3

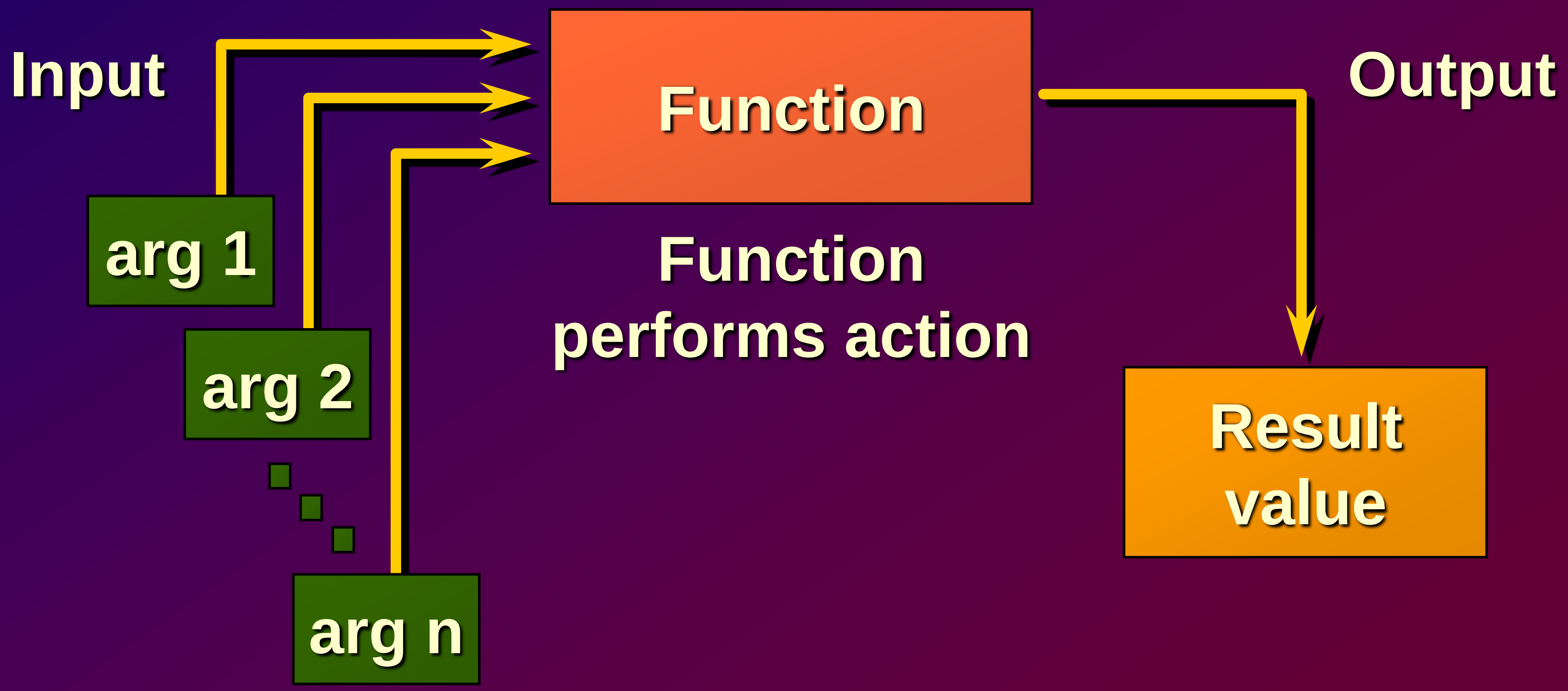
Single-Row Functions

Objectives

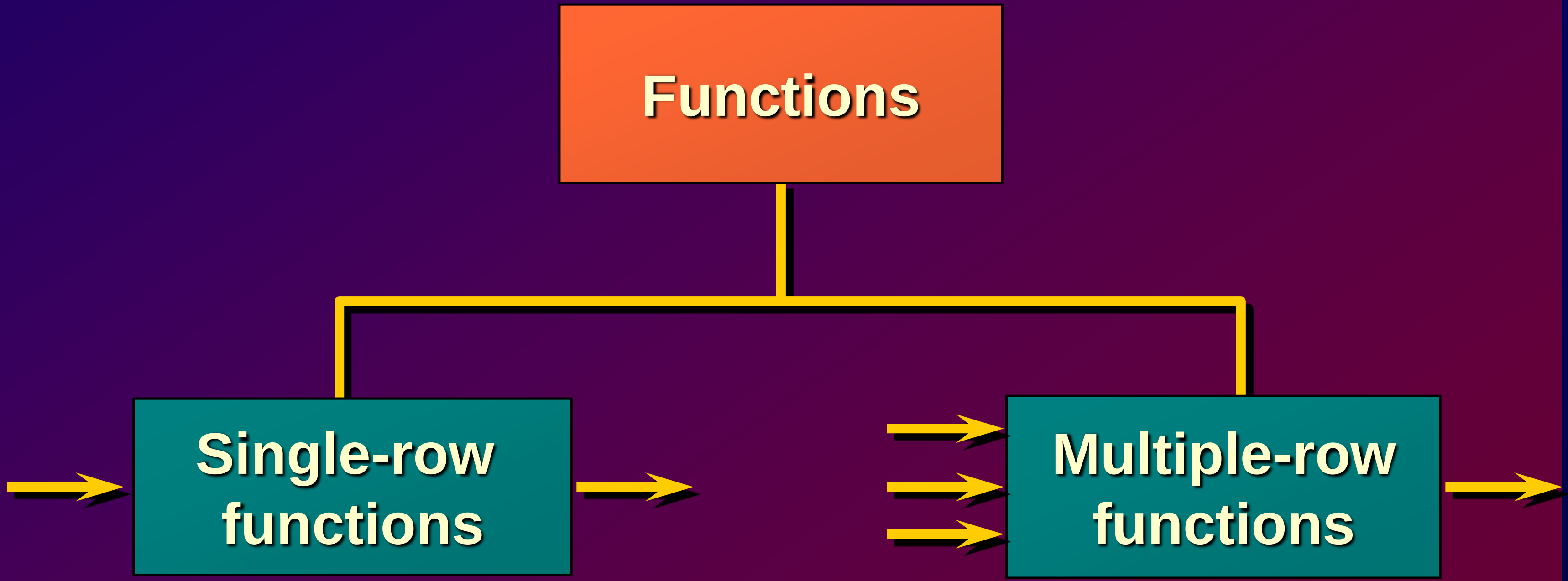
At the end of this lesson, you should be able to:

- Describe various types of functions available in SQL
- Use character, number, and date functions in SELECT statements
- Describe the use of conversion functions

