SQL Cheat Sheet

SQL, or *Structured Query Language*, is a language to talk to databases. It allows you to select specific data and to build complex reports. Today, SQL is a universal language of data. It is used in practically all technologies that process data.

SAMPLE DATA

COUNTRY			
id	name	population	area
1	France	66600000	640680
2	Germany	80700000	357000
...	...	...	...

CITY				
id	name	country_id	population	rating
1	Paris	1	2243000	5
2	Berlin	2	3460000	3
...	...	...	...	...

QUERYING SINGLE TABLE

Fetch all columns from the `country` table:

```
SELECT *
FROM country;
```

Fetch id and name columns from the city table:

```
SELECT id, name
FROM city;
```

Fetch city names sorted by the `rating` column in the default ASCending order:

```
SELECT name
FROM city
ORDER BY rating [ASC];
```

Fetch city names sorted by the `rating` column in the DESCending order:

```
SELECT name
FROM city
ORDER BY rating DESC;
```

ALIASES

COLUMNS

```
SELECT name AS city_name
FROM city;
```

TABLES

```
SELECT co.name, ci.name
FROM city AS ci
JOIN country AS co
  ON ci.country_id = co.id;
```

FILTERING THE OUTPUT

COMPARISON OPERATORS

Fetch names of cities that have a rating above 3:

```
SELECT name
FROM city
WHERE rating > 3;
```

Fetch names of cities that are neither Berlin nor Madrid:

```
SELECT name
FROM city
WHERE name != 'Berlin'
  AND name != 'Madrid';
```

TEXT OPERATORS

Fetch names of cities that start with a 'P' or end with an 's':

```
SELECT name
FROM city
WHERE name LIKE 'P%'
  OR name LIKE '%s';
```

Fetch names of cities that start with any letter followed by 'ublin' (like Dublin in Ireland or Lublin in Poland):

```
SELECT name
FROM city
WHERE name LIKE '_ublin';
```

OTHER OPERATORS

Fetch names of cities that have a population between 500K and 5M:

```
SELECT name
FROM city
WHERE population BETWEEN 500000 AND 5000000;
```

Fetch names of cities that don't miss a rating value:

```
SELECT name
FROM city
WHERE rating IS NOT NULL;
```

Fetch names of cities that are in countries with IDs 1, 4, 7, or 8:

```
SELECT name
FROM city
WHERE country_id IN (1, 4, 7, 8);
```

QUERYING MULTIPLE TABLES

INNER JOIN

`JOIN` (or explicitly `INNER JOIN`) returns rows that have matching values in both tables.

```
SELECT city.name, country.name
FROM city
[INNER] JOIN country
  ON city.country_id = country.id;
```

CITY

id	name	country_id
1	Paris	1
2	Berlin	2
3	Warsaw	4

COUNTRY

id	name
1	France
2	Germany
3	Iceland

LEFT JOIN

`LEFT JOIN` returns all rows from the left table with corresponding rows from the right table. If there's no matching row, `NULL`s are returned as values from the second table.

```
SELECT city.name, country.name
FROM city
LEFT JOIN country
  ON city.country_id = country.id;
```

CITY

id	name	country_id
1	Paris	1
2	Berlin	2
3	Warsaw	4

COUNTRY

id	name
1	France
2	Germany
NULL	NULL

RIGHT JOIN

`RIGHT JOIN` returns all rows from the right table with corresponding rows from the left table. If there's no matching row, `NULL`s are returned as values from the left table.

```
SELECT city.name, country.name
FROM city
RIGHT JOIN country
  ON city.country_id = country.id;
```

CITY

id	name	country_id
1	Paris	1
2	Berlin	2
NULL	NULL	NULL

COUNTRY

id	name
1	France
2	Germany
3	Iceland

FULL JOIN

`FULL JOIN` (or explicitly `FULL OUTER JOIN`) returns all rows from both tables – if there's no matching row in the second table, `NULL`s are returned.

```
SELECT city.name, country.name
FROM city
FULL [OUTER] JOIN country
  ON city.country_id = country.id;
```

CITY			COUNTRY	
id	name	country_id	id	name
1	Paris	1	1	France
2	Berlin	2	2	Germany
3	Warsaw	4	NULL	NULL
NULL	NULL	NULL	3	Iceland

CROSS JOIN

`CROSS JOIN` returns all possible combinations of rows from both tables. There are two syntaxes available.

```
SELECT city.name, country.name
FROM city
CROSS JOIN country;

SELECT city.name, country.name
FROM city, country;
```

