Database Programming

3-3

Introduction to Functions

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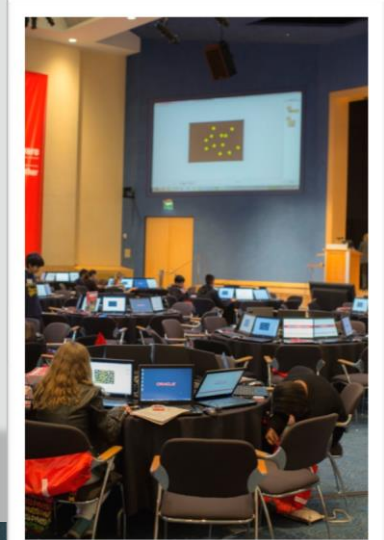
Objectives

- This lesson covers the following objectives:
  - Identify appropriate applications of single-row functions in query statements
  - Classify a function as a single-row or multi-row function
  - Differentiate between single-row functions and multi-row functions and the results returned by each

3

3

Purpose

- When you put money in a drink machine, something happens between the time the money is deposited and your favorite drink is dispensed

- The transaction is processed internally by the machine.

- Your money is the input and the drink is the output

- The machine performs a function

- The machine:
  - Counts your money
  - Makes sure your selection is chosen
  - Returns change, if necessary

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4

4

Purpose

- In SQL, there are many types of functions that are used to transform input in one form to output in another form

- These functions are used to manipulate data values

- Functions are small programs that perform an action on a value or column and produce something different as output

How could you find out whether the first mane and last name of employees in the employees table is stored in uppercase, lowercase or mixed case? Execute a SELECT statement to look at the output.

SELECT first_name, last_name

FROM employees;

Functions

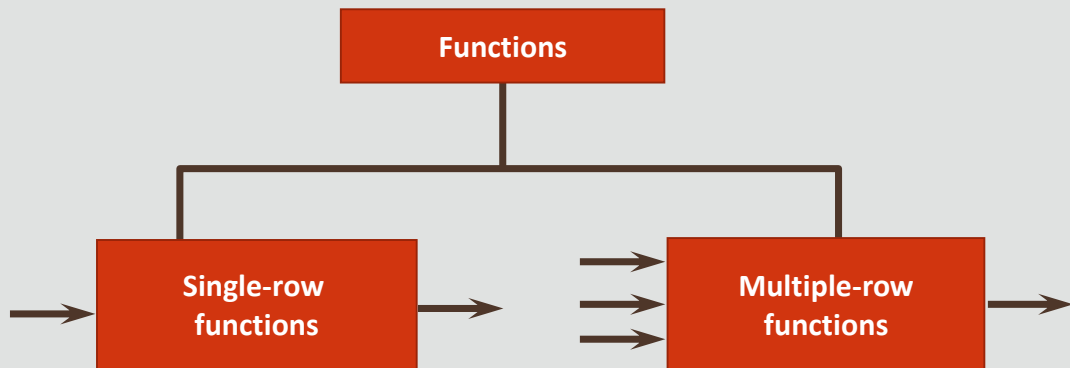- Functions have both input and output. Input into a function is referred to as an argument

Input (Argument) → Function → Output

- In the drink machine example, the input is money and the output is a drink

Money → Drink Machine → Drink

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Functions

- Oracle has two distinct types of functions:
  - Single-Row
  - Multiple-Row

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                        │    Functions    │
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                ┌────────────────┴────────────────┐
                │                                  │
       ┌─────────────────┐              ┌─────────────────┐
  ───→ │   Single-row    │ ───→    ───→ │   Multiple-row  │ ───→
       │    functions    │         ───→ │    functions    │
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```

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Introduction to Functions

7

Single-Row functions are covered in greater depth in the next Section.

Multiple-Row functions are covered later in the course.

