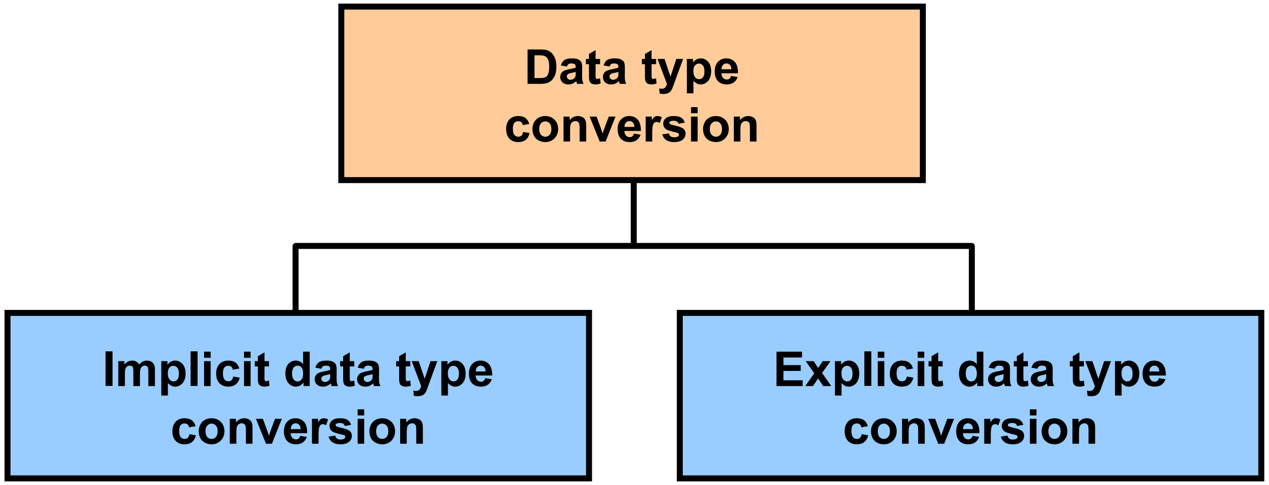
4 Using Conversion Functions and Conditional Expressions

Objectives

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

- Describe the various types of conversion functions that are available in SQL
- Use the `TO_CHAR`, `TO_NUMBER`, and `TO_DATE` conversion functions
- Apply conditional expressions in a `SELECT` statement

Conversion Functions



Implicit Data Type Conversion

In expressions, the Oracle server can automatically convert the following:

From	To
`VARCHAR2 or CHAR`	`NUMBER`
`VARCHAR2 or CHAR`	`DATE`

Implicit Data Type Conversion

For expression evaluation, the Oracle server can automatically convert the following:

From	To
`NUMBER`	`VARCHAR2 or CHAR`
`DATE`	`VARCHAR2 or CHAR`

Explicit Data Type Conversion

$$\begin{tikzcd}
\text{NUMBER} \arrow[r, bend right, "\text{TO\_CHAR}"'] & \text{CHARACTER} \arrow[l, bend right, "\text{TO\_NUMBER}"'] \arrow[r, bend left, "\text{TO\_DATE}"] & \text{DATE} \arrow[l, bend left, "\text{TO\_CHAR}"]
\end{tikzcd}$$

Using the `TO_CHAR` Function with Dates

```
TO_CHAR(date, 'format_model')
```

The format model:

- Must be enclosed with single quotation marks
- Is case-sensitive
- Can include any valid date format element
- Has an `fm` element to remove padded blanks or suppress leading zeros
- Is separated from the date value by a comma

Elements of the Date Format Model

Element	Result
`YYYY`	Full year in numbers
`YEAR`	Year spelled out (in English)
`MM`	Two-digit value for the month
`MONTH`	Full name of the month
`MON`	Three-letter abbreviation of the month
`DY`	Three-letter abbreviation of the day of the week
`DAY`	Full name of the day of the week
`DD`	Numeric day of the month