CITY			COUNTRY	
id	name	country_id	id	name
1	Paris	1	1	France
1	Paris	1	2	Germany
2	Berlin	2	1	France
2	Berlin	2	2	Germany

NATURAL JOIN

`NATURAL JOIN` will join tables by all columns with the same name.

```
SELECT city.name, country.name
FROM city
NATURAL JOIN country;
```

CITY			COUNTRY	
country_id	id	name	name	id
6	6	San Marino	San Marino	6
7	7	Vatican City	Vatican City	7
5	9	Greece	Greece	9
10	11	Monaco	Monaco	10

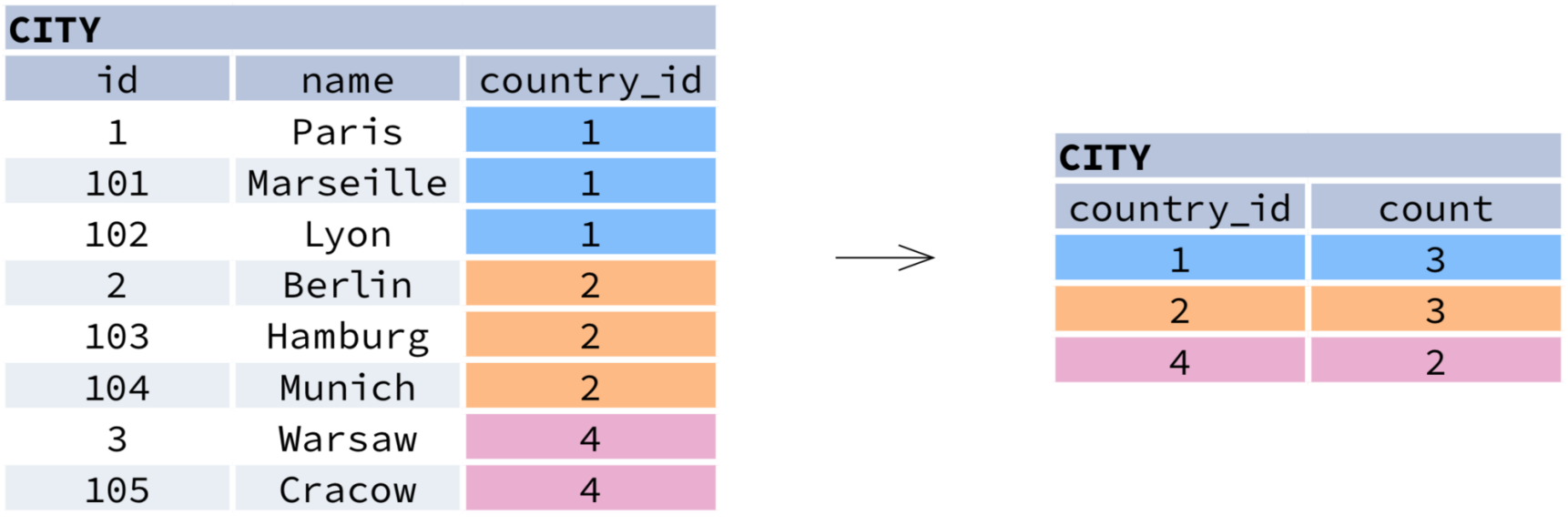
`NATURAL JOIN` used these columns to match rows:

`city.id`, `city.name`, `country.id`, `country.name`.

`NATURAL JOIN` is very rarely used in practice.

AGGREGATION AND GROUPING

`GROUP BY` **groups** together rows that have the same values in specified columns. It computes summaries (aggregates) for each unique combination of values.



CITY

id	name	country_id
1	Paris	1
101	Marseille	1
102	Lyon	1
2	Berlin	2
103	Hamburg	2
104	Munich	2
3	Warsaw	4
105	Cracow	4

CITY

country_id	count
1	3
2	3
4	2

AGGREGATE FUNCTIONS

- `avg(expr)` − average value for rows within the group
- `count(expr)` − count of values for rows within the group
- `max(expr)` − maximum value within the group
- `min(expr)` − minimum value within the group
- `sum(expr)` − sum of values within the group

EXAMPLE QUERIES

Find out the number of cities:

```
SELECT COUNT(*)
FROM city;
```

Find out the number of cities with non-null ratings:

```
SELECT COUNT(rating)
FROM city;
```

Find out the number of distinctive country values:

```
SELECT COUNT(DISTINCT country_id)
FROM city;
```

Find out the smallest and the greatest country populations:

```
SELECT MIN(population), MAX(population)
FROM country;
```

Find out the total population of cities in respective countries:

```
SELECT country_id, SUM(population)
FROM city
GROUP BY country_id;
```

Find out the average rating for cities in respective countries if the average is above 3.0:

```
SELECT country_id, AVG(rating)
FROM city
GROUP BY country_id
HAVING AVG(rating) > 3.0;
```

If you like learning SQL using hands-on exercises, then you've got to try **LearnSQL.com**.

