



Database Programming with SQL

5-2

NULL Functions



Objectives

This lesson covers the following objectives:

- Demonstrate and explain the evaluation of a nested function
- List at least four general functions that work with any data type and relate to handling null values
- Explain the use of the COALESCE and the NVL functions
- Explain the use of general functions to deal with null values in data
- Construct and execute a SQL query that correctly applies NVL, NVL2, NULLIF, and COALESCE single-row functions



Purpose

- Besides functions that control how data is formatted or converted to another type, SQL uses a set of general functions designed specifically to deal with null values.
- You may be wondering how a value that is unavailable, unassigned, unknown, or inapplicable can deserve so much attention.
- Null may be "nothing," but it can affect how expressions are evaluated, how averages are computed, and where a value appears in a sorted list.
- This lesson is all about handling null values.

How Functions are Evaluated

- Up to now, you have applied single-row functions in simple statements.
- It is possible, however, to nest functions to any depth.
- It is important to know how nested functions are evaluated.
- "Nesting" refers to one thing being contained within another thing (like an egg contained within a nest).
- The following example is a nested function.
- The evaluation process begins from the innermost level to the outermost level.

How Functions are Evaluated

```
SELECT TO_CHAR(NEXT_DAY(ADD_MONTHS(hire_date, 6), 'FRIDAY'), 'fmDay,  
      Month ddth, YYYY') AS "Next Evaluation"  
FROM employees  
WHERE employee_id = 100;
```

- The result is:
Friday, December 18th, 1987



How Functions are Evaluated

```
SELECT TO_CHAR(NEXT_DAY(ADD_MONTHS(hire_date, 6), 'FRIDAY'), 'fmDay,  
Month ddth, YYYY') AS "Next Evaluation"  
FROM employees  
WHERE employee_id = 100;
```

- Step 1: The hire date is going to have six months added to it.
- Step 2: The first Friday following the day returned at Step 1 will be identified.
- Step 3: The default date format will be formatted to read and display the date returned by Step 2 in a format similar to: Friday, December 18th, 1987, and will appear in the output under the column name "Next Evaluation."

Functions Pertaining to Null Values

- At the beginning of the course, the term "null" was introduced.
- Null is the value that is unavailable, unassigned, unknown, or inapplicable.
- As a result, we cannot test to see if it is the same as another value, because we do not know what value it has.
- It isn't equal to anything, not even zero!
- But just because it really isn't anything doesn't mean that it is not important.

Functions Pertaining to Null Values

- Imagine this question: Is it true that $X = Y$?
- In order to answer you have to know the values of X and Y.
- Oracle has four general functions that pertain to the use of null values.
- The four functions are:
 - NVL
 - NVL2
 - NULLIF
 - COALESCE

NVL Function

- The NVL function converts a null value to a known value of a fixed data type, either date, character, or number.
- The data types of the null value column and the new value must be the same.
- The NVL function is:

```
NVL (expression 1 value that may contain a null, expression 2  
value to substitute for null)
```

- NVL (value or column that may contain a null, value to substitute for null)

NVL Function

- The following query uses the NVL function with character data types:

```
SELECT country_name, NVL(internet_extension, 'None')  
      AS "Internet extn"  
FROM wf_countries  
WHERE location = 'Southern Africa'  
ORDER BY internet_extension DESC;
```

- Null values are replaced with the text 'None'.

COUNTRY_NAME	Internet extn
Juan de Nova Island	None
Europa Island	None
Republic of Zimbabwe	.zw
Republic of Zambia	.zm
Republic of South Africa	.za

NVL Function

- The data types of the null value column and the new value must be the same as shown in the following examples:

Examples:	Output	
<pre>SELECT last_name, NVL(commission_pct, 0) FROM employees WHERE department_id IN(80,90);</pre>	Zlotkey Abel Taylor King	.2 .3 .2 0
<pre>SELECT NVL(date_of_independence, 'No date') FROM wf_countries;</pre> <p>Note: date_of_independence is a Varchar2 data type</p>	1-Jul-1867 15-Sep-1821 5-Jul-1975 No date	

NVL Function

- You can use the NVL function to convert column values containing nulls to a number before doing calculations.
- When an arithmetic calculation is performed with null, the result is null.
- The NVL function can convert the null value to a number before arithmetic calculations are done to avoid a null result.

