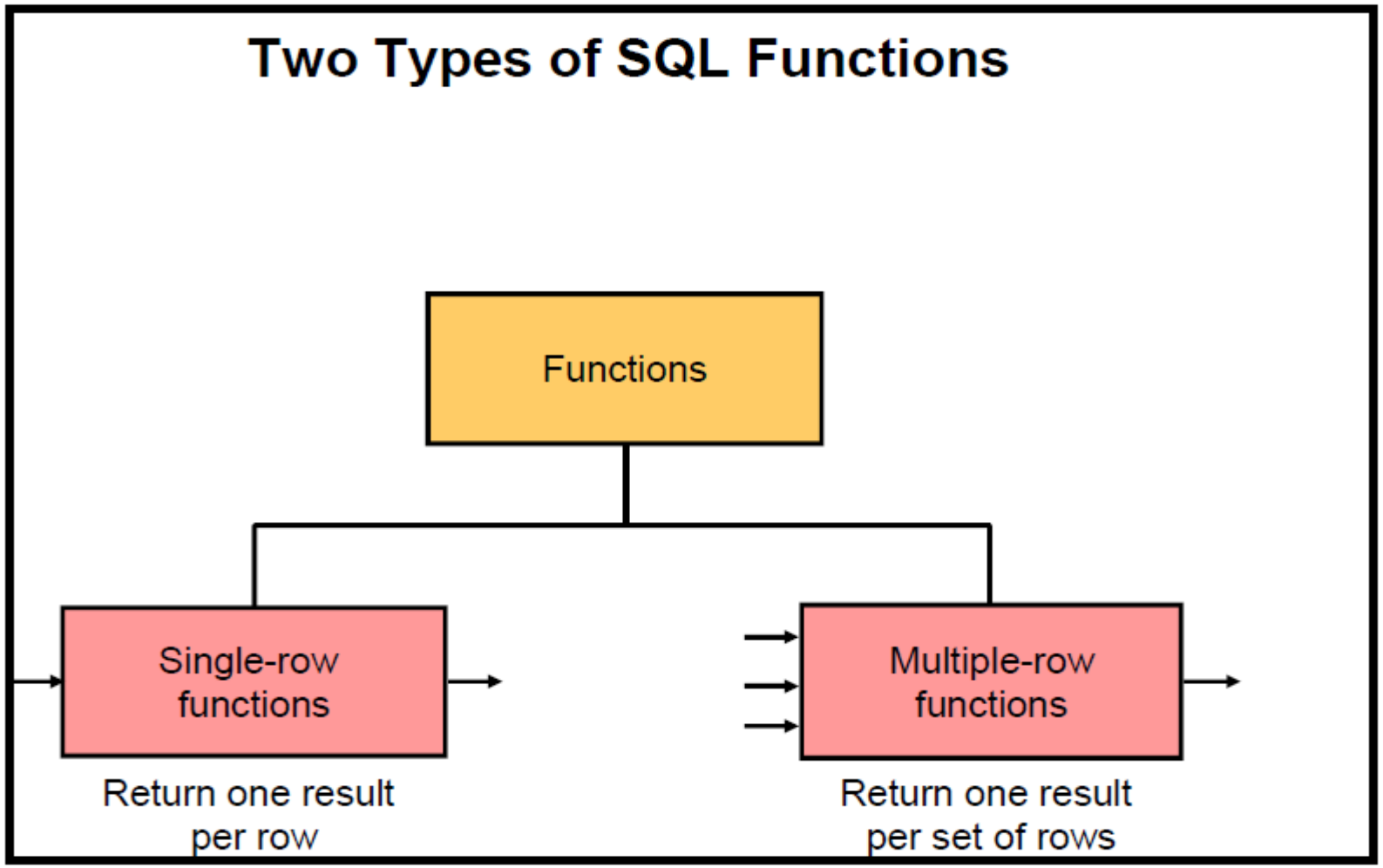
Reporting Aggregated Data Using the Group Functions

Multi rows functions


Two Types of SQL Functions
Functions
Single-row functions
Multiple-row functions
Return one result per row
Return one result per set of rows

What Are Group Functions?

Group functions operate on sets of rows to give one result per group.