Elements of the Date Format Model

- Time elements format the time portion of the date:

`HH24:MI:SS AM`	`15:45:32 PM`

- Add character strings by enclosing them with double quotation marks:

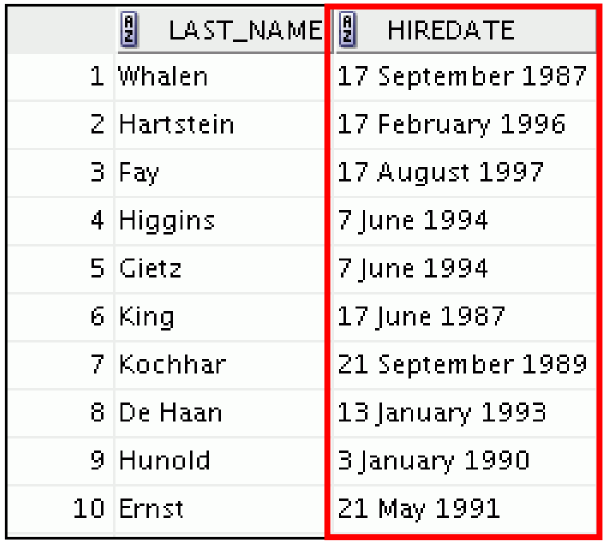
`DD "of" MONTH`	`12 of OCTOBER`

- Number suffixes spell out numbers:

`ddspth`	`fourteenth`

Using the `TO_CHAR` Function with Dates

```
SELECT last_name,
       TO_CHAR(hire_date, 'fmDD Month YYYY')
       AS HIREDATE
FROM   employees;
```



	LAST_NAME	HIREDATE
1	Whalen	17 September 1987
2	Hartstein	17 February 1996
3	Fay	17 August 1997
4	Higgins	7 June 1994
5	Gietz	7 June 1994
6	King	17 June 1987
7	Kochhar	21 September 1989
8	De Haan	13 January 1993
9	Hunold	3 January 1990
10	Ernst	21 May 1991

...

Using the `TO_CHAR` Function with Numbers

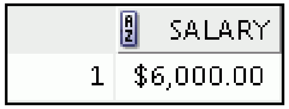
```
TO_CHAR(number, 'format_model')
```

These are some of the format elements that you can use with the `TO_CHAR` function to display a number value as a character:

Element	Result
`9`	Represents a number
`0`	Forces a zero to be displayed
`$`	Places a floating dollar sign
`L`	Uses the floating local currency symbol
`.`	Prints a decimal point
`,`	Prints a comma as a thousands indicator

Using the TO_CHAR Function with Numbers

```
SELECT TO_CHAR(salary, '$99,999.00') SALARY
FROM   employees
WHERE  last_name = 'Ernst';
```



```
     SALARY
1 $6,000.00
```

Using the TO_NUMBER and TO_DATE Functions

- Convert a character string to a number format using the `TO_NUMBER` function:

```
TO_NUMBER(char[, 'format_model'])
```

- Convert a character string to a date format using the `TO_DATE` function:

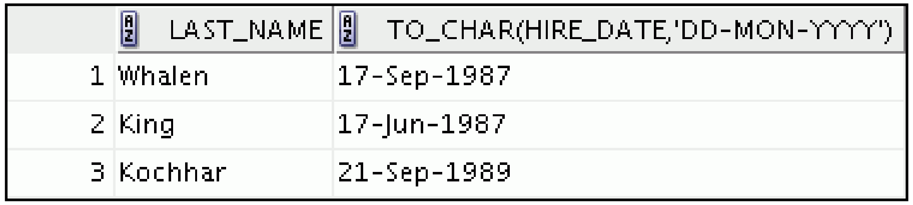
```
TO_DATE(char[, 'format_model'])
```

- These functions have an `fx` modifier. This modifier specifies the exact match for the character argument and date format model of a `TO_DATE` function.

