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Database Programming with SQL

1-3
Anatomy of a SQL Statement

ORACLE Academy

Objectives

This lesson covers the following objectives:

- Match projection and selection with their correct capabilities
- Create a basic SELECT statement
- Use the correct syntax to display all rows in a table
- Use the correct syntax to select specific columns in a table, modify the way data is displayed, and perform calculations using arithmetic expressions and operators

Objectives

This lesson covers the following objectives:

- Formulate queries using correct operator precedence to display desired results
- Define a null value
- Demonstrate the effect null values create in arithmetic expressions
- Construct a query using a column alias

SELECT Keyword

- SELECT is one of the most important, if not the most important, keyword in SQL.
- You use SELECT to retrieve information from the database. When you learn how to use SELECT, you've opened the door to the database.
- Imagine a database containing information about movies such as title, genre, studio, producer, release date, series, country, language, rating, running time, and so on.
- What if you only wanted the titles of movies created in India?
- The SELECT statement allows you to search for specific data.

SELECT Statement

- The SELECT statement retrieves information from the database.
- The syntax for a SELECT statement is as follows:

```
SELECT <column_name(s)>
FROM <table_name>;
```

- In its simplest form, a SELECT statement must include the following:
- A SELECT clause, which specifies the columns to be displayed
- A FROM clause, which specifies the table containing the columns listed in the SELECT clause

Conventions

- Throughout this course, the following will be used:

```
SELECT last_name
FROM employees
```

- A keyword refers to an individual SQL command.
- For example, SELECT and FROM are keywords.
- A clause is a part of a SQL statement.
- For example, SELECT last_name is a clause.
- A statement is a combination of two or more clauses.
- For example, SELECT last_name FROM employees is a statement.

Capabilities of SELECT Statements

- Projection: Used to choose columns in a table
- Selection: Used to choose rows in a table

Table 2: Projection

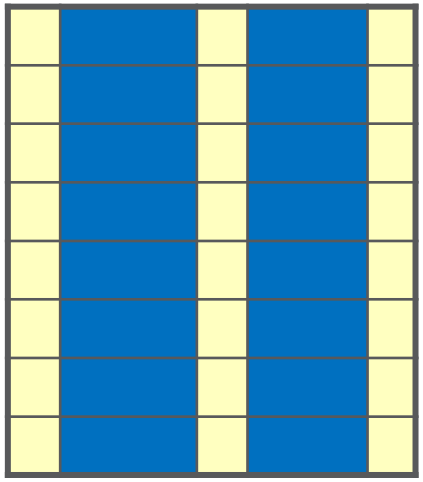
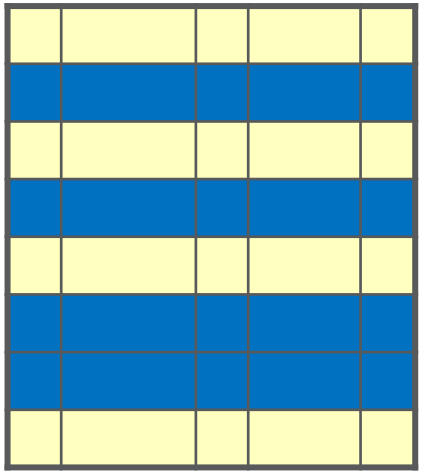


Table 2: Selection



Projection and Selection

ID	FIRST_NAME	LAST_NAME	SALARY
10	John	Doe	4000
20	Jane	Jones	3000
30	Sylvia	Smith	5000
40	Hai	Nguyen	6000

Projection

Selection

```
SELECT salary
FROM employees
WHERE last_name like 'Smith';
```

Selecting All Columns

- You can display all of the columns of data in a table by using an asterisk symbol (*) instead of a column name in the SELECT clause.
- In the example shown, all of the columns in the countries table are selected.

```
SELECT *
FROM countries;
```

COUNTRY_ID	COUNTRY_NAME	REGION_ID
CA	Canada	2
DE	Germany	1
UK	United Kingdom	1
US	United States of America	2

Selecting All Columns

- You can also display all the columns in a table by listing them individually.

```
SELECT country_id, country_name, region_id
FROM countries;
```

COUNTRY_ID	COUNTRY_NAME	REGION_ID
CA	Canada	2
DE	Germany	1
UK	United Kingdom	1
US	United States of America	2

Projecting Specific Columns

- If you want to PROJECT only specific columns from a table to be displayed, simply list each of the column names you want and separate each name with a comma in the SELECT clause.

```
SELECT location_id, city, state_province
FROM locations;
```

LOCATION_ID	CITY	STATE_PROVINCE
1800	Toronto	Ontario
2500	Oxford	Oxford
1400	Southlake	Texas
1500	South San Francisco	California
1700	Seattle	Washington

Using Arithmetic Operators

- Using a few simple rules and guidelines, you can construct SQL statements that are both easy to read and easy to edit.
- Knowing the rules will make learning SQL easy.
- You may need to modify the way in which data is displayed, perform calculations, or look at what-if scenarios.
- For example, "What if every employee was given a 5% raise?
- How would that affect our yearly profit figures?"

Using Arithmetic Operators

- These types of calculations are all possible using arithmetic expressions.
- You are already familiar with arithmetic expressions in mathematics:
  - add (+), subtract (-) , multiply (*) and divide (/)
- Note that this example does not create new columns in the tables or change the actual data values.
- The results of the calculations will appear only in the output.

Using Arithmetic Operators

- The example shown uses the addition operator to calculate a salary increase of 300 for all employees and displays a new SALARY + 300 column in the output.

```
SELECT last_name, salary, salary + 300
FROM employees;
```

- Putting in blank spaces before and after an arithmetic operator will not affect the output.