Single-Row Versus Multiple-Row Functions

- Single-row functions operate on single rows only and return one result per row

- There are different types of single-row functions including character, number, date, and conversion functions
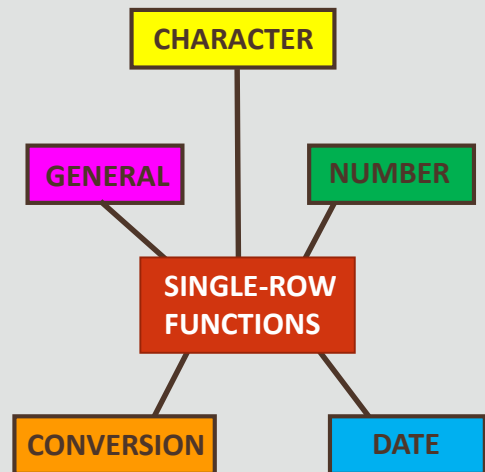
$$\longrightarrow \boxed{\textbf{Single-row functions}} \longrightarrow$$

- Multiple-row functions can manipulate groups of rows to give one result per group of rows

- These functions are also known as group functions

$$\longrightarrow\atop\longrightarrow\atop\longrightarrow \boxed{\textbf{Multiple-row functions}} \longrightarrow$$

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8

Single-Row Functions

- In SQL, Single-Row functions can be used to:
  - Perform calculations such as rounding numbers to a specified decimal place
  - Modify individual data items such as converting character values from uppercase to lowercase

CHARACTER

GENERAL

NUMBER

SINGLE-ROW FUNCTIONS

CONVERSION

DATE

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9

9

Single-Row Functions

- Format dates and numbers for display such as converting the internal numeric database date format to a standard format

- Convert column data types such as converting a character string to a number or date

CHARACTER

GENERAL

NUMBER

SINGLE-ROW FUNCTIONS

CONVERSION

DATE

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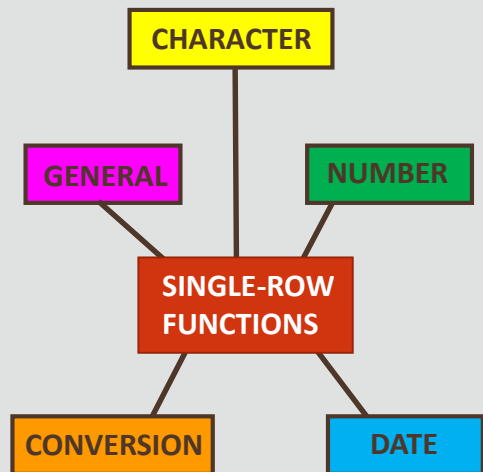
Single-Row Functions

- Single-Row Functions accept one or more arguments and will return a single result per row

- So if you apply the single row function to 12 rows, you will get 12 results out of the single row function

- In summary, single-row functions do the following:
  - Manipulate data items
  - Accept arguments and return one value
  - Act on each row returned
  - Return one result per row
  - Can modify the data type
  - Can be nested

An argument can be one of the following:

User-supplied constant

Variable value

Column name

Expression

Additional features of single-row functions include:

Possibly returning a data value of a different type than that referenced

Possibly expecting one or more arguments

Can be used in SELECT, WHERE, and ORDER BY clauses.

Multiple-Row Functions

- Multiple-Row (or Group) functions take many rows as input, and return a single value as output
- The rows input may be the whole table or the table split into smaller groups
- Examples of Multiple-Row (Group) functions include:
  - MAX: finds the highest value in a group of rows
  - MIN: finds the lowest value in a group of rows
  - AVG: finds the average value in a group of rows

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12

Terminology

- Key terms used in this lesson included:
  - Single Row Function
  - Multiple Row Function

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13

Summary

- In this lesson, you should have learned how to:
  - Identify appropriate applications of single-row functions in query statements
  - Classify a function as a single-row or multi-row function
  - Differentiate between single-row functions and multi-row functions and the results returned by each

14