as table names and columns names are entered in lowercase.

Executing SQL Statements

In SQL Developer, click the Run Script icon or press [F5] to run the command or commands in the SQL Worksheet. You can also click the Execute Statement icon or press [F9] to run a SQL statement in the SQL Worksheet. The Execute Statement icon executes the statement at the mouse pointer in the Enter SQL Statement box while the Run Script icon executes all the statements in the Enter SQL Statement box. The Execute Statement icon displays the output of the query on the Results tabbed page while the Run Script icon emulates the SQL*Plus display and shows the output on the Script Output tabbed page.

In SQL*Plus, terminate the SQL statement with a semicolon, and then press [Enter] to run the command.

Column Heading Defaults

- SQL Developer:
  - Default heading alignment: Left-aligned
  - Default heading display: Uppercase
- SQL*Plus:
  - Character and Date column headings are left-aligned.
  - Number column headings are right-aligned.
  - Default heading display: Uppercase

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Column Heading Defaults

In SQL Developer, column headings are displayed in uppercase and are left-aligned.

```
SELECT last_name, hire_date, salary
FROM   employees;
```

	LAST_NAME	HIRE_DATE	SALARY
1	King	17-JUN-87	24000
2	Kochhar	21-SEP-89	17000
3	De Haan	13-JAN-93	17000
4	Hunold	03-JAN-90	9000
5	Ernst	21-MAY-91	6000
6	Lorentz	07-FEB-99	4200
7	Mourgos	16-NOV-99	5800
8	Rajs	17-OCT-95	3500

...

You can override the column heading display with an alias. Column aliases are covered later in this lesson.

Lesson Agenda

- Basic SELECT statement
- Arithmetic expressions and NULL values in the SELECT statement
- Column Aliases
- Use of concatenation operator, literal character strings, alternative quote operator, and the DISTINCT keyword
- DESCRIBE command

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Arithmetic Expressions

Create expressions with number and date data by using arithmetic operators.

Operator	Description
+	Add
-	Subtract
*	Multiply
/	Divide

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Arithmetic Expressions

You may need to modify the way in which data is displayed, or you may want to perform calculations, or look at what-if scenarios. All these are possible using arithmetic expressions. An arithmetic expression can contain column names, constant numeric values, and the arithmetic operators.

Arithmetic Operators

The slide lists the arithmetic operators that are available in SQL. You can use arithmetic operators in any clause of a SQL statement (except the `FROM` clause).

Note: With the `DATE` and `TIMESTAMP` data types, you can use the addition and subtraction operators only.

Using Arithmetic Operators

```
SELECT last_name, salary, salary + 300
FROM   employees;
```

	LAST_NAME	SALARY	SALARY+300
1	King	24000	24300
2	Kochhar	17000	17300
3	De Haan	17000	17300
4	Hunold	9000	9300
5	Ernst	6000	6300
6	Lorentz	4200	4500
7	Mourgos	5800	6100
8	Rajs	3500	3800
9	Davies	3100	3400
10	Matos	2600	2900

...

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Using Arithmetic Operators

The example in the slide uses the addition operator to calculate a salary increase of $300 for all employees. The slide also displays a `SALARY+300` column in the output.

Note that the resultant calculated column, `SALARY+300`, is not a new column in the `EMPLOYEES` table; it is for display only. By default, the name of a new column comes from the calculation that generated it—in this case, `salary+300`.

Note: The Oracle server ignores blank spaces before and after the arithmetic operator.

Operator Precedence

If an arithmetic expression contains more than one operator, multiplication and division are evaluated first. If operators in an expression are of the same priority, then evaluation is done from left to right.

You can use parentheses to force the expression that is enclosed by the parentheses to be evaluated first.

Rules of Precedence:

- Multiplication and division occur before addition and subtraction.
- Operators of the same priority are evaluated from left to right.
- Parentheses are used to override the default precedence or to clarify the statement.

Operator Precedence

```
SELECT last_name, salary, 12*salary+100
FROM   employees;
```

1

	LAST_NAME	SALARY	12*SALARY+100
1	King	24000	288100
2	Kochhar	17000	204100
3	De Haan	17000	204100

...

```
SELECT last_name, salary, 12*(salary+100)
FROM   employees;
```

2

	LAST_NAME	SALARY	12*(SALARY+100)
1	King	24000	289200
2	Kochhar	17000	205200
3	De Haan	17000	205200

...