SUBQUERIES

A subquery is a query that is nested inside another query, or inside another subquery. There are different types of subqueries.

SINGLE VALUE

The simplest subquery returns exactly one column and exactly one row. It can be used with comparison operators `=`, `<`, `<=`, `>`, or `>=`.

This query finds cities with the same rating as Paris:

```
SELECT name
FROM city
WHERE rating = (
  SELECT rating
  FROM city
  WHERE name = 'Paris'
);
```

MULTIPLE VALUES

A subquery can also return multiple columns or multiple rows. Such subqueries can be used with operators `IN`, `EXISTS`, `ALL`, or `ANY`.

This query finds cities in countries that have a population above 20M:

```
SELECT name
FROM city
WHERE country_id IN (
  SELECT country_id
  FROM country
  WHERE population > 20000000
);
```

CORRELATED

A correlated subquery refers to the tables introduced in the outer query. A correlated subquery depends on the outer query. It cannot be run independently from the outer query.

This query finds cities with a population greater than the average population in the country:

```
SELECT *
FROM city main_city
WHERE population > (
  SELECT AVG(population)
  FROM city average_city
  WHERE average_city.country_id = main_city.country_id
);
```

This query finds countries that have at least one city:

```
SELECT name
FROM country
WHERE EXISTS (
  SELECT *
  FROM city
  WHERE country_id = country.id
);
```

SET OPERATIONS

Set operations are used to combine the results of two or more queries into a single result. The combined queries must return the same number of columns and compatible data types. The names of the corresponding columns can be different

CYCLING

id	name	country
1	YK	DE
2	ZG	DE
3	WT	PL
...	...	...

SKATING

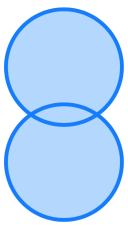
id	name	country
1	YK	DE
2	DF	DE
3	AK	PL
...	...	...

UNION

`UNION` combines the results of two result sets and removes duplicates. `UNION ALL` doesn't remove duplicate rows.

This query displays German cyclists together with German skaters:

```
SELECT name
FROM cycling
WHERE country = 'DE'
UNION / UNION ALL
SELECT name
FROM skating
WHERE country = 'DE';
```

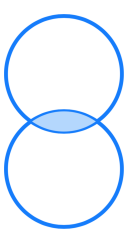


INTERSECT

`INTERSECT` returns only rows that appear in both result sets.

This query displays German cyclists who are also German skaters at the same time:

```
SELECT name
FROM cycling
WHERE country = 'DE'
INTERSECT
SELECT name
FROM skating
WHERE country = 'DE';
```

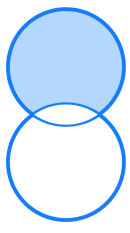


EXCEPT

`EXCEPT` returns only the rows that appear in the first result set but do not appear in the second result set.

This query displays German cyclists unless they are also German skaters at the same time:

```
SELECT name
FROM cycling
WHERE country = 'DE'
EXCEPT / MINUS
SELECT name
FROM skating
WHERE country = 'DE';
```



Querying data from a table

Query data in columns c1, c2 from a table

```
SELECT c1, c2 FROM t;
Code language: SQL (Structured Query Language) (sql)
```

Query all rows and columns from a table

```
SELECT * FROM t;
Code language: SQL (Structured Query Language) (sql)
```

Query data and filter rows with a condition

```
SELECT c1, c2 FROM t
WHERE condition;Code language: SQL (Structured Query Language) (sql)
```

Query distinct rows from a table

```
SELECT DISTINCT c1 FROM t
WHERE condition;
Code language: SQL (Structured Query Language) (sql)
```

Sort the result set in ascending or descending order

```
SELECT c1, c2 FROM t
ORDER BY c1 ASC [DESC];Code language: SQL (Structured Query Language) (sql)
```

