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Database Programming with SQL

2-1

Columns, Characters, and Rows

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Objectives

- This lesson covers the following objectives:
 - Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression
 - Use column aliases to rename columns in the query result
 - Enter literal values of type character, number, or date into a SELECT statement
 - Define and use DISTINCT to eliminate duplicate rows
 - Edit, execute, and save SQL statements in Oracle Application Express

Concatenation: – the state of being linked together as in a chain; union in a linked series.

Purpose

- If you were writing an article about the Olympics, you might want to know how many different countries and how many different athletes from each country were being represented
- Having to go through lists and lists of participant names could be very tedious
- Fortunately, using SQL, your job could take less than a minute
- In addition, you could format your output to read like a sentence
- You will find these SQL features very useful

DESCRIBE

- Use the DESCRIBE (DESC) command to display the structure of a table

```
DESCRIBE <table_name>;
```

- DESC returns the table name, data types, primary and foreign keys, and nullable columns, as well as other object details that will be covered later in the course
- An example of using the DESCRIBE command is shown on the next slide

DESCRIBE

```
DESC departments;
```

Table	Column	Data Type	Length	Precision	Scale	Primary Key	Nullable	Default	Comment
DEPARTMENTS	DEPARTMENT_ID	NUMBER	-	4	0	1	-	-	-
	DEPARTMENT_NAME	VARCHAR2	30	-	-	-	-	-	-
	MANAGER_ID	NUMBER	-	6	0	-	-	-	-
	LOCATION_ID	NUMBER	-	4	0	-	-	-	-

In general, SQL keywords cannot be abbreviated. DESCRIBE is an Oracle Proprietary command, which is why it can be abbreviated to DESC.

DESCRIBE

- This is important information when inserting new rows into a table because you must know the type of data each column will accept and whether or not the column can be left empty



The Concatenation Operator

- Concatenation means to connect or link together in a series
- The symbol for concatenation is 2 vertical bars sometimes referred to as "pipes"
- Values on either side of the || operator are combined to make a single output column
- The syntax is:

```
string1 || string2 || string_n
```

- When values are concatenated, the resulting value is a character string

The Concatenation Operator

- In SQL, the concatenation operator can link columns to other columns, arithmetic expressions, or constant values to create a character expression
- The concatenation operator is used to create readable text output
- In the following example, the department_id is concatenated to the department_name

```
SELECT department_id ||  
       department_name  
FROM departments;
```

DEPARTMENT_ID DEPARTMENT_NAME
Administration
Marketing
Shipping
IT
...

The Concatenation Operator

- In this variation on the previous example, the `||' '||` is used to make a space between the `department_id` and `department_name`
- The 'space' character in single quotation marks creates a space between the column values

```
SELECT department_id ||' '||department_name  
FROM departments;
```

DEPARTMENT_ID ' ' DEPARTMENT_NAME
10 Administration
20 Marketing
50 Shipping
60 IT
...

Concatenation and Column Aliases

- Column aliases are useful when using the concatenation operator so that the default SELECT line does not appear as the column heading

```
SELECT department_id || ' ' ||  
       department_name AS "Department Info "  
FROM departments;
```

Department Info
10 Administration
20 Marketing
50 Shipping
60 IT
...

```
SELECT first_name || ' ' ||  
       last_name AS "Employee Name"  
FROM employees;
```

Employee Name
Ellen Abel
Curtis Davies
Lex De Haan

Concatenation and Literal Values

- A literal value is a fixed data value such as a character, number, or date
- The following are examples of literal values:
 - 'dollars'
 - 1000
 - 'January 1, 2009'
- Using concatenation and literal values, you can create output that looks like a sentence or statement

Concatenation and Literal Values

- Literal values can be included in the SELECT list with the concatenation operator
- Characters and dates must be enclosed in a set of single quotes ''
- Every row returned from a query with literal values will have the same character string in it

Number literals do not have to be enclosed in single quotes.