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Operator Precedence (continued)

The first example in the slide displays the last name, salary, and annual compensation of employees. It calculates the annual compensation by multiplying the monthly salary with 12, plus a one-time bonus of $100. Note that multiplication is performed before addition.

Note: Use parentheses to reinforce the standard order of precedence and to improve clarity. For example, the expression in the slide can be written as `(12*salary)+100` with no change in the result.

Using Parentheses

You can override the rules of precedence by using parentheses to specify the desired order in which the operators are to be executed.

The second example in the slide displays the last name, salary, and annual compensation of employees. It calculates the annual compensation as follows: adding a monthly bonus of $100 to the monthly salary, and then multiplying that subtotal with 12. Because of the parentheses, addition takes priority over multiplication.

Defining a Null Value

- Null is a value that is unavailable, unassigned, unknown, or inapplicable.
- Null is not the same as zero or a blank space.

```
SELECT last_name, job_id, salary, commission_pct
FROM   employees;
```

	LAST_NAME	JOB_ID	SALARY	COMMISSION_PCT
1	King	AD_PRES	24000	(null)
2	Kochhar	AD_VP	17000	(null)
...				
12	Zlotkey	SA_MAN	10500	0.2
13	Abel	SA_REP	11000	0.3
14	Taylor	SA_REP	8600	0.2
...				
19	Higgins	AC_MGR	12000	(null)
20	Gietz	AC_ACCOUNT	8300	(null)

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Defining a Null Value

If a row lacks a data value for a particular column, that value is said to be *null* or to contain a null.

Null is a value that is unavailable, unassigned, unknown, or inapplicable. Null is not the same as zero or a blank space. Zero is a number and blank space is a character.

Columns of any data type can contain nulls. However, some constraints (`NOT NULL` and `PRIMARY KEY`) prevent nulls from being used in the column.

In the `COMMISSION_PCT` column in the `EMPLOYEES` table, notice that only a sales manager or sales representative can earn a commission. Other employees are not entitled to earn commissions. A null represents that fact.

Note: By default, SQL Developer uses the literal, (null), to identify null values. However, you can set it to something more relevant to you. To do so, select Preferences from the Tools menu. In the Preferences dialog box, expand the Database node. Click Advanced Parameters and on the right pane, for the "Display Null value As," enter the appropriate value.

Null Values in Arithmetic Expressions

Arithmetic expressions containing a null value evaluate to null.

```
SELECT last_name, 12*salary*commission_pct
FROM   employees;
```

	LAST_NAME	12*SALARY*COMMISSION_PCT
1	King	(null)
2	Kochhar	(null)
...		
12	Zlotkey	25200
13	Abel	39600
14	Taylor	20640
...		
19	Higgins	(null)
20	Gietz	(null)

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Null Values in Arithmetic Expressions

If any column value in an arithmetic expression is null, the result is null. For example, if you attempt to perform division by zero, you get an error. However, if you divide a number by null, the result is a null or unknown.

In the example in the slide, employee King does not get any commission. Because the `COMMISSION_PCT` column in the arithmetic expression is null, the result is null.

For more information, see the section on "Basic Elements of Oracle SQL" in *Oracle Database SQL Language Reference 11g, Release 1 (11.1)*.

Lesson Agenda

- Basic `SELECT` statement
- Arithmetic expressions and `NULL` values in the `SELECT` statement
- Column aliases
- Use of concatenation operator, literal character strings, alternative quote operator, and the `DISTINCT` keyword
- `DESCRIBE` command

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Defining a Column Alias

A column alias:

- Renames a column heading
- Is useful with calculations
- Immediately follows the column name (There can also be the optional `AS` keyword between the column name and alias.)
- Requires double quotation marks if it contains spaces or special characters, or if it is case-sensitive

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Defining a Column Alias

When displaying the result of a query, SQL Developer normally uses the name of the selected column as the column heading. This heading may not be descriptive and, therefore, may be difficult to understand. You can change a column heading by using a column alias.

Specify the alias after the column in the `SELECT` list using blank space as a separator. By default, alias headings appear in uppercase. If the alias contains spaces or special characters (such as # or $), or if it is case-sensitive, enclose the alias in double quotation marks (“ ”).