Using the TO_CHAR and TO_DATE Function with the RR Date Format

To find employees hired before 1990, use the RR date format, which produces the same results whether the command is run in 1999 or now:

```
SELECT last_name, TO_CHAR(hire_date, 'DD-Mon-YYYY')
FROM   employees
WHERE hire_date < TO_DATE('01-Jan-90','DD-Mon-RR');
```

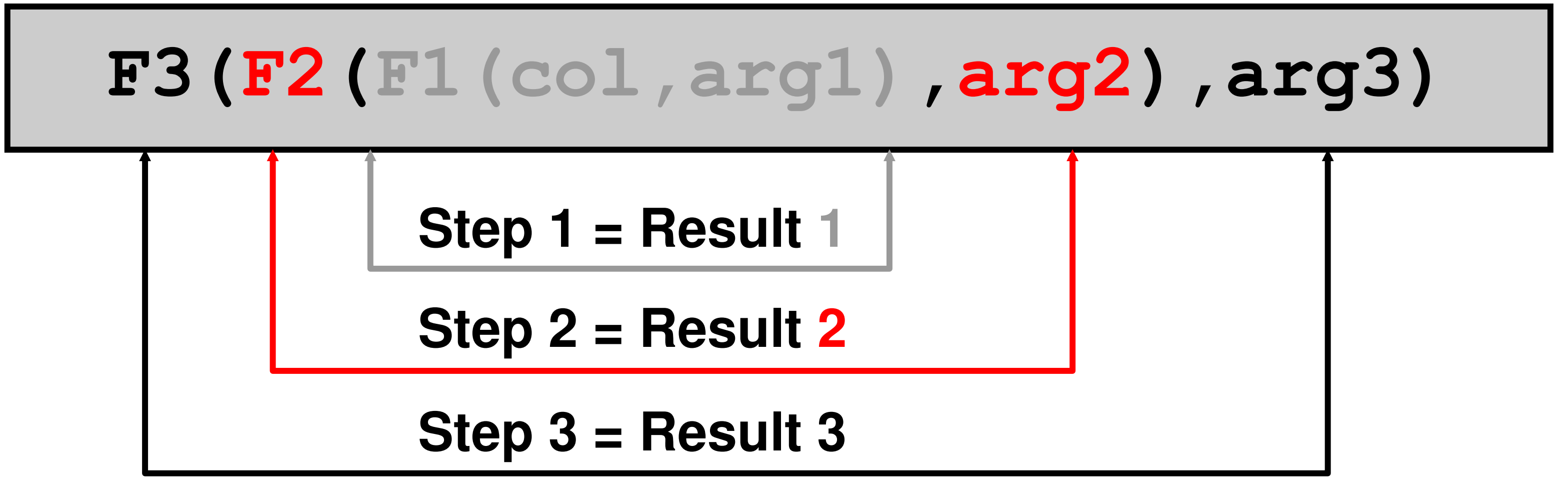


	LAST_NAME	TO_CHAR(HIRE_DATE,'DD-MON-YYYY')
1	Whalen	17-Sep-1987
2	King	17-Jun-1987
3	Kochhar	21-Sep-1989

Nesting Functions

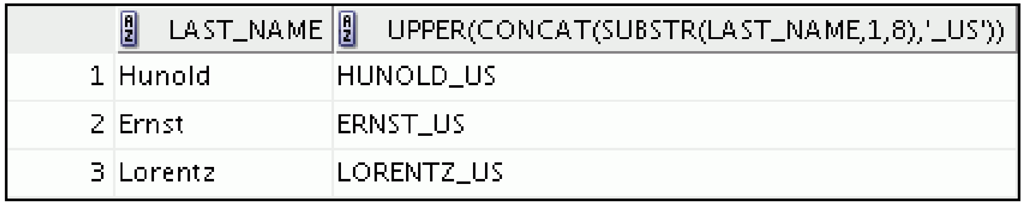
- Single-row functions can be nested to any level.
- Nested functions are evaluated from the deepest level to the least deep level.

```
F3(F2(F1(col,arg1),arg2),arg3)
```



