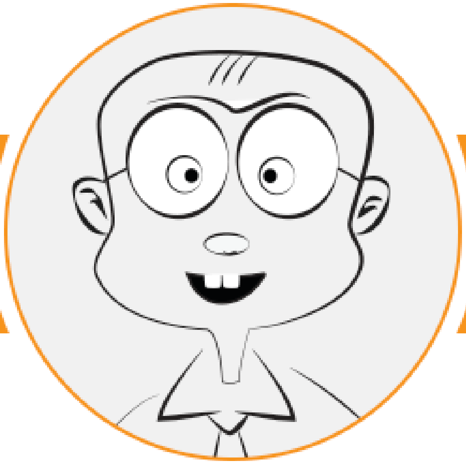

SELECT OPTIONS

Learning Goals

By the end of this lecture students should be able to:

- ✓ Understand and use SQL functions
- ✓ Use Group, Having, Order clauses to built queries
- ✓ Copy data from one table into another, combine the result-set of two or more SELECT statements

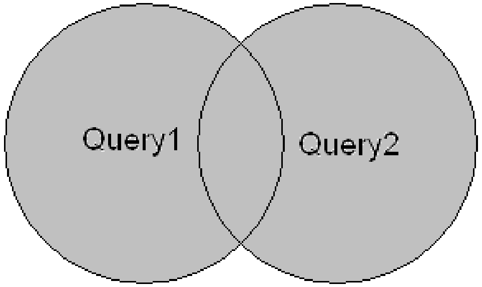

Table of contents

- SQL Functions
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- Quiz

Trainee’s missions

To complete this course and achieve goals, trainees must:

- ✓ Read Lecture
- ✓ Do Exercises
- ✓ Take quizz
- ✓ Complete final exam

SQL FUNCTIONS

SQL Functions

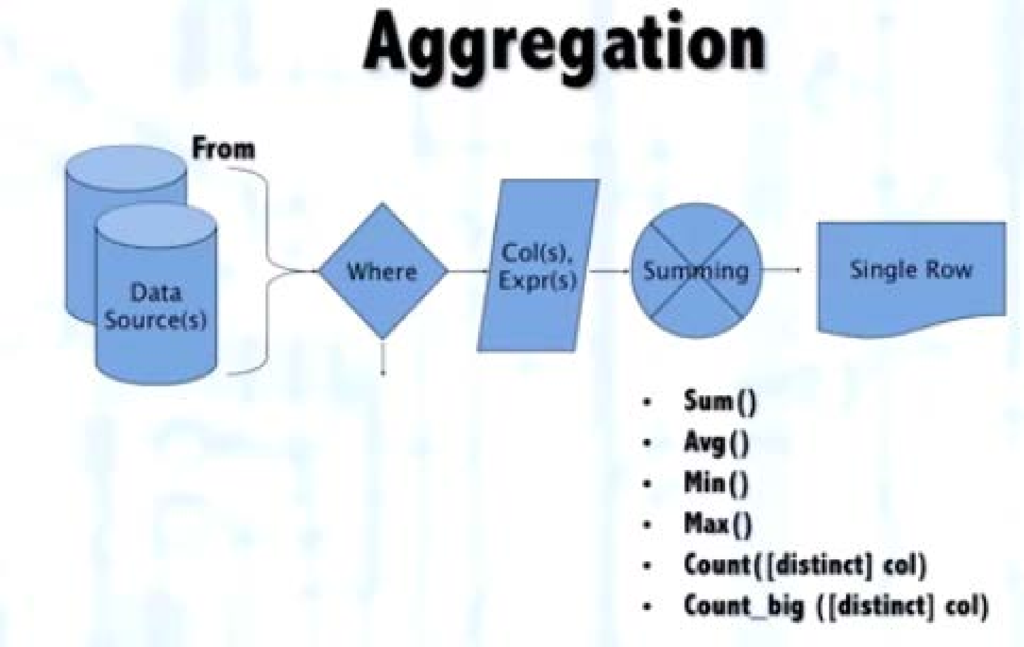
- SQL has many built-in functions for performing calculations on data:

✓ SQL aggregate functions return a single value, calculated from values in a column.

✓ SQL scalar functions return a single value, based on the input value.

What is an aggregate function

- An aggregate function is function that takes a collection of values as input and returns a single value.
- Aggregate functions can be used as expressions only in the following:
  - ✓ The select list of a SELECT statement
  - ✓ A HAVING clause.