Using Column Aliases

```
SELECT last_name AS name, commission_pct comm
FROM   employees;
```

	NAME	COMM
1	King	(null)
2	Kochhar	(null)
3	De Haan	(null)

...

```
SELECT last_name "Name" , salary*12 "Annual Salary"
FROM   employees;
```

	Name	Annual Salary
1	King	288000
2	Kochhar	204000
3	De Haan	204000

...

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Using Column Aliases

The first example displays the names and the commission percentages of all the employees. Note that the optional `AS` keyword has been used before the column alias name. The result of the query is the same whether the `AS` keyword is used or not. Also, note that the SQL statement has the column aliases, `name` and `comm`, in lowercase, whereas the result of the query displays the column headings in uppercase. As mentioned in the previous slide, column headings appear in uppercase by default.

The second example displays the last names and annual salaries of all the employees. Because `Annual Salary` contains a space, it has been enclosed in double quotation marks. Note that the column heading in the output is exactly the same as the column alias.

Lesson Agenda

- Basic `SELECT` Statement
- Arithmetic Expressions and NULL values in `SELECT` statement
- Column Aliases
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- `DESCRIBE` command

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Concatenation Operator

A concatenation operator:

- Links columns or character strings to other columns
- Is represented by two vertical bars (||)
- Creates a resultant column that is a character expression

```
SELECT   last_name||job_id AS "Employees"
FROM     employees;
```

	Employees
1	AbelSA_REP
2	DaviesST_CLERK
3	De HaanAD_VP
4	ErnstIT_PROG
5	FayMK_REP

...

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Concatenation Operator

You can link columns to other columns, arithmetic expressions, or constant values to create a character expression by using the concatenation operator (||). Columns on either side of the operator are combined to make a single output column.

In the example, `LAST_NAME` and `JOB_ID` are concatenated, and given the alias `Employees`. Note that the last name of the employee and the job code are combined to make a single output column.

The `AS` keyword before the alias name makes the `SELECT` clause easier to read.

Null Values with the Concatenation Operator

If you concatenate a null value with a character string, the result is a character string. `LAST_NAME || NULL` results in `LAST_NAME`.

Note: You can also concatenate date expressions with other expressions or columns.

Literal Character Strings

- A literal is a character, a number, or a date that is included in the `SELECT` statement.
- Date and character literal values must be enclosed within single quotation marks.
- Each character string is output once for each row returned.

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Literal Character Strings

A literal is a character, a number, or a date that is included in the `SELECT` list. It is not a column name or a column alias. It is printed for each row returned. Literal strings of free-format text can be included in the query result and are treated the same as a column in the `SELECT` list.

Date and character literals *must* be enclosed within single quotation marks (`' '`); number literals need not be enclosed in a similar manner.

Using Literal Character Strings

```
SELECT last_name ||' is a '||job_id
       AS "Employee Details"
FROM   employees;
```

	Employee Details
1	Abel is a SA_REP
2	Davies is a ST_CLERK
3	De Haan is a AD_VP
4	Ernst is a IT_PROG
5	Fay is a MK_REP

...

18	Vargas is a ST_CLERK
19	Whalen is a AD_ASST
20	Zlotkey is a SA_MAN

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Using Literal Character Strings

The example in the slide displays the last names and job codes of all employees. The column has the heading Employee Details. Note the spaces between the single quotation marks in the `SELECT` statement. The spaces improve the readability of the output.

In the following example, the last name and salary for each employee are concatenated with a literal, to give the returned rows more meaning:

```
SELECT last_name ||': 1 Month salary = '||salary Monthly
FROM   employees;
```

	MONTHLY
1	King: 1 Month salary = 24000
2	Kochhar: 1 Month salary = 17000
3	De Haan: 1 Month salary = 17000
4	Hunold: 1 Month salary = 9000
5	Ernst: 1 Month salary = 6000
6	Lorentz: 1 Month salary = 4200
7	Mourgos: 1 Month salary = 5800
8	Rajs: 1 Month salary = 3500

...

Alternative Quote (q) Operator

- Specify your own quotation mark delimiter.
- Select any delimiter.
- Increase readability and usability.

```
SELECT department_name || ' Department' ||
       q'['s Manager Id: ]'
       || manager_id
       AS "Department and Manager"
FROM departments;
```

	Department and Manager
1	Administration Department's Manager Id:200
2	Marketing Department's Manager Id:201
3	Shipping Department's Manager Id:124
4	IT Department's Manager Id:103
5	Sales Department's Manager Id:149
6	Executive Department's Manager Id:100
7	Accounting Department's Manager Id:205
8	Contracting Department's Manager Id:

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Alternative Quote (q) Operator

Many SQL statements use character literals in expressions or conditions. If the literal itself contains a single quotation mark, you can use the quote (q) operator and select your own quotation mark delimiter.