LAST_NAME	SALARY	SALARY+300
King	24000	24300
Kochhar	17000	17300
De Haan	17000	17300
Whalen	4400	4700
Higgins	12000	12300
Gietz	8300	8600
Zlotkey	10500	10800
Abel	11000	11300
Taylor	8600	8900
Grant	7000	7300

Precedence in Arithmetic Operators

- Precedence is the order in which Oracle evaluates different operators in the same expression.
- When evaluating an expression containing multiple operators, Oracle evaluates operators with higher precedence before evaluating those with lower precedence.
- Oracle evaluates operators with equal precedence from left to right within an expression.

Precedence in Arithmetic Operators

- Arithmetic operators perform the mathematical operations of Multiplication, Division, Addition, and Subtraction.
- If these operators appear together in an expression, multiplication and division are evaluated first.
- So the order is: * / + -.
- An easy way to remember their operator precedence is the mnemonic device: My Dear Aunt Sally

Precedence in Arithmetic Operators

- If operators within an expression are of the same priority, then evaluation is done from left to right.
- You can always use parentheses to force the expression within parentheses to be evaluated first.
- In the example tables shown on the next slide, note the differences in the output between the query that used parentheses and the one that didn't.

Precedence in Arithmetic Operators

Operator Precedence

```
SELECT last_name, salary,
       12*salary +100
FROM employees;
```

LAST_NAME	SALARY	12*SALARY+100
King	24000	288100
Kochhar	17000	204100
De Haan	17000	204100
Whalen	4400	52900
Higgins	12000	144100
Gietz	8300	99700

Using Parentheses

```
SELECT last_name, salary,
       12*(salary +100)
FROM employees;
```

LAST_NAME	SALARY	12*(SALARY+100)
King	24000	289200
Kochhar	17000	205200
De Haan	17000	205200
Whalen	4400	54000
Higgins	12000	145200
Gietz	8300	100800

NULL Values

- In SQL, NULL is an interesting word.
- To understand NULL, you have to know what NULL is and what NULL is not.
- NULL is a value that is unavailable, unassigned, unknown, or inapplicable.
- NULL is not the same as a zero or a space.
- In SQL, a zero is a number, and a space is a character.

NULL Values

- Sometimes, you don't know the value for a column.
- In a database, you can store unknowns in your databases.
- Relational databases use a placeholder called NULL or null to represent these unknown values.

NULL Values

- If any column value in an arithmetic expression is null, the result is null or unknown.
- If you try to divide by null, the result is null or unknown.
- However, if you try to divide by zero, you get an error.

Salaries and Commissions

LAST_NAME	JOB_ID	SALARY	COMMISSION_PCT
King	AD_PRES	24000	-
Kochhar	AD_VP	17000	-
De Haan	AD_VP	17000	-
Whalen	AD_ASST	4400	-
Higgins	AC_MGR	12000	-
Gietz	AC_ACCOUNT	8300	-
Zlotkey	SA_MAN	10500	.2
Abel	SA_REP	11000	.3

NULL Values

```
SELECT last_name, job_id, salary, commission_pct, salary*commission_pct
FROM employees;
```

Salaries and Commissions

LAST_NAME	JOB_ID	SALARY	COMMISSION_PCT	SALARY*COMMISSION_PCT
King	AD_PRES	24000	-	-
Kochhar	AD_VP	17000	-	-
De Haan	AD_VP	17000	-	-
Whalen	AD_ASST	4400	-	-
Higgins	AC_MGR	12000	-	-
Gietz	AC_ACCOUNT	8300	-	-
Zlotkey	SA_MAN	10500	.2	2100
Abel	SA_REP	11000	.3	3300
Taylor	SA_REP	8600	.2	1720

Aliases

- An Alias is a way of renaming a column heading in the output.
- Without aliases, when the result of a SQL statement is displayed, the name of the columns displayed will be the same as the column names in the table or a name showing an arithmetic operation such as 12*(SALARY + 100).
- You probably want your output to display a name that is easier to understand, a more "friendly" name.
- Column aliases let you rename columns in the output.

Aliases

- There are several rules when using column aliases to format output.
- A column alias:
  - Renames a column heading
  - Is useful with calculations
  - Immediately follows the column name
  - May have the optional AS keyword between the column name and alias
  - Requires double quotation marks if the alias contains spaces or special characters, or is case-sensitive

Using Column Aliases

- The syntax for aliases is:

```
SELECT * |column|expr [ AS alias], .....
FROM      table;
```

- Examples:

```
SELECT last_name AS name,
       commission_pct AS comm
FROM employees;
```

NAME	COMM
King	-
Kochhar	-
De Haan	-

```
SELECT last_name "Name",
       salary*12 "Annual Salary"
FROM employees;
```

Name	Annual Salary
King	288000
Kochhar	204000
De Haan	204000

Terminology

Key terms used in this lesson included:

- Arithmetic expression
- Arithmetic operator
- Clause
- Column
- Column alias
- From clause
- NULL

Terminology

Key terms used in this lesson included:

- Projection
- Select clause
- Selection
- Select statement
- Statement
- WHERE Clause
- * (Asterisk)

Summary

In this lesson, you should have learned how to:

- Match projection and selection with their correct capabilities
- Create a basic SELECT statement
- Use the correct syntax to display all rows in a table
- Use the correct syntax to select specific columns in a table, modify the way data is displayed, and perform calculations using arithmetic expressions and operators

Summary

In this lesson, you should have learned how to:

- Formulate queries using correct operator precedence to display desired results
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