Concatenation and Literal Values

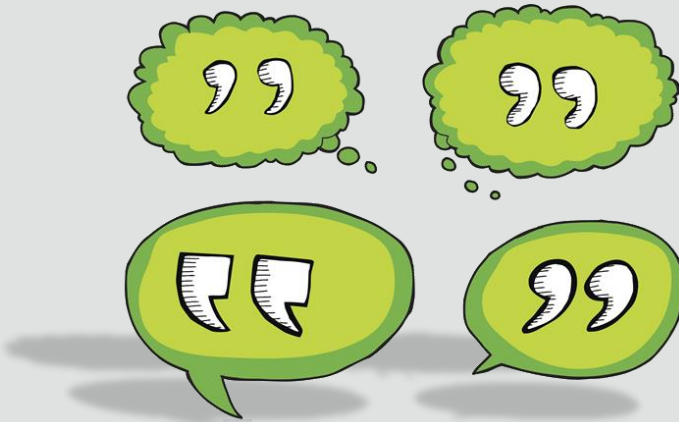
- In the following example, King earns 24000 dollars a month
- The strings, 'has a monthly salary of ' and 'dollars.', are examples of literals
- If you were to create a SQL statement to produce output in this format, it would be written as:

PAY
King has a monthly salary of 24000 dollars.
Kochhar has a monthly salary of 17000 dollars.
De Haan has a monthly salary of 17000 dollars.
Whalen has a monthly salary of 4400 dollars.
Higgins has a monthly salary of 12000 dollars.
Gietz has a monthly salary of 8300 dollars.
...

```
SELECT last_name || ' has a monthly  
salary of ' || salary || '  
dollars.' AS Pay  
FROM employees;
```

Concatenation and Literal Values

- Note the space character following the opening quote and preceding the ending quote
- What happens if you remove the spaces?



Concatenation and Literal Values

- You can also include numbers as literal values
- In the following example, the number 1 is concatenated to the strings, 'has a ' and 'year salary of '

```
SELECT last_name || ' has a ' || 1 || ' year salary of ' ||  
       salary*12 || ' dollars.' AS Pay  
FROM employees;
```

PAY
King has a 1 year salary of 288000 dollars.
Kochhar has a 1 year salary of 204000 dollars.
De Haan has a 1 year salary of 204000 dollars.
Whalen has a 1 year salary of 52800 dollars.
Higgins has a 1 year salary of 144000 dollars.
...

Using DISTINCT to Eliminate Duplicate Rows

- Many times, you will want to know how many unique instances of something exist
- For example, what if you wanted a list of all of the departments for which there are employees
- You could write a query to select the department_ids from the employees table:

DEPARTMENT_ID
90
90
90
10
110
110
80
80
80
...

```
SELECT department_id  
FROM employees;
```

Using DISTINCT to Eliminate Duplicate Rows

- Note all of the duplicate rows
- How can you modify the statement to eliminate the duplicate rows?

```
SELECT department_id  
FROM employees;
```

DEPARTMENT_ID
90
90
90
10
110
110
80
80
80
...

Using DISTINCT to Eliminate Duplicate Rows

- Unless you indicate otherwise, the output of a SQL query will display the results without eliminating duplicate rows
- In SQL, the DISTINCT keyword is used to eliminate duplicate rows

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

- The DISTINCT qualifier affects all listed columns and returns every distinct combination of the columns in the SELECT clause
- The keyword DISTINCT must appear directly after the SELECT keyword

DEPARTMENT_ID
-
90
20
110
80
50
10
60

EXECUTE, SAVE, and EDIT in Oracle Application Express

- Now that you have been using Oracle Application Express to create and execute statements, it would be nice if you could save those statements for later so you could run them again or perhaps edit them slightly and then save a new copy of the statement
- Oracle Application Express has facilities to do just that
- Your teacher will demonstrate these facilities for you, and you can find further information in the Oracle Application Express User Guide

Terminology

- Key terms used in this lesson included:
 - DESCRIBE
 - Concatenation Operator
 - Literal Values
 - DISTINCT

Summary

- In this lesson, you should have learned how to:
 - Apply the concatenation operator to link columns to other columns, arithmetic expressions, or constant values to create a character expression
 - Use column aliases to rename columns in the query result
 - Enter literal values of type character, number, or date into a SELECT statement
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