You can choose any convenient delimiter, single-byte or multibyte, or any of the following character pairs: [ ], { }, ( ), or < >.

In the example shown, the string contains a single quotation mark, which is normally interpreted as a delimiter of a character string. By using the q operator, however, brackets [] are used as the quotation mark delimiters. The string between the brackets delimiters is interpreted as a literal character string.

Duplicate Rows

The default display of queries is all rows, including duplicate rows.

```
SELECT department_id
FROM   employees;
```

1

	DEPARTMENT_ID
1	90
2	90
3	90
4	60
5	60

...

```
SELECT DISTINCT department_id
FROM   employees;
```

2

	DEPARTMENT_ID
1	(null)
2	90
3	20
4	110

...

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Duplicate Rows

Unless you indicate otherwise, SQL displays the results of a query without eliminating the duplicate rows. The first example in the slide displays all the department numbers from the `EMPLOYEES` table. Note that the department numbers are repeated.

To eliminate duplicate rows in the result, include the `DISTINCT` keyword in the `SELECT` clause immediately after the `SELECT` keyword. In the second example in the slide, the `EMPLOYEES` table actually contains 20 rows, but there are only seven unique department numbers in the table.

You can specify multiple columns after the `DISTINCT` qualifier. The `DISTINCT` qualifier affects all the selected columns, and the result is every distinct combination of the columns.

```
SELECT  DISTINCT department_id, job_id
FROM    employees;
```

	DEPARTMENT_ID	JOB_ID
1	110	AC_ACCOUNT
2	90	AD_VP
3	50	ST_CLERK
4	80	SA_REP
5	50	ST_MAN

...

Lesson Agenda

- Basic `SELECT` statement
- Arithmetic expressions and `NULL` values in the `SELECT` statement
- Column aliases
- Use of concatenation operator, literal character strings, alternative quote operator, and the `DISTINCT` keyword
- `DESCRIBE` command

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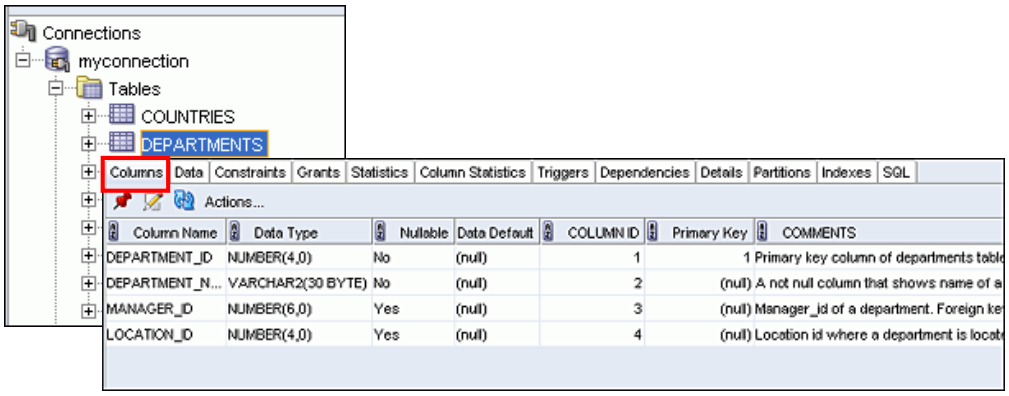
Displaying the Table Structure

- Use the `DESCRIBE` command to display the structure of a table.
- Or, select the table in the Connections tree and use the Columns tab to view the table structure.

```
DESC[RIBE] tablename
```



Displaying the Table Structure

In SQL Developer, you can display the structure of a table by using the `DESCRIBE` command. The command displays the column names and the data types, and it shows you whether a column *must* contain data (that is, whether the column has a `NOT NULL` constraint).

In the syntax, *`table name`* is the name of any existing table, view, or synonym that is accessible to the user.

Using the SQL Developer GUI interface, you can select the table in the Connections tree and use the Columns tab to view the table structure.

Note: The `DESCRIBE` command is supported by both SQL*Plus and SQL Developer.