NVL Function

- In the example, the commission_pct column in the employees table contains null values.
- The NVL function is used to change the null to zero before arithmetic calculations.

```
SELECT last_name, NVL(commission_pct, 0)*250  
       AS "Commission"  
FROM employees  
WHERE department_id IN(80,90);
```

LAST_NAME	Commission
Zlotkey	50
Abel	75
Taylor	50
King	0
Kochhar	0
De Haan	0

NVL2 Function

- The NVL2 function evaluates an expression with three values.
- If the first value is not null, then the NVL2 function returns the second expression.
- If the first value is null, then the third expression is returned.
- The values in expression 1 can have any data type.
- Expression 2 and expression 3 can have any data type except LONG.
- The data type of the returned value is always the same as the data type of expression 2, unless expression 2 is character data, in which case the returned type is VARCHAR2.

NVL2 Function

- The NVL2 function is:

```
NVL2 (expression 1 value that may contain a null, expression 2  
value to return if expression 1 is not null, expression 3 value to  
replace if expression 1 is null)
```

- An easy way to remember NVL2 is to think, "if expression 1 has a value, substitute expression 2; if expression 1 is null, substitute expression 3."

NVL2 Function

- The NVL2 function shown uses number data types for expressions 1, 2 and 3.

```
SELECT last_name, salary,  
       NVL2(commission_pct, salary + (salary * commission_pct), salary)  
       AS income  
FROM employees  
WHERE department_id IN(80,90);
```

LAST_NAME	SALARY	INCOME
Zlotkey	10500	12600
Abel	11000	14300
Taylor	8600	10320
King	24000	24000
Kochhar	17000	17000
De Haan	17000	17000

NULLIF Function

- The NULLIF function compares two expressions.
- If they are equal, the function returns null.
- If they are not equal, the function returns the first expression.
- The NULLIF function is:

```
NULLIF(expression 1, expression 2)
```

NULLIF Function

- In this example, NULLIF compares the length of employees first and last names.
- If the length of both names are the same, NULLIF returns NULL (as in row 2 Curtis Davies), otherwise expression 1 LENGTH of first_name is returned.

```
SELECT first_name, LENGTH(first_name) AS "Length FN", last_name,  
       LENGTH(last_name) AS "Length LN", NULLIF(LENGTH(first_name),  
       LENGTH(last_name)) AS "Compare Them"  
FROM employees;
```

FIRST_NAME	Length FN	LAST_NAME	Length LN	Compare Them
Ellen	5	Abel	4	5
Curtis	6	Davies	6	-
Lex	3	De Haan	7	3

COALESCE Function

- The COALESCE function is an extension of the NVL function, except COALESCE can take multiple values.
- The word "coalesce" literally means "to come together" and that is what happens.
- If the first expression is null, the function continues down the line until a not null expression is found.
- Of course, if the first expression has a value, the function returns the first expression and the function stops.
- The COALESCE function is:

```
COALESCE (expression 1, expression 2, ...expression n)
```

COALESCE Function

- Examine the SELECT statement from the employees table shown at right.
- If an employee has a value (not NULL)for commission_pct, this is returned, otherwise if salary has a value, return salary.
- If an employees commission_pct and salary are NULL, return the number 10.

```
SELECT last_name,  
       COALESCE(commission_pct, salary, 10)  
       AS "Comm"  
FROM employees  
ORDER BY commission_pct;
```

LAST_NAME	Comm
Grant	.15
Zlotkey	.2
Taylor	.2
Abel	.3
Higgins	12000
Gietz	8300

Terminology

Key terms used in this lesson included:

- NVL
- NVL2
- NULLIF
- COALESCE

Summary

In this lesson, you should have learned how to:

- Demonstrate and explain the evaluation of a nested function
- List at least four general functions that work with any data type and relate to handling null values
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