- Sum()
- Avg()
- Min()
- Max()
- Count([distinct] col)
- Count_big ([distinct] col)

Aggregate Functions

- Each function eliminates NULL values and operates on Non-NULL values

Function	Description
AVG ()	Return the average value in a column
COUNT()	Return the total number of values in a given column
COUNT(*)	Return the number of rows
MAX ()	Return the largest value in a column
MIN ()	Return the smallest value in a column

Scalar functions

Function	Description
LEN()	Return the length of a text field
ROUND()	Round a numeric field to the number of decimals specified
NOW()	Return the current system date and time
FORMAT()	Format how a field is to be displayed

SQL CLAUSES

Group By

- Sometimes we want to apply aggregate functions to groups of rows.

Syntax:

```
SELECT column_name, aggregate_function(column_name)
FROM table_name
WHERE column_name operator value
GROUP BY column_name;
```

- Example, find the average mark of each student.

Group

Id	Name	SubjectID	Mark
1	John	DBS	76
2	John	IAI	72
3	Mary	DBS	60
4	Mand	PR1	63
5	Mand	PR2	35
6	Jane	IAI	54

Grades

```
SELECT Name,
AVG(Mark) AS Average
FROM Grades
GROUP BY Name
```

Name	Average
John	74
Mary	60
Mand	49
Jane	54

Having clause

- **HAVING** is like a **WHERE** clause, except that it applies to the results of a **GROUP BY** query.
- It can be used to select groups which satisfy a given condition.
- Ex:

```
SELECT Name, AVG(Mark) AS Average
FROM Grades
GROUP BY Name
HAVING AVG(Mark) >= 50
```

Id	Name	SubjectID	Mark
1	John	DBS	76
2	John	IAI	72
3	Mary	DBS	60
4	Mand	PR1	63
5	Mand	PR2	35
6	Jane	IAI	54

Name	Average
John	74
Mary	60
Jane	54

WHERE and HAVING

- WHERE refers to the rows of tables, and so cannot use aggregate functions
- HAVING refers to the groups of rows, can use aggregate functions and cannot use columns which are not in the GROUP BY

```
SELECT Name,
AVG(Mark) AS Average
FROM Grades
WHERE AVG(Mark) >= 50
GROUP BY Name
```

✗

```
SELECT Name,
AVG(Mark) AS Average
FROM Grades
GROUP BY Name
HAVING AVG(Mark) >= 50
```

✓

Order by clause

- The SQL **ORDER BY clause** is used to sort (ascending or descending) the records in the result set for a SELECT statement.

Syntax:

```
    SELECT column_name, column_name
    FROM table_name
    [WHERE  conditions]
    ORDER BY column_name, column_name [ASC|DESC]
```

- Ex:

Group

Id	Name	SubjectID	Mark
1	John	DBS	76
2	John	IAI	72
3	Mary	DBS	60
4	Mand	PR1	63
5	Mand	PR2	35
6	Jane	IAI	54

Grades

```
SELECT Name,
AVG(Mark) AS Average
FROM Grades
GROUP BY Name
ORDER BY Average DESC
```

Name	Average
John	74
Mary	60
Jane	54
Mand	49

OTHER OPTIONS

UNION Operator

The SQL UNION operator combines the result of two or more SELECT statements.

Syntax:

```
SELECT column_name(s) FROM table1
UNION
SELECT column_name(s) FROM table2;
```

Note: The UNION operator selects only distinct values by default. To allow duplicate values, use the ALL keyword with UNION.

```
SELECT Column1, Column2 FROM Table1
UNION
SELECT Column1, Column2 FROM
Table2;
```

```
SELECT Column1, Column2 FROM Table1
UNION ALL
SELECT Column1, Column2 FROM
Table2;
```

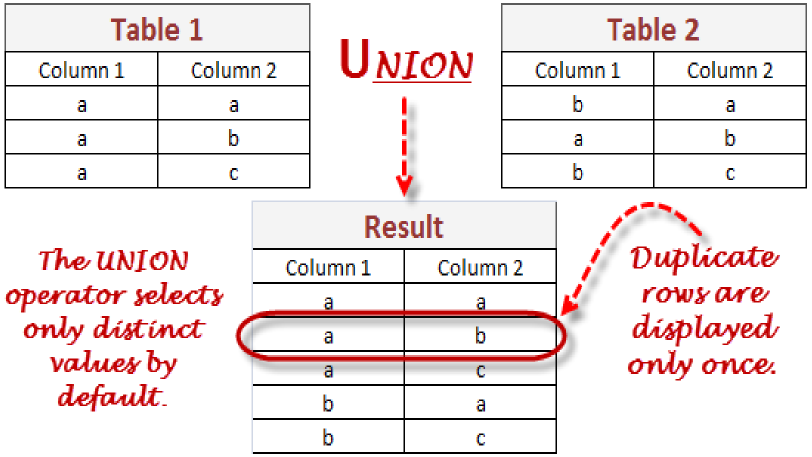


Table 1

Column 1	Column 2
a	a
a	b
a	c

UNION

Table 2

Column 1	Column 2
b	a
a	b
b	c

Result

Column 1	Column 2
a	a
a	b
a	c
b	a
b	c

The UNION operator selects only distinct values by default.