Using the DESCRIBE Command

```
DESCRIBE employees
```

```
DESCRIBE employees
Name                          Null     Type
----------------------------- -------- ----------------------
EMPLOYEE_ID                   NOT NULL NUMBER(6)
FIRST_NAME                             VARCHAR2(20)
LAST_NAME                     NOT NULL VARCHAR2(25)
EMAIL                         NOT NULL VARCHAR2(25)
PHONE_NUMBER                           VARCHAR2(20)
HIRE_DATE                     NOT NULL DATE
JOB_ID                        NOT NULL VARCHAR2(10)
SALARY                                 NUMBER(8,2)
COMMISSION_PCT                         NUMBER(2,2)
MANAGER_ID                             NUMBER(6)
DEPARTMENT_ID                          NUMBER(4)

11 rows selected
```

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Using the DESCRIBE Command

The example in the slide displays information about the structure of the EMPLOYEES table using the DESCRIBE command.

In the resulting display, *Null* indicates that the values for this column may be unknown. NOT NULL indicates that a column must contain data. *Type* displays the data type for a column.

The data types are described in the following table:

Data Type	Description
NUMBER(*p*,*s*)	Number value having a maximum number of digits *p*, with *s* digits to the right of the decimal point
VARCHAR2(*s*)	Variable-length character value of maximum size *s*
DATE	Date and time value between January 1, 4712 B.C. and December 31, A.D. 9999.
CHAR(*s*)	Fixed-length character value of size *s*

Summary

In this lesson, you should have learned how to:

- Write a `SELECT` statement that:
  - Returns all rows and columns from a table
  - Returns specified columns from a table
  - Uses column aliases to display more descriptive column headings

```
SELECT *|{[DISTINCT] column|expression [alias],...}
FROM table;
```

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`SELECT` Statement

In this lesson, you should have learned how to retrieve data from a database table with the `SELECT` statement.

```
SELECT  *|{[DISTINCT] column [alias],...}
FROM    table;
```

In the syntax:

`SELECT`	is a list of one or more columns
`*`	selects all columns
`DISTINCT`	suppresses duplicates
`column|expression`	selects the named column or the expression
`alias`	gives the selected columns different headings
`FROM` *`table`*	specifies the table containing the columns

Practice 1: Overview

This practice covers the following topics:

- Selecting all data from different tables
- Describing the structure of tables
- Performing arithmetic calculations and specifying column names

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Practice 1: Overview

In this practice, you write simple `SELECT` queries. The queries cover most of the `SELECT` clauses and operations that you learned in this lesson.

Practice 1

Part 1

Test your knowledge:

1. The following `SELECT` statement executes successfully:

```
SELECT last_name, job_id, salary AS Sal
FROM   employees;
```

   True/False

2. The following `SELECT` statement executes successfully:

```
SELECT *
FROM   job_grades;
```

   True/False

3. There are four coding errors in the following statement. Can you identify them?

```
SELECT    employee_id, last_name
sal x 12  ANNUAL SALARY
FROM      employees;
```

Part 2

Note the following points before you begin with the practices:

- Save all your lab files at the following location: `D:\labs\SQL1\labs`
- Enter your SQL statements in a SQL Worksheet. To save a script in SQL Developer, make sure the required SQL worksheet is active and then from the File menu, select Save As or right-click in the SQL Worksheet and select Save file to save your SQL statement as a lab_<lessonno>_<stepno>.sql script. When you are modifying an existing script, make sure you use Save As to save it with a different filename.
- To run the query, click the Execute Statement icon in the SQL Worksheet. Alternatively, you can press [F9]. For DML and DDL statements, use the Run Script icon or press [F5].
- After you have executed the query, make sure that you do not enter your next query in the same worksheet. Open a new worksheet.

You have been hired as a SQL programmer for Acme Corporation. Your first task is to create some reports based on data from the Human Resources tables.