EMPLOYEES

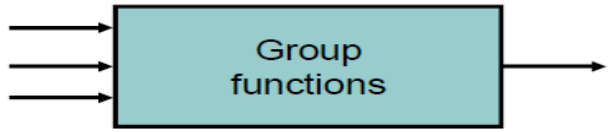
	DEPARTMENT_ID	SALARY
1	10	4400
2	20	13000
3	20	6000
4	110	12000
5	110	8300
6	90	24000
7	90	17000
8	90	17000
9	60	9000
10	60	6000
...		
18	80	11000
19	80	8600
20	(null)	7000

Maximum salary in EMPLOYEES table

MAX(SALARY)
24000

Types of Group Functions

- AVG
- COUNT
- MAX
- MIN
- SUM
- LISTAGG
- STDDEV
- VARIANCE



Function	Description
AVG([DISTINCT|ALL]*n*)	Average value of *n*, ignoring null values
COUNT	Number of rows, where *expr* evaluates to something other than null (count all selected rows using *, including duplicates and rows with nulls)
MAX([DISTINCT|ALL]*expr*)	Maximum value of *expr*, ignoring null values
MIN([DISTINCT|ALL]*expr*)	Minimum value of *expr*, ignoring null values
STDDEV([DISTINCT|ALL]*n*)	Standard deviation of *n*, ignoring null values
SUM([DISTINCT|ALL]*n*)	Sum values of *n*, ignoring null values
LISTAGG	Orders data within each group specified in the ORDER BY clause and then concatenates the values of the measure column
VARIANCE([DISTINCT|ALL]*n*)	Variance of *n*, ignoring null values

The group function is placed after the SELECT keyword. You may have multiple group functions separated by commas.

Syntax:

group_function ([DISTINCT | ALL] *expr*)

Guidelines for using the group functions:

- DISTINCT makes the function consider only nonduplicate values; ALL makes it consider every value, including duplicates. The default is ALL and, therefore, does not need to be specified.
- The data types for the functions with an expr argument may be CHAR, VARCHAR2, NUMBER, or DATE.
- All group functions ignore null values. To substitute a value for null values, use the NVL, NVL2, COALESCE, CASE, or DECODE functions.

Creating Groups of Data

EMPLOYEES

	DEPARTMENT_ID	SALARY	
1	10	4400	4400
2	20	13000	9500
3	20	6000	
4	50	2500	
5	50	2600	
6	50	3100	3500
7	50	3500	
8	50	5800	
9	60	9000	
10	60	6000	6400
11	60	4200	
12	80	11000	
13	80	8600	10033
...			
18	110	8300	
19	110	12000	
20	(null)	7000	

Average salary in the EMPLOYEES table for each department

	DEPARTMENT_ID	AVG(SALARY)
1	(null)	7000
2	20	9500
3	90	19333.333333333333...
4	110	10150
5	50	3500
6	80	10033.333333333333...
7	10	4400
8	60	6400

Creating Groups of Data: GROUP BY Clause Syntax

You can divide rows in a table into smaller groups by using the GROUP BY clause.

```
SELECT      column, group_function(column)
FROM        table
[WHERE      condition]
[GROUP BY   group_by_expression]
[ORDER BY   column];
```

Guidelines

- If you include a group function in a SELECT clause, you cannot select individual column as well, *unless* the individual column appears in the GROUP BY clause. You receive an error message if you fail to include the column list in the GROUP BY clause.
- Using a WHERE clause, you can exclude rows before dividing them into groups.
- You can substitute *column* by an Expression in the SELECT statement.
- You must include the *columns* in the GROUP BY clause.
- You cannot use a column alias in the GROUP BY clause.

Illegal Queries Using Group Functions

Any column or expression in the SELECT list that is not an aggregate function must be in the GROUP BY clause:

```
SELECT department_id, COUNT(last_name)
FROM   employees;
```

```
ORA-00937: not a single-group group function
00937. 00000 - "not a single-group group function"
```

A GROUP BY clause must be added to count the last names for each department_id.

```
SELECT department_id, job_id, COUNT(last_name)
FROM   employees
GROUP BY department_id;
```

```
ORA-00979: not a GROUP BY expression
00979. 00000 - "not a GROUP BY expression"
```

Either add job_id in the GROUP BY or remove the job_id column from the SELECT list.

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Illegal Queries Using Group Functions

- You cannot use the `WHERE` clause to restrict groups.
- You use the `HAVING` clause to restrict groups.
- You cannot use group functions in the `WHERE` clause.

```
SELECT    department_id, AVG(salary)
FROM      employees
WHERE     AVG(salary) > 8000
GROUP BY department_id;
```

```
ORA-00934: group function is not allowed here
00934. 00000 - "group function is not allowed here"
*Cause:
*Action:
Error at Line: 3 Column: 9
```

Cannot use the `WHERE` clause to restrict groups

Thank You