Nesting Functions: Example 1

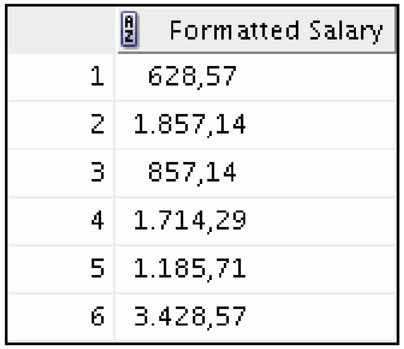
```
SELECT last name,
  UPPER(CONCAT(SUBSTR (LAST_NAME, 1, 8), '_US'))
FROM    employees
WHERE   department_id = 60;
```



	LAST_NAME	UPPER(CONCAT(SUBSTR(LAST_NAME,1,8),'_US'))
1	Hunold	HUNOLD_US
2	Ernst	ERNST_US
3	Lorentz	LORENTZ_US

Nesting Functions: Example 2

```
SELECT   TO_CHAR(ROUND((salary/7), 2),'99G999D99',
         'NLS_NUMERIC_CHARACTERS = '',.'' ')
         "Formatted Salary"
FROM employees;
```



	Formatted Salary
1	628,57
2	1.857,14
3	857,14
4	1.714,29
5	1.185,71
6	3.428,57

...

General Functions

The following functions work with any data type and pertain to using nulls:

- `NVL (expr1, expr2)`
- `NVL2 (expr1, expr2, expr3)`
- `NULLIF (expr1, expr2)`
- `COALESCE (expr1, expr2, ..., exprn)`

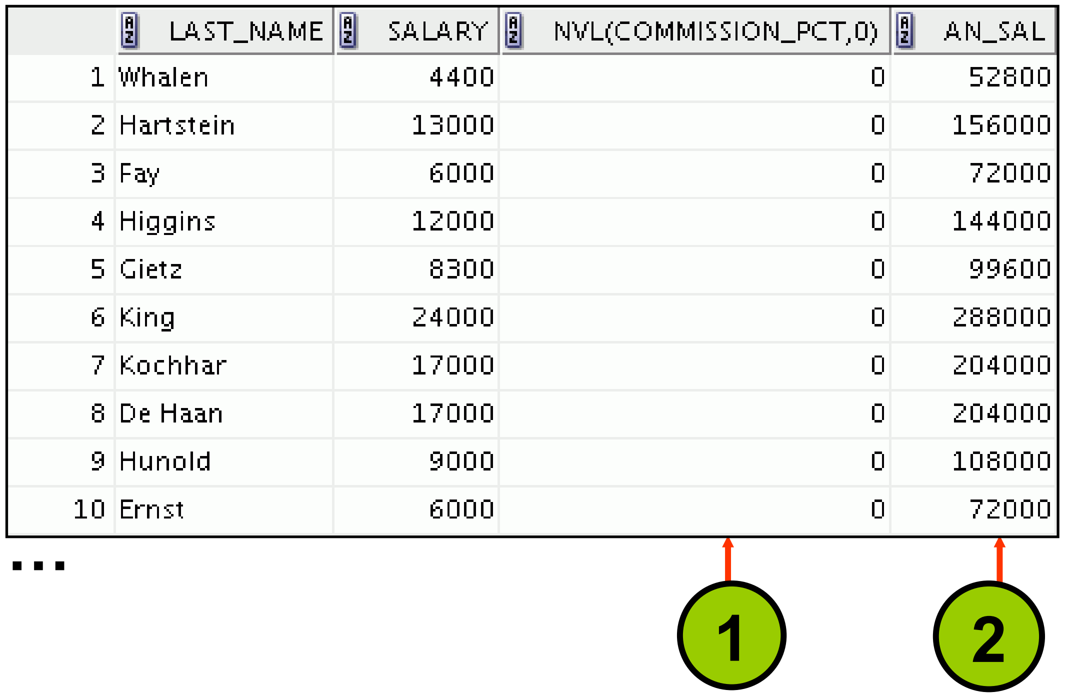
NVL Function

Converts a null value to an actual value:

- Data types that can be used are date, character, and number.
- Data types must match:
  - `NVL(commission_pct,0)`
  - `NVL(hire_date,'01-JAN-97')`
  - `NVL(job_id,'No Job Yet')`

Using the NVL Function

```
SELECT last_name, salary, NVL(commission_pct, 0),
   (salary*12) + (salary*12*NVL(commission_pct, 0)) AN_SAL
FROM employees;
```

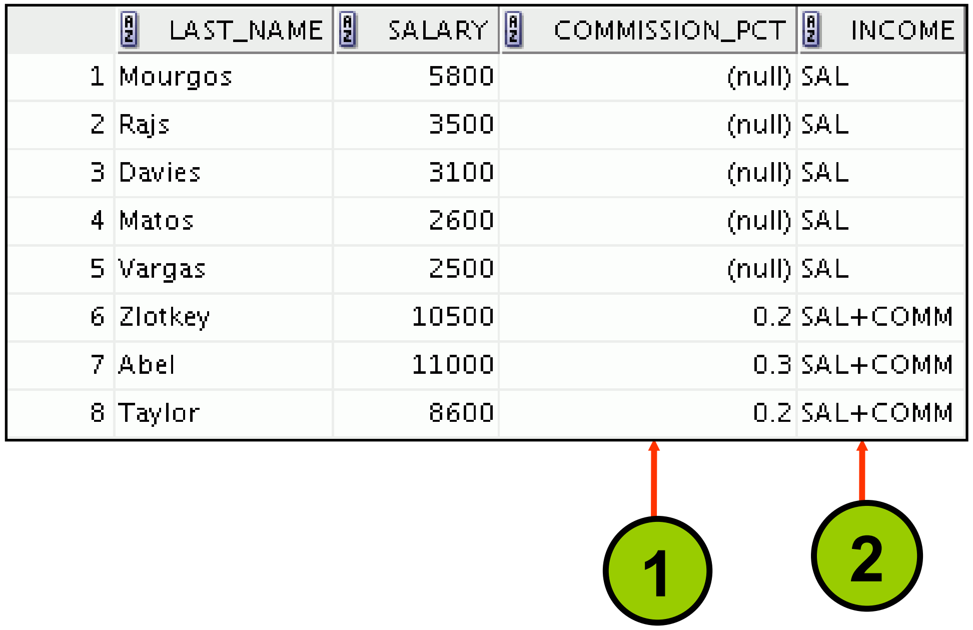


	LAST_NAME	SALARY	NVL(COMMISSION_PCT,0)	AN_SAL
1	Whalen	4400	0	52800
2	Hartstein	13000	0	156000
3	Fay	6000	0	72000
4	Higgins	12000	0	144000
5	Gietz	8300	0	99600
6	King	24000	0	288000
7	Kochhar	17000	0	204000
8	De Haan	17000	0	204000
9	Hunold	9000	0	108000
10	Ernst	6000	0	72000

...