4. Your first task is to determine the structure of the `DEPARTMENTS` table and its contents.

```
DESCRIBE departments
Name                           Null     Type
------------------------------ -------- ----------------
DEPARTMENT_ID                  NOT NULL NUMBER(4)
DEPARTMENT_NAME                NOT NULL VARCHAR2(30)
MANAGER_ID                              NUMBER(6)
LOCATION_ID                             NUMBER(4)

4 rows selected
```

Practice 1 (continued)

	DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
1	10	Administration	200	1700
2	20	Marketing	201	1800
3	50	Shipping	124	1500
4	60	IT	103	1400
5	80	Sales	149	2500
6	90	Executive	100	1700
7	110	Accounting	205	1700
8	190	Contracting	(null)	1700

5. You need to determine the structure of the `EMPLOYEES` table.

```
DESCRIBE employees
Name                          Null     Type
----------------------------- -------- ------------------
EMPLOYEE_ID                   NOT NULL NUMBER(6)
FIRST_NAME                             VARCHAR2(20)
LAST_NAME                     NOT NULL VARCHAR2(25)
EMAIL                         NOT NULL VARCHAR2(25)
PHONE_NUMBER                           VARCHAR2(20)
HIRE_DATE                     NOT NULL DATE
JOB_ID                        NOT NULL VARCHAR2(10)
SALARY                                 NUMBER(8,2)
COMMISSION_PCT                         NUMBER(2,2)
MANAGER_ID                             NUMBER(6)
DEPARTMENT_ID                          NUMBER(4)

11 rows selected
```

The HR department wants a query to display the last name, job code, hire date, and employee number for each employee, with the employee number appearing first. Provide an alias `STARTDATE` for the `HIRE_DATE` column. Save your SQL statement to a file named `lab_01_05.sql` so that you can dispatch this file to the HR department.

Practice 1 (continued)

6. Test your query in the `lab_01_05.sql` file to ensure that it runs correctly.

   Note: After you have executed the query, make sure that you do not enter your next query in the same worksheet. Open a new worksheet.

	EMPLOYEE_ID	LAST_NAME	JOB_ID	STARTDATE
1	100	King	AD_PRES	17-JUN-87
2	101	Kochhar	AD_VP	21-SEP-89
3	102	De Haan	AD_VP	13-JAN-93
4	103	Hunold	IT_PROG	03-JAN-90
5	104	Ernst	IT_PROG	21-MAY-91
6	107	Lorentz	IT_PROG	07-FEB-99
7	124	Mourgos	ST_MAN	16-NOV-99
8	141	Rajs	ST_CLERK	17-OCT-95
9	142	Davies	ST_CLERK	29-JAN-97
10	143	Matos	ST_CLERK	15-MAR-98

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19	205	Higgins	AC_MGR	07-JUN-94
20	206	Gietz	AC_ACCOUNT	07-JUN-94

7. The HR department wants a query to display all unique job codes from the `EMPLOYEES` table.

	JOB_ID
1	AC_ACCOUNT
2	AC_MGR
3	AD_ASST
4	AD_PRES
5	AD_VP
6	IT_PROG
7	MK_MAN
8	MK_REP
9	SA_MAN
10	SA_REP
11	ST_CLERK
12	ST_MAN

Practice 1 (continued)

Part 3

If you have time, complete the following exercises:

8. The HR department wants more descriptive column headings for its report on employees. Copy the statement from `lab_01_05.sql` to a new SQL Worksheet. Name the column headings `Emp #`, `Employee`, `Job`, and `Hire Date`, respectively. Then run your query again.

	Emp #	Employee	Job	Hire Date
1	100	King	AD_PRES	17-JUN-87
2	101	Kochhar	AD_VP	21-SEP-89
3	102	De Haan	AD_VP	13-JAN-93
4	103	Hunold	IT_PROG	03-JAN-90
5	104	Ernst	IT_PROG	21-MAY-91
6	107	Lorentz	IT_PROG	07-FEB-99
7	124	Mourgos	ST_MAN	16-NOV-99
8	141	Rajs	ST_CLERK	17-OCT-95
9	142	Davies	ST_CLERK	29-JAN-97
10	143	Matos	ST_CLERK	15-MAR-98

▪ ▪ ▪

19	205	Higgins	AC_MGR	07-JUN-94
20	206	Gietz	AC_ACCOUNT	07-JUN-94

9. The HR department has requested a report of all employees and their job IDs. Display the last name concatenated with the job ID (separated by a comma and space) and name the column `Employee and Title`.

