



Retrieving Data Using the SQL `SELECT` Statement

Objectives

After completing this lesson, you should be able to do the following:

- **Structured Query Language**
- **List the capabilities of SQL `SELECT` statements**
- **Execute a basic `SELECT` statement**

Structured Query Language

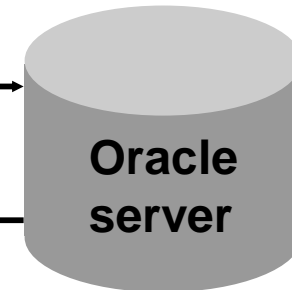
- **Structured query language (SQL): A standard interactive programming language for getting information from and updating information in a database**
- **SQL provides statements for a variety of tasks, including:**
 - Querying data
 - Inserting, updating, and deleting rows in a table
 - Creating, replacing, altering, and dropping objects
 - Controlling access to the database and its objects
 - Guaranteeing database consistency and integrity

Communicating with an RDBMS Using SQL

SQL statement is entered.

Statement is sent to
Oracle server.

```
SELECT department_name  
FROM departments;
```



DEPARTMENT_NAME
Administration
Marketing
Shipping
IT
Sales
Executive
Accounting
Contracting

Tables Used in the Course

EMPLOYEES

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALA
100	Steven	King	SKING	515.123.4567	17-JUN-87	AD_PRES	240
101	Neena	Kochhar	NKOCHHAR	515.123.4568	21-SEP-89	AD_VP	170
102	Lex	De Haan	LDEHAAN	515.123.4569	13-JAN-93	AD_VP	170
103	Alexander	Hunold	AHUNOLD	590.423.4567	03-JAN-90	IT_PROG	90
104	Bruce	Ernst	BERNST	590.423.4568	21-MAY-91	IT_PROG	60
107	Diana	Lorentz	DLORENTZ	590.423.5567	07-FEB-99	IT_PROG	42
124	Kevin	Mourgos	KMOURGOS	650.123.5234	16-NOV-99	ST_MAN	58
141	Trenna	Rajs	TRAJS	650.121.8009	17-OCT-95	ST_CLERK	35
142	Curtis	Davies	CDAVIES	650.121.2994	29-JAN-97	ST_CLERK	31

DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
50	Shipping	124	1500
60	IT	103	1400
80	Sales	149	2500
90	Executive	100	1700
110	Accounting	205	1700
190	Contracting		1700

1.2874	15-MAR-98	ST_CLERK	26
1.2004	09-JUL-98	ST_CLERK	25
1.2004	09-JUL-98	ST_CLERK	25

GRA	LOWEST_SAL	HIGHEST_SAL
A	1000	2999
B	3000	5999
C	6000	9999
D	10000	14999
E	15000	24999
F	25000	40000

DEPARTMENTS

JOB_GRADES

SQL Statements

SELECT
INSERT
UPDATE
DELETE
MERGE

Data manipulation language (DML)

CREATE
ALTER
DROP
RENAME
TRUNCATE
COMMENT

Data definition language (DDL)

GRANT
REVOKE

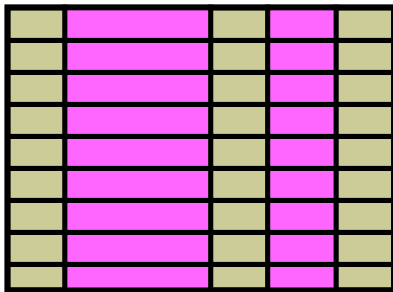
Data control language (DCL)

COMMIT
ROLLBACK
SAVEPOINT

Transaction control

Capabilities of SQL `SELECT` Statements

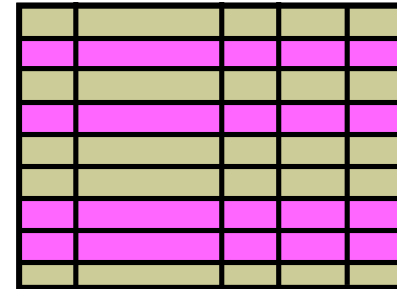
Projection



A 10x5 grid representing a table. The second, third, and fourth columns are highlighted in pink, illustrating the selection of specific columns (projection) from the original table.

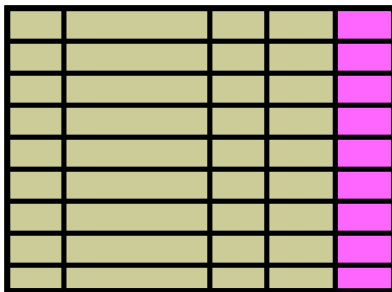
Table 1

Selection



A 10x5 grid representing a table. The first, third, fourth, and fifth rows are highlighted in pink, illustrating the selection of specific rows (selection) from the original table.

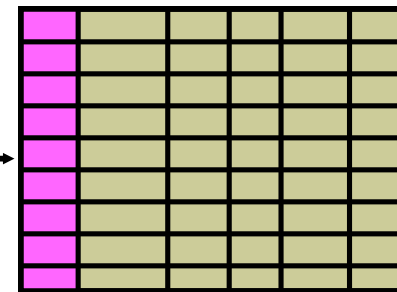
Table 1



A 10x5 grid representing a table. The fifth column is highlighted in pink, representing the result of a join operation where data from the original Table 1 is joined with data from Table 2.

Table 1

Join



A 10x5 grid representing a table. The first column is highlighted in pink, representing the result of a join operation where data from the original Table 2 is joined with data from Table 1.