Skip *offset* of rows and return the next n rows

```
SELECT c1, c2 FROM t
ORDER BY c1
LIMIT n OFFSET offset;Code language: SQL (Structured Query Language) (sql)
```

Group rows using an aggregate function

```
SELECT c1, aggregate(c2)
FROM t
GROUP BY c1;
Code language: SQL (Structured Query Language) (sql)
```

Filter groups using HAVING clause

```
SELECT c1, aggregate(c2)
FROM t
GROUP BY c1
HAVING condition;
Code language: SQL (Structured Query Language) (sql)
```

Querying from multiple tables

Inner join t1 and t2

```
SELECT c1, c2
FROM t1
INNER JOIN t2 ON condition;
Code language: SQL (Structured Query Language) (sql)
```

Left join t1 and t1

```
SELECT c1, c2
FROM t1
LEFT JOIN t2 ON condition;
Code language: SQL (Structured Query Language) (sql)
```

Right join t1 and t2

```
SELECT c1, c2
FROM t1
RIGHT JOIN t2 ON condition;
Code language: SQL (Structured Query Language) (sql)
```

Perform full outer join

```
SELECT c1, c2
FROM t1
FULL OUTER JOIN t2 ON condition;
Code language: SQL (Structured Query Language) (sql)
```

Produce a Cartesian product of rows in tables

```
SELECT c1, c2
FROM t1
CROSS JOIN t2;
Code language: SQL (Structured Query Language) (sql)
```

Another way to perform cross join

```
SELECT c1, c2
FROM t1, t2;
Code language: SQL (Structured Query Language) (sql)
```

Join t1 to itself using INNER JOIN clause

```
SELECT c1, c2
FROM t1 A
INNER JOIN t1 B ON condition;
Code language: SQL (Structured Query Language) (sql)
```

Using SQL Operators

Combine rows from two queries

```
SELECT c1, c2 FROM t1
UNION [ALL]
SELECT c1, c2 FROM t2;
Code language: SQL (Structured Query Language) (sql)
```

Return the intersection of two queries

```
SELECT c1, c2 FROM t1
INTERSECT
SELECT c1, c2 FROM t2;
Code language: SQL (Structured Query Language) (sql)
```

Subtract a result set from another result set

```
SELECT c1, c2 FROM t1
MINUS
SELECT c1, c2 FROM t2;
Code language: SQL (Structured Query Language) (sql)
```

Query rows using pattern matching %, _

```
SELECT c1, c2 FROM t1
WHERE c1 [NOT] LIKE pattern;
Code language: SQL (Structured Query Language) (sql)
```

Query rows in a list

```
SELECT c1, c2 FROM t
WHERE c1 [NOT] IN value_list;
Code language: SQL (Structured Query Language) (sql)
```

Query rows between two values

```
SELECT c1, c2 FROM t
WHERE  c1 BETWEEN low AND high;
Code language: SQL (Structured Query Language) (sql)
```

Check if values in a table is NULL or not

```
SELECT c1, c2 FROM t
WHERE  c1 IS [NOT] NULL;
Code language: SQL (Structured Query Language) (sql)
```

Managing tables

Create a new table with three columns

```
CREATE TABLE t (
     id INT PRIMARY KEY,
     name VARCHAR NOT NULL,
     price INT DEFAULT 0
);
Code language: SQL (Structured Query Language) (sql)
```

Delete the table from the database

```
DROP TABLE t ;
Code language: SQL (Structured Query Language) (sql)
```

Add a new column to the table

```
ALTER TABLE t ADD column;
Code language: SQL (Structured Query Language) (sql)
```

Drop column c from the table

```
ALTER TABLE t DROP COLUMN c ;
Code language: SQL (Structured Query Language) (sql)
```

Add a constraint

```
ALTER TABLE t ADD constraint;
Code language: SQL (Structured Query Language) (sql)
```

Drop a constraint

```
ALTER TABLE t DROP constraint;
Code language: SQL (Structured Query Language) (sql)
```

Rename a table from t1 to t2

```
ALTER TABLE t1 RENAME TO t2;
Code language: SQL (Structured Query Language) (sql)
```

Rename column c1 to c2

```
ALTER TABLE t1 RENAME c1 TO c2 ;
Code language: SQL (Structured Query Language) (sql)
```

Remove all data in a table

```
TRUNCATE TABLE t;
Code language: SQL (Structured Query Language) (sql)
```