SQL Functions



Two Types of SQL Functions

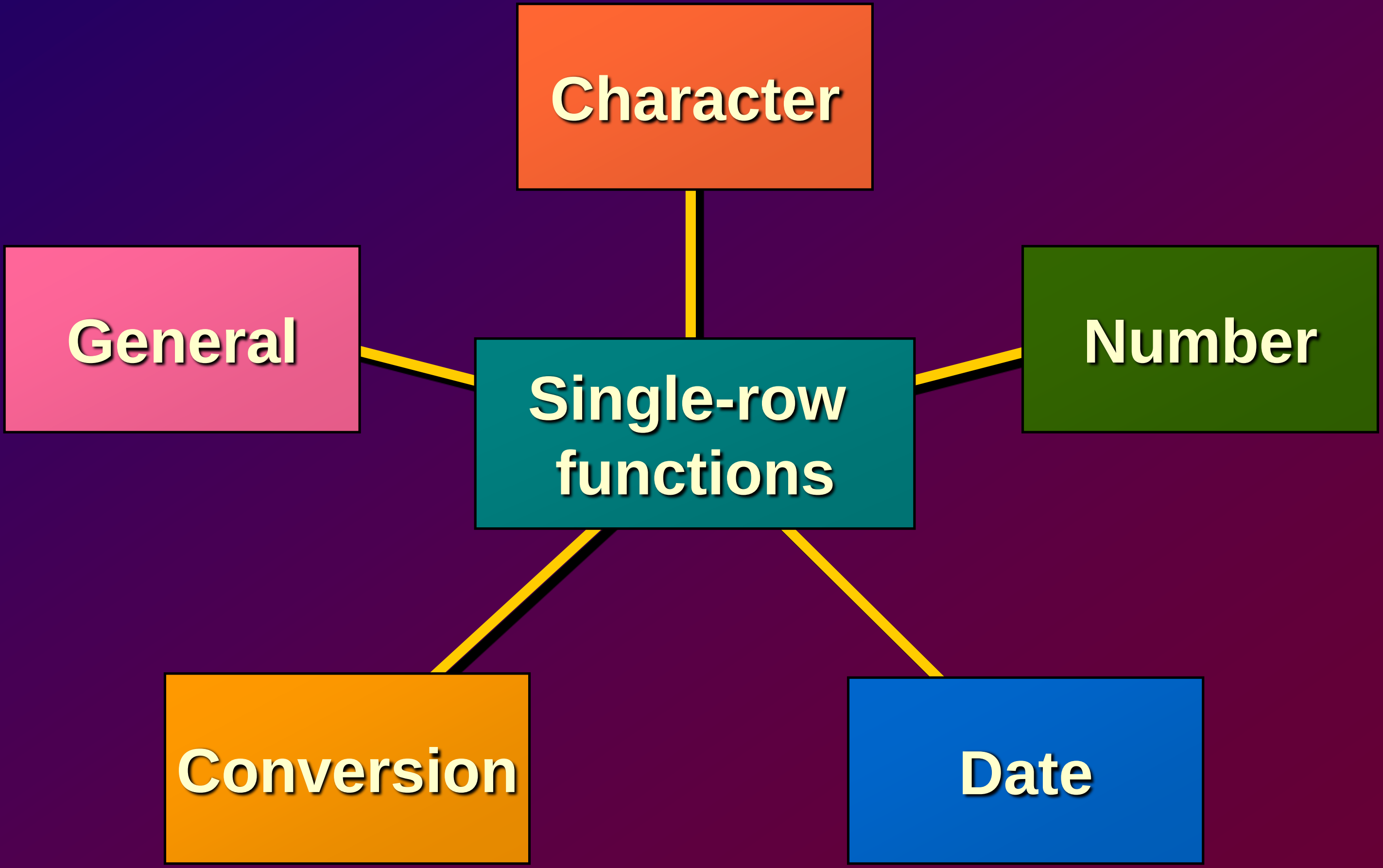


Single-Row Functions

- Manipulate data items
- Accept arguments and return one value
- Act on each row returned
- Return one result per row
- May modify the datatype
- Can be nested

```
function_name (column|expression, [arg1, arg2,...])
```

Single-Row Functions



Character Functions

Character functions

Case conversion functions

- LOWER
- UPPER
- INITCAP

Character manipulation functions

- CONCAT
- SUBSTR
- LENGTH
- INSTR
- LPAD

Case Conversion Functions

Convert case for character strings

Function	Result
LOWER('SQL Course')	sql course
UPPER('SQL Course')	SQL COURSE
INITCAP('SQL Course')	Sql Course

Using Case Conversion Functions

Display the employee number, name, and department number for employee Blake.

```
SQL> SELECT   empno, ename, deptno
  2  FROM     emp
  3  WHERE    ename = 'blake';
no rows selected
```

```
SQL> SELECT   empno, ename, deptno
  2  FROM     emp
  3  WHERE    LOWER(ename) = 'blake';
```

```
    EMPNO ENAME          DEPTNO
--------- ---------- ----------
     7698 BLAKE              30
```

Character Manipulation Functions

Manipulate character strings

Function	Result
CONCAT('Good', 'String')	GoodString
SUBSTR('String',1,3)	Str
LENGTH('String')	6
INSTR('String', 'r')	3
LPAD(sal,10,'*')	******5000

