Database Design

Introduction to Functions – Single Row Functions

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

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

Purpose (cont.)

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.

How could you find out whether the information in the DJs on Demand CD titles table is stored in uppercase or lowercase? Execute a SELECT statement to look at the output.

```
SELECT title
FROM d_cds;
```

Functions

Functions are programs that do an action on a value or column and produce something different as output. Functions have both input and output. Input into a function is referred to as an argument.
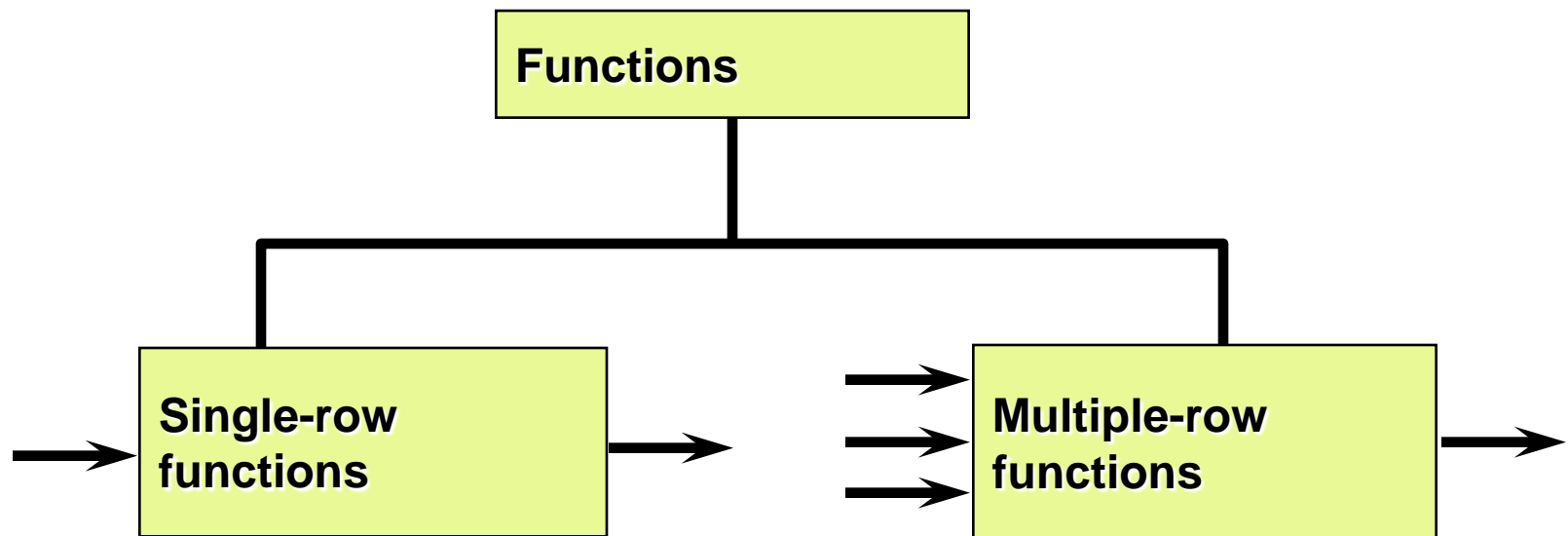
| Input (Argument) → | Function | → Output |

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

| Money → | Drink Machine | → Drink |

Functions (cont.)

Oracle has two distinct types of functions:

- Single-Row
- Multiple-Row

```
                    ┌─────────────────┐
                    │    Functions    │
                    └────────┬────────┘
                             │
            ┌────────────────┴────────────────┐
    ┌───────────────┐                  ┌───────────────┐
 ──►│  Single-row   │──►            ──►│ Multiple-row  │──►
    │  functions    │               ──►│  functions    │
    └───────────────┘               ──►└───────────────┘
```