Table 2

Basic SELECT Statement

```
SELECT * | { [DISTINCT] column | expression [alias] , ... }  
FROM      table;
```

- **SELECT** identifies the columns to be displayed
- **FROM** identifies the table containing those columns

Writing SQL Statements

- **SQL statements are not case-sensitive.**
- **SQL statements can be on one or more lines.**
- **Keywords cannot be abbreviated or split across lines.**
- **Clauses are usually placed on separate lines.**
- **Indents are used to enhance readability.**
- **In SQL*plus, you are required to end each SQL statement with a semicolon (;).**

Selecting All Columns

```
SELECT *  
FROM departments;
```

DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
50	Shipping	124	1500
60	IT	103	1400
80	Sales	149	2500
90	Executive	100	1700
110	Accounting	205	1700
190	Contracting		1700

8 rows selected.

Selecting Specific Columns

```
SELECT department_id, location_id  
FROM departments;
```

DEPARTMENT_ID	LOCATION_ID
10	1700
20	1800
50	1500
60	1400
80	2500
90	1700
110	1700
190	1700

8 rows selected.

Arithmetic Expressions

Create expressions with number and date data by using arithmetic operators.

Operator	Description
+	Add
-	Subtract
*	Multiply
/	Divide

Using Arithmetic Operators

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

LAST_NAME	SALARY	SALARY+300
King	24000	24300
Kochhar	17000	17300
De Haan	17000	17300
Hunold	9000	9300
Ernst	6000	6300

■ ■ ■

20 rows selected.

Operator Precedence

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

1

LAST_NAME	SALARY	12*SALARY+100
King	24000	288100
Kochhar	17000	204100
De Haan	17000	204100

■ ■ ■

20 rows selected.

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

2

LAST_NAME	SALARY	12*(SALARY+100)
King	24000	289200
Kochhar	17000	205200
De Haan	17000	205200

■ ■ ■

20 rows selected.

Defining a Null Value

- A null is a value that is unavailable, unassigned, unknown, or inapplicable.
- A null is not the same as a zero or a blank space.

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

LAST_NAME	JOB_ID	SALARY	COMMISSION_PCT
King	AD_PRES	24000	
Kochhar	AD_VP	17000	
...			
Slottkey	SA_MAN	10500	.2
Abel	SA_REP	11000	.3
Taylor	SA_REP	8600	.2
...			
Gietz	AC_ACCOUNT	8300	

20 rows selected.

Null Values in Arithmetic Expressions

Arithmetic expressions containing a null value evaluate to null.

```
SELECT last_name, 12*salary*commission_pct  
FROM employees;
```

Kochhar	
King	
LAST_NAME	12*SALARY*COMMISSION_PCT
...	
Zlotkey	25200
Abel	39600
Taylor	20640
...	
Gietz	

20 rows selected.

Defining a Column Alias

A column alias:

- **Renames a column heading**
- **Is useful with calculations**
- **Immediately follows the column name (There can also be the optional AS keyword between the column name and alias.)**
- **Requires double quotation marks if it contains spaces or special characters or if it is case-sensitive**

Using Column Aliases

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

NAME	COMM
King	
Kochhar	
De Haan	

...

20 rows selected.

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

Name	Annual Salary
King	288000
Kochhar	204000
De Haan	204000

...

20 rows selected.

Concatenation Operator

A concatenation operator:

- Links columns or character strings to other columns
- Is represented by two vertical bars (||)
- Creates a resultant column that is a character expression

```
SELECT    last_name||job_id AS "Employees"  
FROM      employees;
```

Employees	
KingAD_PRES	
KochharAD_VP	
De HaanAD_VP	
...	

20 rows selected.

Literal Character Strings

- A literal is a character, a number, or a date that is included in the `SELECT` statement.
- Date and character literal values must be enclosed by single quotation marks.
- Each character string is output once for each row returned.

Using Literal Character Strings

```
SELECT last_name || ' is a ' || job_id  
       AS "Employee Details"  
FROM   employees;
```

Employee Details
King is a AD_PRES
Kochhar is a AD_VP
De Haan is a AD_VP
Hunold is a IT_PROG
Ernst is a IT_PROG
Lorentz is a IT_PROG
Mourgos is a ST_MAN
Rajs is a ST_CLERK

...

20 rows selected.

Alternative Quote (q) Operator

- Specify your own quotation mark delimiter
- Choose any delimiter
- Increase readability and usability

```
SELECT department_name ||  
       q'[, it's assigned Manager Id: ]'  
       || manager_id  
       AS "Department and Manager"  
FROM departments;
```

Department and Manager
Administration, it's assigned manager ID: 200
Marketing, it's assigned manager ID: 201
Shipping, it's assigned manager ID: 124

...

8 rows selected.

Duplicate Rows

The default display of queries is all rows, including duplicate rows.

```
SELECT department_id  
FROM employees;
```

1

DEPARTMENT_ID	
	90
	90
	90

...

20 rows selected.

```
SELECT DISTINCT department_id  
FROM employees;
```

2

DEPARTMENT_ID	
	10
	20
	50

...

8 rows selected.

Summary

In this lesson, you should have learned how to:

- Write a **SELECT** statement that:
 - Returns all rows and columns from a table
 - Returns specified columns from a table
 - Uses column aliases to display more descriptive column headings

```
SELECT *|{ [DISTINCT] column|expression [alias], ... }  
FROM table;
```


Test

- **Create a query to display the last name, job code, hire date, and employee number for each employee, with employee number appearing first. Provide an alias STARTDATE for the HIRE_DATE column.**
- **Create a query to display unique job codes from the EMPLOYEES table.**

Practice 1: Overview

This practice covers the following topics:

- **Selecting all data from different tables**
- **Describing the structure of tables**
- **Performing arithmetic calculations and specifying column names**