Using the Character Manipulation Functions

```
SQL> SELECT ename, CONCAT (ename, job), LENGTH(ename),
  2         INSTR(ename, 'A')
  3  FROM   emp
  4  WHERE  SUBSTR(job,1,5) = 'SALES';
```

```
ENAME      CONCAT(ENAME,JOB)    LENGTH(ENAME) INSTR(ENAME,'A')
---------- -------------------- ------------- ----------------
MARTIN     MARTINSALESMAN                   6                2
ALLEN      ALLENSALESMAN                    5                1
TURNER     TURNERSALESMAN                   6                0
WARD       WARDSALESMAN                     4                2
```

Number Functions

- ROUND: Rounds value to specified decimal

ROUND(45.926, 2) $\longrightarrow$ 45.93

- TRUNC: Truncates value to specified decimal

TRUNC(45.926, 2) $\longrightarrow$ 45.92

- MOD: Returns remainder of division

MOD(1600, 300) $\longrightarrow$ 100

Using the ROUND Function

Display the value 45.923 rounded to the hundredth, no, and ten decimal places.

```
SQL> SELECT ROUND(45.923,2), ROUND(45.923,0),
  2         ROUND(45.923,-1)
  3  FROM   SYS.DUAL;
```

```
ROUND(45.923,2) ROUND(45.923,0) ROUND(45.923,-1)
--------------- --------------- ----------------
          45.92              46               50
```

Using the TRUNC Function

Display the value 45.923 truncated to the hundredth, no, and ten decimal places.

```
SQL> SELECT  TRUNC(45.923,2), TRUNC(45.923),
  2          TRUNC(45.923,-1)
  3  FROM    SYS.DUAL;
```

```
TRUNC(45.923,2) TRUNC(45.923) TRUNC(45.923,-1)
--------------- ------------- ----------------
          45.92            45               40
```

Using the MOD Function

Calculate the remainder of the ratio of salary to commission for all employees whose job title is a salesman.

```
SQL> SELECT   ename, sal, comm, MOD(sal, comm)
  2  FROM     emp
  3  WHERE    job = 'SALESMAN';
```

```
ENAME            SAL       COMM  MOD(SAL,COMM)
---------- ---------- ---------- -------------
MARTIN          1250       1400           1250
ALLEN           1600        300            100
TURNER          1500          0           1500
WARD            1250        500            250
```

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Working with Dates

- Oracle stores dates in an internal numeric format: Century, year, month, day, hours, minutes, seconds.
- The default date format is DD-MON-YY.
- SYSDATE is a function returning date and time.
- DUAL is a dummy table used to view SYSDATE.

Arithmetic with Dates

- Add or subtract a number to or from a date for a resultant *date* value.
- Subtract two dates to find the *number* of days between those dates.
- Add *hours* to a date by dividing the number of hours by 24.

Using Arithmetic Operators with Dates

```
SQL> SELECT ename, (SYSDATE-hiredate)/7 WEEKS
  2  FROM   emp
  3  WHERE  deptno = 10;
```

```
ENAME           WEEKS
---------- ----------
KING        830.93709
CLARK       853.93709
MILLER      821.36566
```

Date Functions

FUNCTION	DESCRIPTION
MONTHS_BETWEEN	Number of months between two dates
ADD_MONTHS	Add calendar months to date
NEXT_DAY	Next day of the date specified
LAST_DAY	Last day of the month
ROUND	Round date
TRUNC	Truncate date