Duplicate rows are displayed only once.

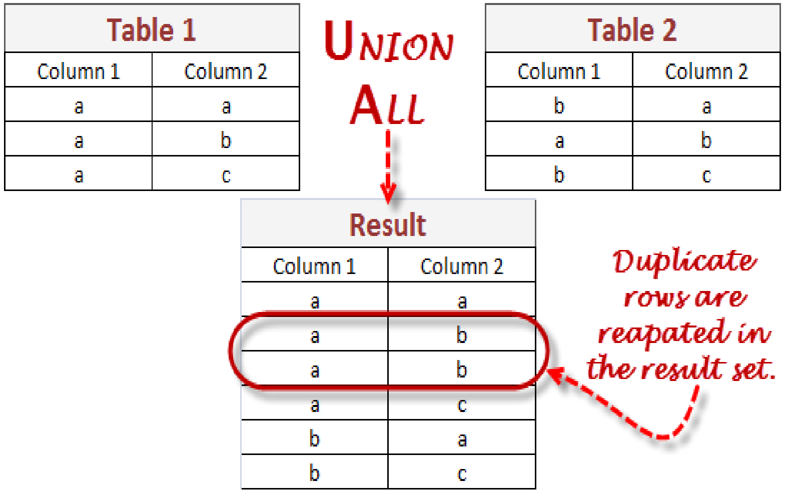


Table 1

Column 1	Column 2
a	a
a	b
a	c

UNION ALL

Table 2

Column 1	Column 2
b	a
a	b
b	c

Result

Column 1	Column 2
a	a
a	b
a	b
a	c
b	a
b	c

Duplicate rows are reapated in the result set.

SELECT INTO Statement

- With SQL, you can copy information from one table into another.
- The SELECT INTO statement selects data from one table and inserts it into a new table.

Syntax:

(1): copy all columns into the new table:

```
SELECT *
INTO newtable [IN externaldb]
FROM table1;
```

(2): copy only the columns we want into the new table:

```
SELECT column_name(s)
INTO newtable [IN externaldb]
FROM table1;
```

INSERT INTO SELECT Statement

- The INSERT INTO SELECT statement selects data from one table and inserts it into an existing table.

- Any existing rows in the target table are unaffected.

- **Syntax:**

✓ *Copy all columns from one table to another, existing table:*

```
INSERT INTO table2
SELECT * FROM table1;
```

✓ *Copy only the columns we want to into another, existing table:*

```
INSERT INTO table2(column_name(s))
SELECT column_name(s)
FROM table1;
```

SELECT Options Demo

- Demo

Quiz!

Now let's check how you understand the lecture!

There are 8 questions below.
Click NEXT button to start!

Now let's check how you understand the lecture!

Quiz!

There are 8 questions below.
*Click **NEXT** button to start!*

Summary

SQL Functions

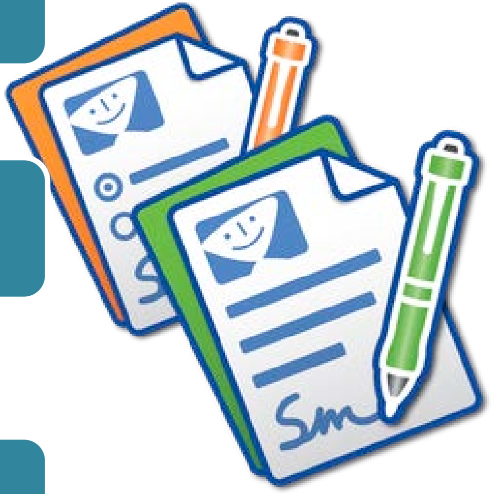
- Aggregate, scalar functions

SQL Clauses

- Group by, Having, Order by

Other Options

- UNION Operator, SQL SELECT INTO, INSERT INTO SELECT



Demo

Quiz

Exit Course

THANK YOU

You have completed "**Lecture 7" course.**

Click EXIT button to exit course and discover the next Lecture "**Lecture 8".**

EXIT