Using the NVL2 Function

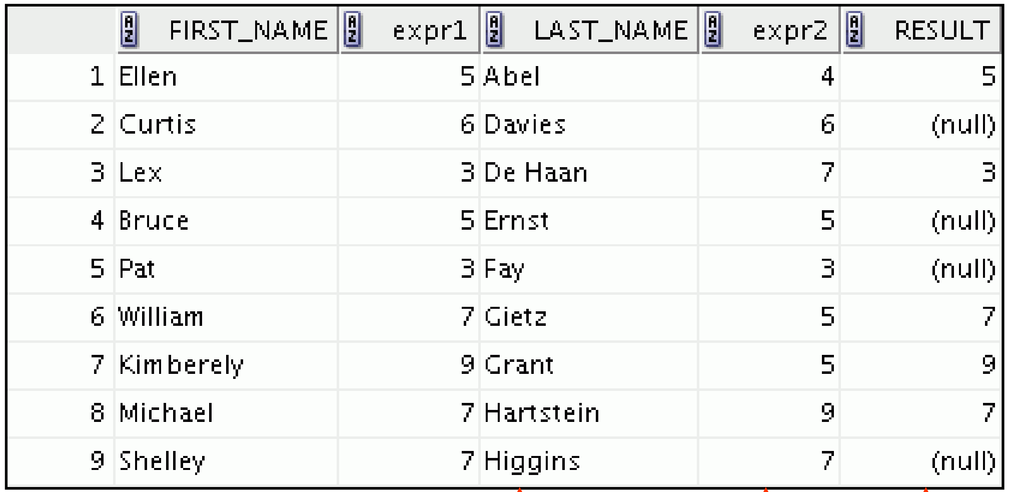
```
SELECT last_name,  salary, commission_pct,
       NVL2(commission_pct,
            'SAL+COMM', 'SAL') income
FROM   employees WHERE department_id IN (50, 80);
```



	LAST_NAME	SALARY	COMMISSION_PCT	INCOME
1	Mourgos	5800	(null)	SAL
2	Rajs	3500	(null)	SAL
3	Davies	3100	(null)	SAL
4	Matos	2600	(null)	SAL
5	Vargas	2500	(null)	SAL
6	Zlotkey	10500	0.2	SAL+COMM
7	Abel	11000	0.3	SAL+COMM
8	Taylor	8600	0.2	SAL+COMM

Using the `NULLIF` Function

```
SELECT first_name, LENGTH(first_name) "expr1",
       last_name,  LENGTH(last_name)  "expr2",
       NULLIF(LENGTH(first_name), LENGTH(last_name)) result
FROM   employees;
```



	FIRST_NAME	expr1	LAST_NAME	expr2	RESULT
1	Ellen	5	Abel	4	5
2	Curtis	6	Davies	6	(null)
3	Lex	3	De Haan	7	3
4	Bruce	5	Ernst	5	(null)
5	Pat	3	Fay	3	(null)
6	William	7	Gietz	5	7
7	Kimberely	9	Grant	5	9
8	Michael	7	Hartstein	9	7
9	Shelley	7	Higgins	7	(null)