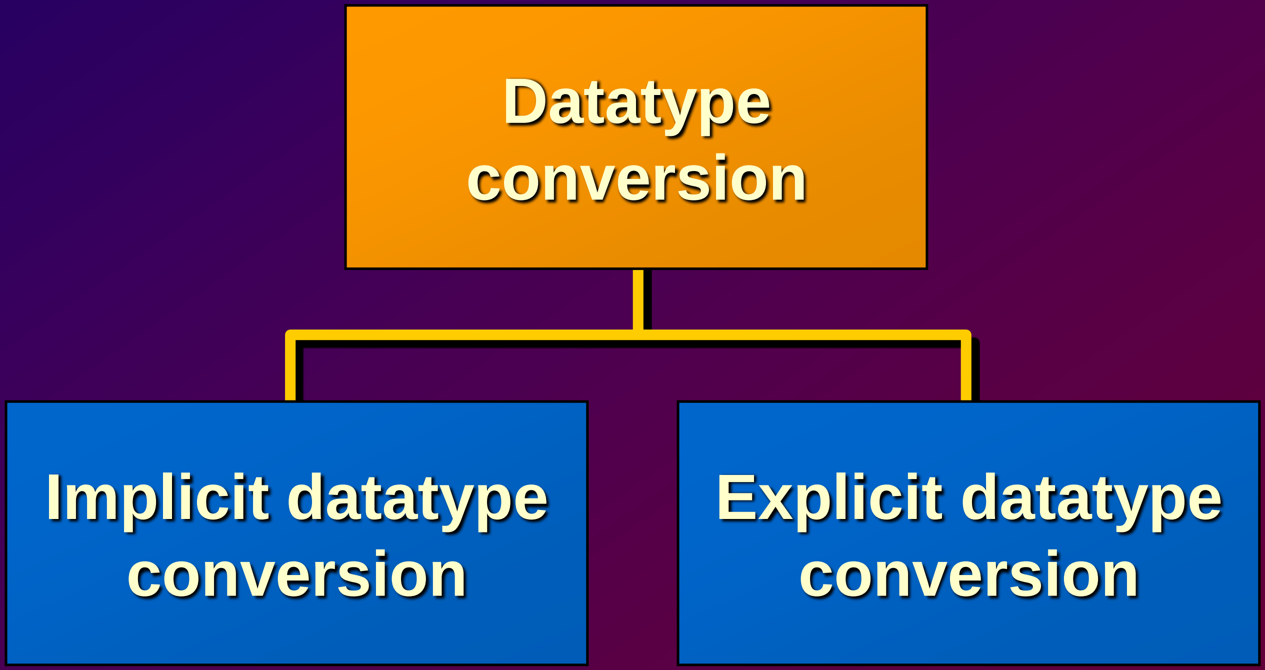
Using Date Functions

- MONTHS_BETWEEN ('01-SEP-95','11-JAN-94') → 19.6774194
- ADD_MONTHS ('11-JAN-94',6) → '11-JUL-94'
- NEXT_DAY ('01-SEP-95','FRIDAY') → '08-SEP-95'
- LAST_DAY('01-SEP-95') → '30-SEP-95'

Using Date Functions

- ROUND('25-JUL-95','MONTH') $\rightarrow$ 01-AUG-95
- ROUND('25-JUL-95','YEAR') $\rightarrow$ 01-JAN-96
- TRUNC('25-JUL-95','MONTH') $\rightarrow$ 01-JUL-95
- TRUNC('25-JUL-95','YEAR') $\rightarrow$ 01-JAN-95

