

SQL Functions Guide

1. Types of SQL Functions

- Scalar Functions (Single-Value Functions)

Operate on one row and return one value.

Examples: UPPER(), LOWER(), LENGTH(), ROUND(), SUBSTRING()

- Aggregate Functions (Multi-Row Functions)

Operate on multiple rows and return a single aggregated result.

Examples: SUM(), AVG(), COUNT(), MIN(), MAX()

- Window Functions (Analytical Functions)

Compute results over a set of rows without collapsing them.

Examples: RANK(), DENSE_RANK(), ROW_NUMBER(), LAG(), LEAD(), AVG() OVER()

- String Functions

Work with text values.

Examples: CONCAT(), LENGTH(), SUBSTR(), UPPER(), LOWER(), TRIM()

- Date and Time Functions

Work with date/time values.

Examples: SYSDATE, CURRENT_DATE, ADD_MONTHS(), EXTRACT(), TO_DATE()

- Numeric Functions

Perform mathematical operations.

Examples: ROUND(), CEIL(), FLOOR(), MOD(), POWER()

- Conversion Functions

Convert data from one type to another.

Examples: TO_CHAR(), TO_DATE(), CAST(), CONVERT()

- User-Defined Functions (UDFs)

Custom functions created by users.

Example: CREATE FUNCTION in SQL Server or PL/pgSQL.

2. SQL Scalar Functions

String Functions:

UPPER('hello') returns 'HELLO'

LOWER('HELLO') returns 'hello'

LENGTH('SQL') returns 3

SUBSTR('DATABASE', 2, 3) returns 'ATA'

TRIM(' SQL ') returns 'SQL'

CONCAT('Hello', ' World') returns 'Hello World'

Numeric Functions:

ROUND(12.345, 2) returns 12.35

CEIL(12.3) returns 13

FLOOR(12.9) returns 12

MOD(10, 3) returns 1

POWER(2, 3) returns 8

3. SQL Aggregate Functions

COUNT(*) returns the number of rows

SUM(SAL) returns the total sum of salaries

AVG(SAL) returns the average salary

MIN(SAL) returns the minimum salary

MAX(SAL) returns the maximum salary

4. SQL Window (Analytical) Functions

ROW_NUMBER() OVER (ORDER BY SAL DESC) assigns unique row numbers.

RANK() OVER (ORDER BY SAL DESC) assigns rank (with gaps).

DENSE_RANK() OVER (ORDER BY SAL DESC) assigns rank (no gaps).

LAG(SAL, 1) OVER (ORDER BY SAL) gets the previous row's value.

LEAD(SAL, 1) OVER (ORDER BY SAL) gets the next row's value.

5. SQL Date & Time Functions

SYSDATE returns the current date & time.

CURRENT_DATE returns today's date.

ADD_MONTHS(SYSDATE, 3) adds 3 months.

EXTRACT(YEAR FROM SYSDATE) extracts the year.

6. SQL Conversion Functions

TO_CHAR(SYSDATE, 'YYYY-MM-DD') converts date to string.

TO_DATE('2025-01-01', 'YYYY-MM-DD') converts string to date.

CAST(100 AS CHAR(10)) converts integer to string.

7. User-Defined Functions (UDFs) in Oracle

```
CREATE FUNCTION GET_ANNUAL_SALARY (p_salary NUMBER)
```

```
RETURN NUMBER
```

```
IS
```

```
BEGIN
```

```
    RETURN p_salary * 12;
```

```
END;
```

```
SELECT ENAME, GET_ANNUAL_SALARY(SAL) AS ANNUAL_SALARY FROM EMP;
```

Summary

- Scalar Functions work on individual values (UPPER(), ROUND()).
- Aggregate Functions summarize multiple rows (SUM(), AVG()).
- Window Functions work over partitions (RANK(), ROW_NUMBER()).
- String Functions modify text (SUBSTR(), CONCAT()).
- Date Functions handle dates (SYSDATE, EXTRACT()).
- Conversion Functions convert data types (TO_CHAR(), CAST()).

- User-Defined Functions allow custom logic using CREATE FUNCTION.