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.
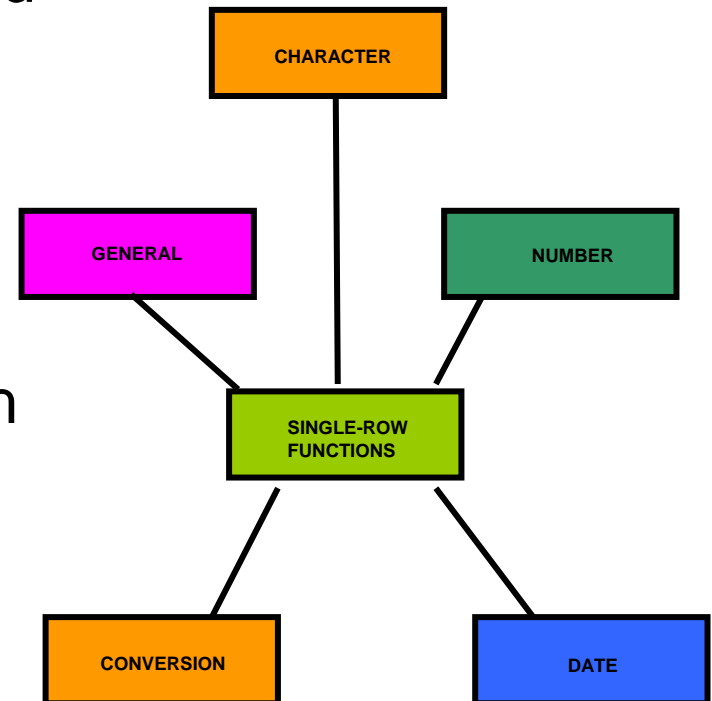
Single-row functions

Multiple-row functions can manipulate groups of rows to give one result per group of rows. These functions are known as group functions.

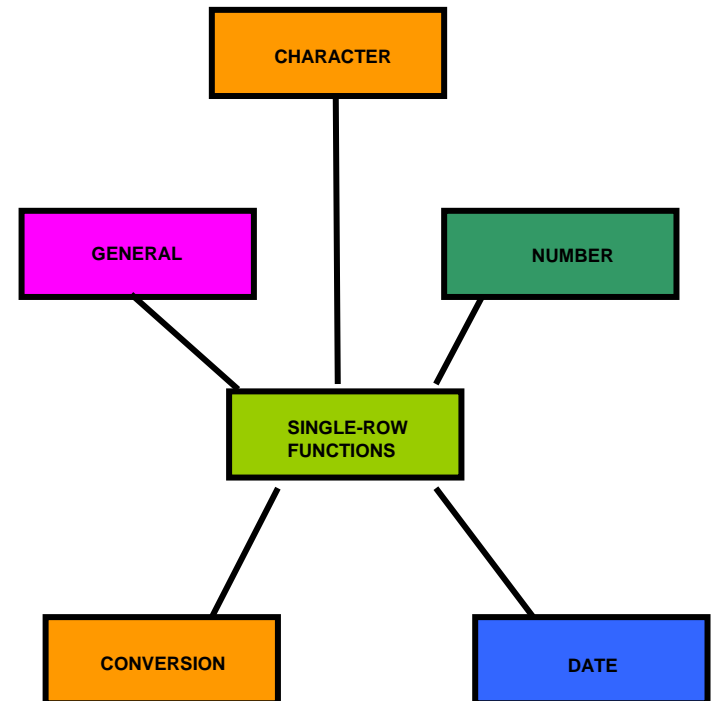**Multiple-row functions**
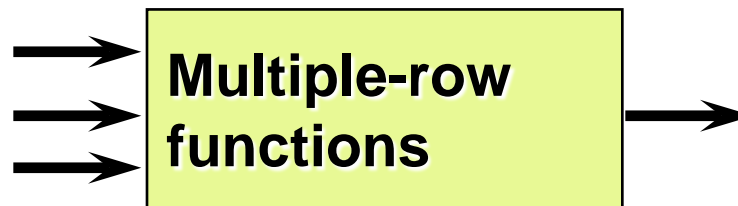
Single-Row Functions

In SQL, functions are a very powerful feature. They 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

- Manipulate output for groups of rows by finding an average or sum for several rows

Single-Row Functions (cont.)

- 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

Single-Row Functions (cont.)

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

Multiple-Row Functions

Group functions take many rows as input, and return a single value as output.

```
SELECT MAX(salary), MIN(salary), AVG(salary)
FROM employees;
```

Multiple-Row Functions (cont.)

Group functions take many rows as input, and return a single value as output.

```
SELECT MAX(salary), MIN(salary), AVG(salary)
FROM employees;
```

MAX(SALARY)	MIN(SALARY)	AVG(SALARY)
24000	2500	8775

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