Conversion Functions



Implicit Datatype Conversion

For assignments, Oracle can automatically convert

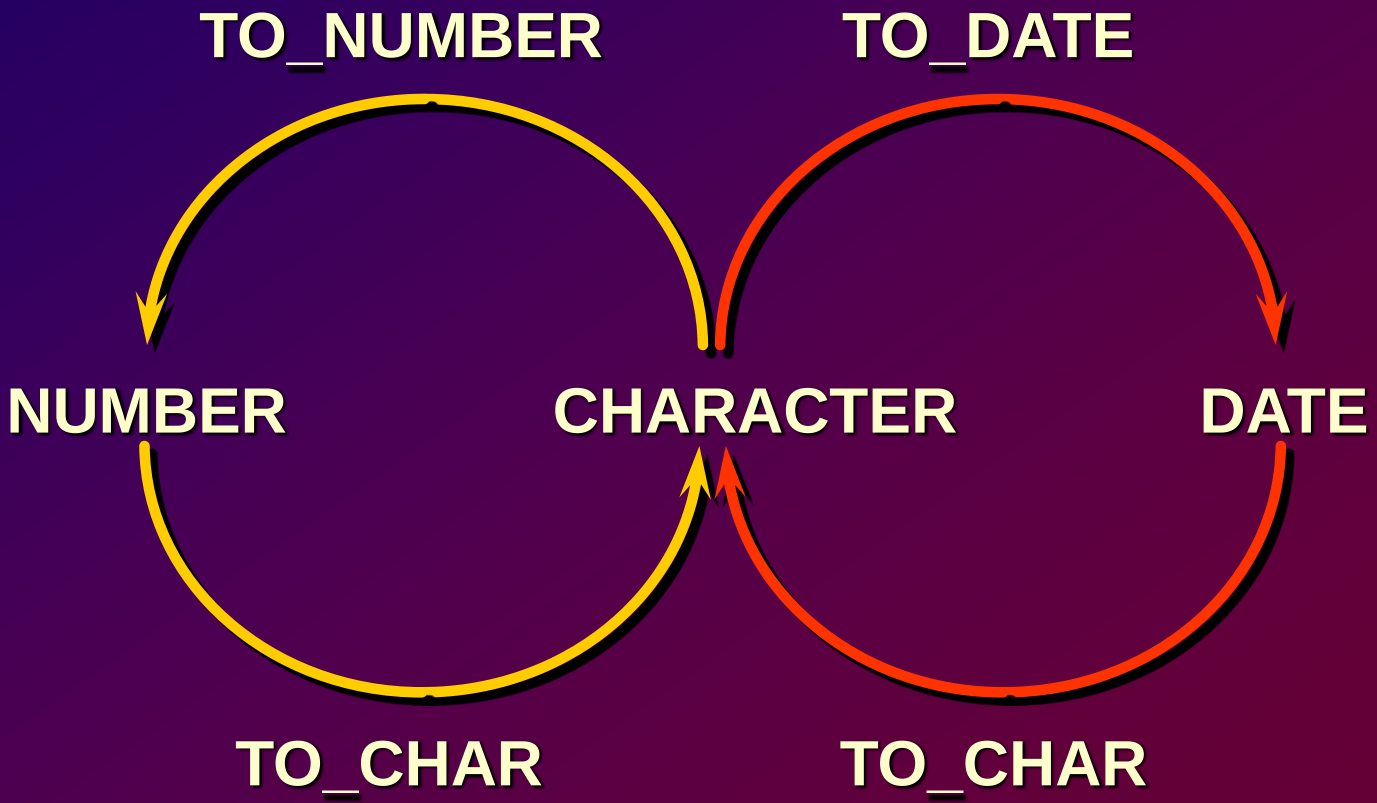
From	To
VARCHAR2 or CHAR	NUMBER
VARCHAR2 or CHAR	DATE
NUMBER	VARCHAR2
DATE	VARCHAR2

Implicit Datatype Conversion

For expression evaluation, Oracle can automatically convert

From	To
VARCHAR2 or CHAR	NUMBER
VARCHAR2 or CHAR	DATE

Explicit Datatype Conversion



TO_CHAR Function with Dates

```
TO_CHAR(date, 'fmt')
```

The format model:

- Must be enclosed in single quotation marks and 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

Date Format Model Elements

YYYY	Full year in numbers
YEAR	Year spelled out
MM	2-digit value for month
MONTH	Full name of the month
DY	3-letter abbreviation of the day of the week
DAY	Full name of the day

Date Format Model Elements

- Time elements format the time portion of the date.

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

- Add character strings by enclosing them in double quotation marks.

DD "of" MONTH	12 of OCTOBER

- Number suffixes spell out numbers.

ddspth	fourteenth

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RR Date Format

Current Year	Specified Date	RR Format	YY Format
1995	27-OCT-95	1995	1995
1995	27-OCT-17	2017	1917
2001	27-OCT-17	2017	2017
2001	27-OCT-95	1995	2095

		If the specified two-digit year is	
		0-49	50-99
If two digits of the current year are	0-49	The return date is in the current century.	The return date is in the century before the current one.
	50-99	The return date is in the century after the current one.	The return date is in the current century.

Using TO_CHAR Function with Dates

```
SQL> SELECT ename,
  2         TO CHAR(hiredate, 'fmDD Month YYYY') HIREDATE
  3  FROM   emp;
```

```
ENAME      HIREDATE
---------- -----------------
KING       17 November 1981
BLAKE      1 May 1981
CLARK      9 June 1981
JONES      2 April 1981
MARTIN     28 September 1981
ALLEN      20 February 1981
...
14 rows selected.
```

TO_CHAR Function with Numbers

```
TO_CHAR(number, 'fmt')
```

Use these formats with the TO_CHAR function to display a number value as a character.