Using SQL constraints

Set c1 and c2 as a primary key

```
CREATE TABLE t(
    c1 INT, c2 INT, c3 VARCHAR,
    PRIMARY KEY (c1,c2)
);
Code language: SQL (Structured Query Language) (sql)
```

Set c2 column as a foreign key

```
CREATE TABLE t1(
    c1 INT PRIMARY KEY,
    c2 INT,
    FOREIGN KEY (c2) REFERENCES t2(c2)
);
Code language: SQL (Structured Query Language) (sql)
```

Make the values in c1 and c2 unique

```
CREATE TABLE t(
    c1 INT, c1 INT,
    UNIQUE(c2,c3)
);
Code language: SQL (Structured Query Language) (sql)
```

Ensure c1 > 0 and values in c1 >= c2

```
CREATE TABLE t(
  c1 INT, c2 INT,
  CHECK(c1> 0 AND c1 >= c2)
);
Code language: SQL (Structured Query Language) (sql)
```

Set values in c2 column not NULL

```
CREATE TABLE t(
     c1 INT PRIMARY KEY,
     c2 VARCHAR NOT NULL
);
Code language: SQL (Structured Query Language) (sql)
```

Modifying Data

Insert one row into a table

```
INSERT INTO t(column_list)
VALUES(value_list);
```

```
Code language: SQL (Structured Query Language) (sql)
```

Insert multiple rows into a table

```
INSERT INTO t(column_list)
VALUES (value_list),
       (value_list), …;
Code language: SQL (Structured Query Language) (sql)
```

Insert rows from t2 into t1

```
INSERT INTO t1(column_list)
SELECT column_list
FROM t2;
Code language: SQL (Structured Query Language) (sql)
```

Update new value in the column c1 for all rows

```
UPDATE t
SET c1 = new_value;
Code language: SQL (Structured Query Language) (sql)
```

Update values in the column c1, c2 that match the condition

```
UPDATE t
SET c1 = new_value,
        c2 = new_value
WHERE condition;
Code language: SQL (Structured Query Language) (sql)
```

Delete all data in a table

```
DELETE FROM t;
Code language: SQL (Structured Query Language) (sql)
```

Delete subset of rows in a table

```
DELETE FROM t
WHERE condition;
Code language: SQL (Structured Query Language) (sql)
```

Managing Views

Create a new view that consists of c1 and c2

```
CREATE VIEW v(c1,c2)
AS
SELECT c1, c2
FROM t;
Code language: SQL (Structured Query Language) (sql)
```

Create a new view with check option

```
CREATE VIEW v(c1,c2)
AS
SELECT c1, c2
FROM t;
WITH [CASCADED | LOCAL] CHECK OPTION;Code language: SQL (Structured Query Language) (sql)
```

Create a recursive view

```
CREATE RECURSIVE VIEW v
AS
select-statement -- anchor part
```

```
UNION [ALL]
select-statement; -- recursive part
Code language: SQL (Structured Query Language) (sql)
```

Create a temporary view

```
CREATE TEMPORARY VIEW v
AS
SELECT c1, c2
FROM t;
Code language: SQL (Structured Query Language) (sql)
```

Delete a view

```
DROP VIEW view_name;
Code language: SQL (Structured Query Language) (sql)
```

Managing indexes

Create an index on c1 and c2 of the t table

```
CREATE INDEX idx_name
ON t(c1,c2);
Code language: SQL (Structured Query Language) (sql)
```

Create a unique index on c3, c4 of the t table

```
CREATE UNIQUE INDEX idx_name
ON t(c3,c4)
Code language: SQL (Structured Query Language) (sql)
```

Drop an index

```
DROP INDEX idx_name;
Code language: SQL (Structured Query Language) (sql)
```

Managing triggers

Create or modify a trigger

```
CREATE OR MODIFY TRIGGER trigger_name
WHEN EVENT
ON table_name TRIGGER_TYPE
EXECUTE stored_procedure;
Code language: SQL (Structured Query Language) (sql)
```

WHEN

- **BEFORE** – invoke before the event occurs
- **AFTER** – invoke after the event occurs

EVENT

- **INSERT** – invoke for INSERT
- **UPDATE** – invoke for UPDATE
- **DELETE** – invoke for DELETE

TRIGGER_TYPE

- **FOR EACH ROW**
- **FOR EACH STATEMENT**

Delete a specific trigger

```
DROP TRIGGER trigger_name;
Code language: SQL (St
```