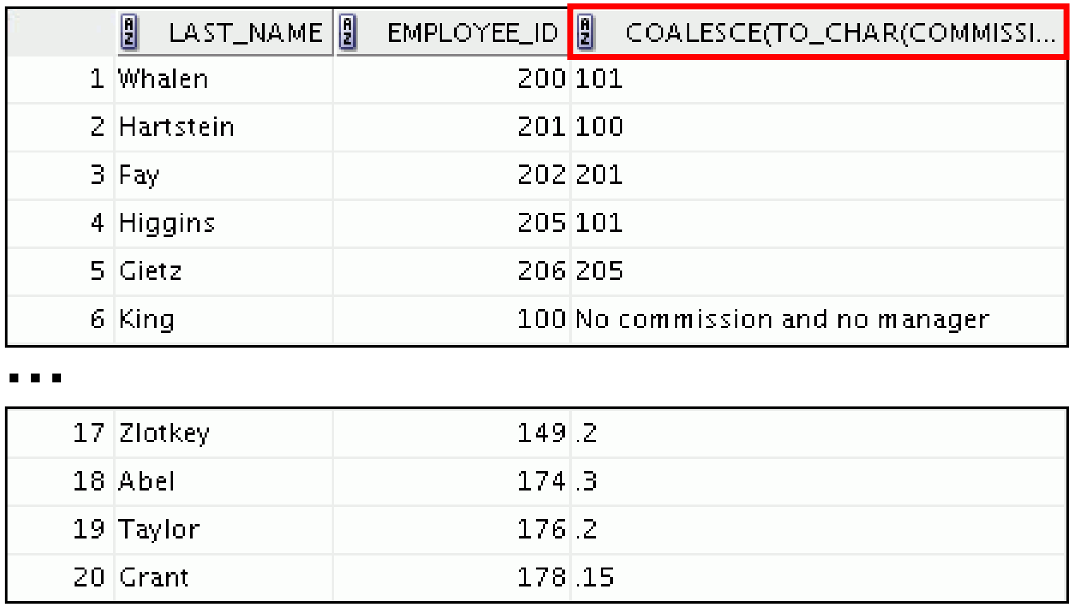
…

Using the `COALESCE` Function

- The advantage of the `COALESCE` function over the `NVL` function is that the `COALESCE` function can take multiple alternate values.
- If the first expression is not null, the `COALESCE` function returns that expression; otherwise, it does a `COALESCE` of the remaining expressions.

Using the COALESCE Function

```
SELECT last_name, employee_id,
COALESCE(TO_CHAR(commission_pct),TO_CHAR(manager_id),
         'No commission and no manager')
FROM employees;
```



	LAST_NAME	EMPLOYEE_ID	COALESCE(TO_CHAR(COMMISSI...
1	Whalen	200	101
2	Hartstein	201	100
3	Fay	202	201
4	Higgins	205	101
5	Gietz	206	205
6	King	100	No commission and no manager

...

17	Zlotkey	149	.2
18	Abel	174	.3
19	Taylor	176	.2
20	Grant	178	.15

Conditional Expressions

- Provide the use of the `IF-THEN-ELSE` logic within a SQL statement.
- Use two methods:
  - `CASE` expression
  - `DECODE` function

CASE Expression

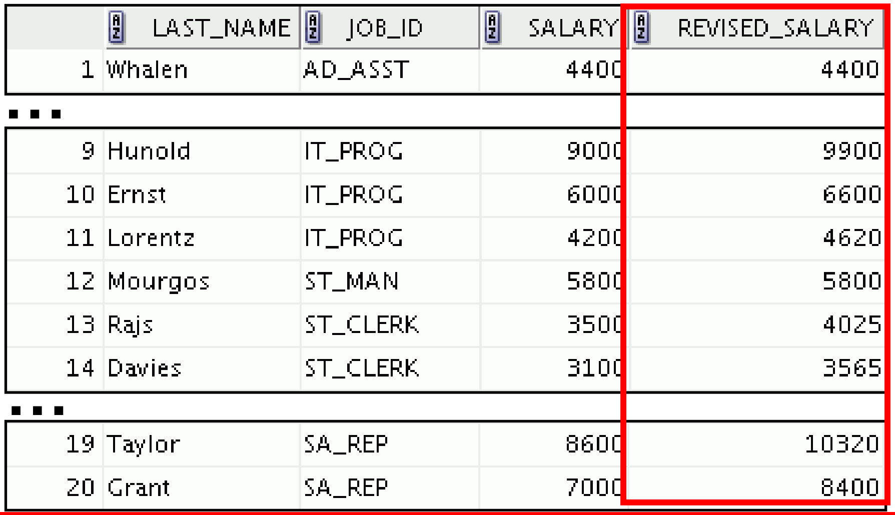
Facilitates conditional inquiries by doing the work of an `IF-THEN-ELSE` statement:

```
CASE expr WHEN comparison_expr1 THEN return_expr1
         [WHEN comparison_expr2 THEN return_expr2
          WHEN comparison_exprn THEN return_exprn
          ELSE else_expr]
END
```

Using the `CASE` Expression

Facilitates conditional inquiries by doing the work of an `IF-THEN-ELSE` statement:

```
SELECT last_name, job_id, salary,
       CASE job_id WHEN 'IT_PROG'  THEN  1.10*salary
                   WHEN 'ST_CLERK' THEN  1.15*salary
                   WHEN 'SA_REP'   THEN  1.20*salary
       ELSE      salary END      "REVISED_SALARY"
FROM   employees;
```