	Employee and Title
1	Abel, SA_REP
2	Davies, ST_CLERK
3	De Haan, AD_VP
4	Ernst, IT_PROG
5	Fay, MK_REP
6	Gietz, AC_ACCOUNT
7	Grant, SA_REP
8	Hartstein, MK_MAN
9	Higgins, AC_MGR
10	Hunold, IT_PROG

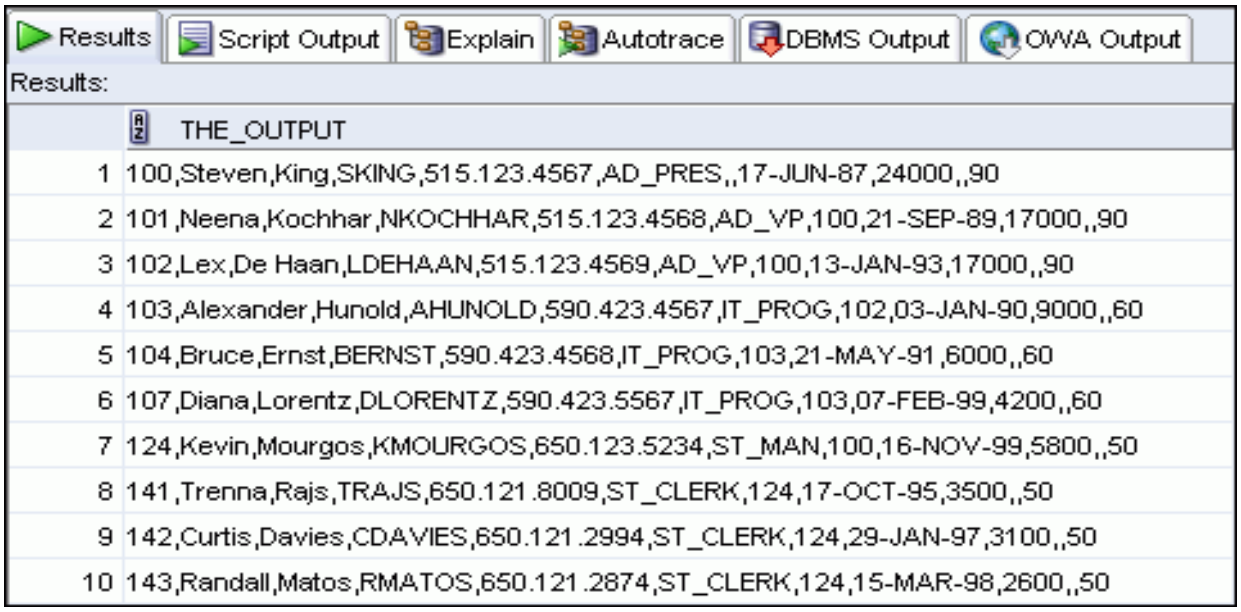
▪ ▪ ▪

19	Whalen, AD_ASST
20	Zlotkey, SA_MAN

Practice 1 (continued)

If you want an extra challenge, complete the following exercise:

10. To familiarize yourself with the data in the `EMPLOYEES` table, create a query to display all the data from that table. Separate each column output by a comma. Name the column title `THE_OUTPUT`.



Results | Script Output | Explain | Autotrace | DBMS Output | OWA Output

Results:

	THE_OUTPUT
1	100,Steven,King,SKING,515.123.4567,AD_PRES,,17-JUN-87,24000,,90
2	101,Neena,Kochhar,NKOCHHAR,515.123.4568,AD_VP,100,21-SEP-89,17000,,90
3	102,Lex,De Haan,LDEHAAN,515.123.4569,AD_VP,100,13-JAN-93,17000,,90
4	103,Alexander,Hunold,AHUNOLD,590.423.4567,IT_PROG,102,03-JAN-90,9000,,60
5	104,Bruce,Ernst,BERNST,590.423.4568,IT_PROG,103,21-MAY-91,6000,,60
6	107,Diana,Lorentz,DLORENTZ,590.423.5567,IT_PROG,103,07-FEB-99,4200,,60
7	124,Kevin,Mourgos,KMOURGOS,650.123.5234,ST_MAN,100,16-NOV-99,5800,,50
8	141,Trenna,Rajs,TRAJS,650.121.8009,ST_CLERK,124,17-OCT-95,3500,,50
9	142,Curtis,Davies,CDAVIES,650.121.2994,ST_CLERK,124,29-JAN-97,3100,,50
10	143,Randall,Matos,RMATOS,650.121.2874,ST_CLERK,124,15-MAR-98,2600,,50

...

19	205,Shelley,Higgins,SHIGGINS,515.123.8080,AC_MGR,101,07-JUN-94,12000,,110
20	206,William,Gietz,WGIETZ,515.123.8181,AC_ACCOUNT,205,07-JUN-94,8300,,110