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 thousand indicator

Using TO_CHAR Function with Numbers

```
SQL> SELECT   TO_CHAR(sal,'$99,999') SALARY
  2  FROM     emp
  3  WHERE    ename = 'SCOTT';
```

```
  SALARY
--------
  $3,000
```

TO_NUMBER and TO_DATE Functions

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

```
TO_NUMBER(char)
```

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

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

NVL Function

Converts null to an actual value

- Datatypes that can be used are date, character, and number.
- Datatypes must match
  - NVL(comm,0)
  - NVL(hiredate,'01-JAN-97')
  - NVL(job,'No Job Yet')

Using the NVL Function

```
SQL> SELECT ename, sal, comm, (sal*12)+NVL(comm,0)
  2  FROM   emp;
```

```
ENAME             SAL      COMM (SAL*12)+NVL(COMM,0)
---------- ---------- --------- --------------------
KING             5000                          60000
BLAKE            2850                          34200
CLARK            2450                          29400
JONES            2975                          35700
MARTIN           1250      1400                16400
ALLEN            1600       300                19500
...
14 rows selected.
```

DECODE Function

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

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

Using the DECODE Function

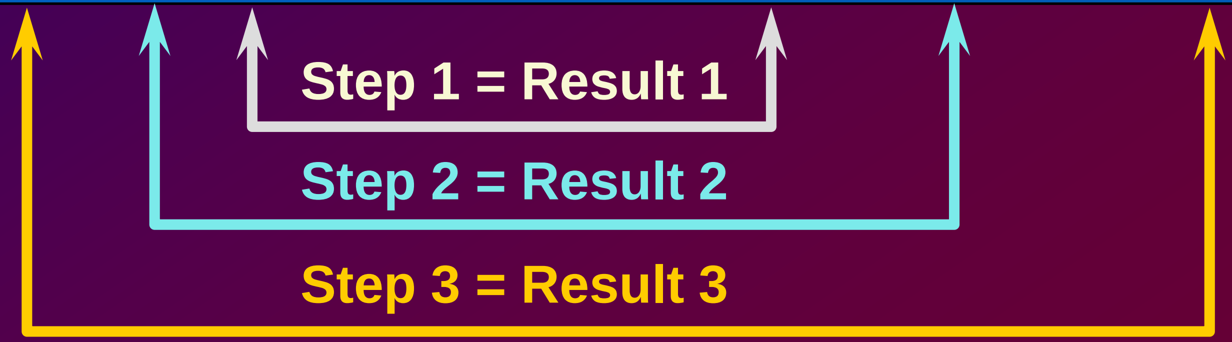
```
SQL> SELECT job, sal,
  2         DECODE(job, 'ANALYST'   SAL*1.1,
  3                     'CLERK',    SAL*1.15,
  4                     'MANAGER',  SAL*1.20,
  5                                 SAL)
  6                REVISED_SALARY
  7  FROM   emp;
```

```
JOB              SAL REVISED_SALARY
--------- ---------- --------------
PRESIDENT       5000           5000
MANAGER         2850           3420
MANAGER         2450           2940
...
14 rows selected.
```

Nesting Functions

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

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



Nesting Functions

```
SQL> SELECT   ename,
  2           NVL(TO_CHAR(mgr),'No Manager')
  3  FROM     emp
  4  WHERE    mgr IS NULL;
```

```
ENAME      NVL(TO_CHAR(MGR),'NOMANAGER')
---------- -----------------------------
KING       No Manager
```

Summary

Use functions to:

- Perform calculations on data
- Modify individual data items
- Manipulate output for groups of rows
- Alter date formats for display
- Convert column datatypes

Practice Overview

- Creating queries that require the use of numeric, character, and date functions
- Using concatenation with functions
- Writing case-insensitive queries to test the usefulness of character functions
- Performing calculations of years and months of service for an employee
- Determining the review date for an employee

Course Overview

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