	LAST_NAME	JOB_ID	SALARY	REVISED_SALARY
1	Whalen	AD_ASST	4400	4400
...				
9	Hunold	IT_PROG	9000	9900
10	Ernst	IT_PROG	6000	6600
11	Lorentz	IT_PROG	4200	4620
12	Mourgos	ST_MAN	5800	5800
13	Rajs	ST_CLERK	3500	4025
14	Davies	ST_CLERK	3100	3565
...				
19	Taylor	SA_REP	8600	10320
20	Grant	SA_REP	7000	8400

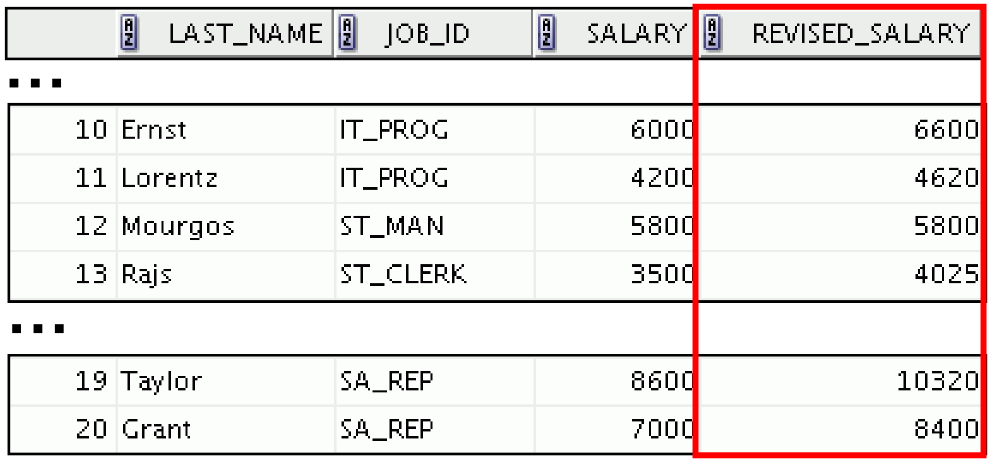
`DECODE` Function

Facilitates conditional inquiries by doing the work of a `CASE` expression or an `IF-THEN-ELSE` statement:

```
DECODE(col|expression, search1, result1
                       [, search2, result2,...,]
                       [, default])
```

Using the DECODE Function

```
SELECT last_name, job_id, salary,
       DECODE(job_id, 'IT_PROG',  1.10*salary,
                      'ST_CLERK', 1.15*salary,
                      'SA_REP',   1.20*salary,
             salary)
       REVISED_SALARY
FROM   employees;
```



	LAST_NAME	JOB_ID	SALARY	REVISED_SALARY
...				
10	Ernst	IT_PROG	6000	6600
11	Lorentz	IT_PROG	4200	4620
12	Mourgos	ST_MAN	5800	5800
13	Rajs	ST_CLERK	3500	4025
...				
19	Taylor	SA_REP	8600	10320
20	Grant	SA_REP	7000	8400

Using the DECODE Function

Display the applicable tax rate for each employee in department 80:

```
SELECT last_name, salary,
       DECODE (TRUNC(salary/2000, 0),
                          0, 0.00,
                          1, 0.09,
                          2, 0.20,
                          3, 0.30,
                          4, 0.40,
                          5, 0.42,
                          6, 0.44,
                             0.45) TAX_RATE
FROM   employees
WHERE  department_id = 80;
```

Quiz

The `TO_NUMBER` function converts either character strings or date values to a number in the format specified by the optional format model.

1. True
2. False

Summary

In this lesson, you should have learned how to:

- Alter date formats for display using functions
- Convert column data types using functions
- Use `NVL` functions
- Use `IF-THEN-ELSE` logic and other conditional expressions in a `SELECT` statement