

PostgreSQL Cheat Sheet

PostgreSQL is an open-source relational database management system. Known for its robust features, extensibility, and adherence to standards, it is a powerful and widely used database solution for storing, managing, and processing data across diverse environments.

Check out the official PostgreSQL site here:
<https://www.postgresql.org/>

CONNECTING TO A POSTGRES SQL SERVER

Connect to a PostgreSQL server using the PostgreSQL command-line client (psql) and a username. It will prompt you for the password:
`psql -U username`

To connect to a specific database on a PostgreSQL server with a username:
`psql -U username -h host_name -d database_name`

To exit the client:
`\q`

For a full list of commands:
`\h`

For a list of psql commands:
`\?`

To export data using the pg_dump tool:
`pg_dump -U username -h host_name -d database_name > data_backup.sql`

CREATING AND DISPLAYING DATABASES

To create a database:
`CREATE DATABASE zoo;`

To delete a specific database:
`DROP DATABASE zoo;`

To list all the databases on a server:
`\l;`

To connect to a specific database:
`\c zoo;`

To list all tables in a database:
`\dt;`

To get information about a specific table:
`\d animal;`

It outputs column names, data types, default values, and more about the table.

CREATING TABLES

To create a table:
`CREATE TABLE habitat (
 id INT,
 name VARCHAR(64)
);`

To increment the ID automatically with each new record, use the SERIAL data type:
`CREATE TABLE habitat (
 id INT SERIAL PRIMARY KEY,
 name VARCHAR(64)
);`

To create a table with a foreign key:
`CREATE TABLE animal (
 id SERIAL PRIMARY KEY,
 name VARCHAR(64),
 species VARCHAR(64),
 age INT,
 habitat_id INT,
 FOREIGN KEY (habitat_id)
 REFERENCES habitat(id)
);`

MODIFYING TABLES

Use the ALTER TABLE to modify a table structure.

To change a table name:
`ALTER TABLE animal RENAME TO pet;`

To add a column to the table:
`ALTER TABLE animal
ADD COLUMN name VARCHAR(64);`

To change a column name:
`ALTER TABLE animal
RENAME COLUMN id TO identifier;`

To change a column data type:
`ALTER TABLE animal
ALTER COLUMN name TYPE VARCHAR(128);`

To delete a column:
`ALTER TABLE animal
DROP COLUMN name;`

To delete a table:
`DROP TABLE animal;`

QUERYING DATA

To select data from a table, use SELECT.
An example of a single-table query:
`SELECT species, AVG(age) AS average_age
FROM animal
WHERE id != 3
GROUP BY species
HAVING AVG(age) > 3
ORDER BY AVG(age) DESC;`

An example of a multiple-table query:
`SELECT city.name, country.name
FROM city
[INNER | LEFT | RIGHT | FULL] JOIN country
ON city.country_id = country.id;`

AGGREGATION AND GROUPING

- **AVG**(expr) – average value of expr for the group.
- **COUNT**(expr) – count of expr values within the group.
- **MAX**(expr) – maximum value of expr values within the group.
- **MIN**(expr) – minimum value of expr values within the group.
- **SUM**(expr) – sum of expr values within the group.

To count the rows in the table:
`SELECT COUNT(*)
FROM animal;`

To count the non-NULL values in a column:
`SELECT COUNT(name)
FROM animal;`

To count unique values in a column:
`SELECT COUNT(DISTINCT name)
FROM animal;`

GROUP BY

To count the animals by species:
`SELECT species, COUNT(id)
FROM animal
GROUP BY species;`

To get the average, minimum, and maximum ages by habitat:
`SELECT habitat_id, AVG(age),
 MIN(age), MAX(age)
FROM animal
GROUP BY habitat_id;`

INSERTING DATA

To insert data into a table, use INSERT:
`INSERT INTO habitat VALUES
(1, 'River'),
(2, 'Forest');`

You may specify the columns in which the data is added. The remaining columns are filled with default values or NULLs.
`INSERT INTO habitat (name)
VALUES ('Savanna');`

UPDATING DATA

To update the data in a table, use UPDATE:
`UPDATE animal
SET
 species = 'Duck',
 name = 'Quack'
WHERE id = 2;`

DELETING DATA

To delete data from a table, use DELETE:
`DELETE FROM animal
WHERE id = 1;`
This deletes all rows satisfying the WHERE condition.

To delete all data from a table, use TRUNCATE TABLE:
`TRUNCATE TABLE animal;`

COPYING DATA

To import data from a CSV file into a table:
`\copy animal FROM 'animal.csv' CSV HEADER`

To export data from a query to a CSV file:
`\copy (SELECT * FROM animal)
TO 'animal.csv' CSV HEADER`

CASTING

To change the type of a value, use the :: operator:
`SELECT 25.5::INTEGER; -- result: 26`

You may also use CAST(). This is useful when the name of the type contains spaces, e.g., double precision:
`SELECT CAST(column AS DOUBLE PRECISION);`

TEXT FUNCTIONS

FILTERING THE OUTPUT

To fetch the city names that are not Berlin:

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

TEXT OPERATORS

To fetch the city names that start with a 'P':

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

To fetch the city names that start with any letter followed by 'ublin' (like Dublin in Ireland or Lublin in Poland):

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

CONCATENATION

To concatenate two strings, use the || operator or the CONCAT() function:

```
SELECT 'Hi ' || 'there!';
-- result: Hi there!
SELECT CONCAT('Hello ', 'there!');
-- result: Hello there!
```

Note that with ||, the result is NULL if any of the strings is NULL:

```
SELECT 'Great ' || 'day' || NULL;
-- result: NULL
```

In contrast, CONCAT() ignores NULL:

```
SELECT CONCAT('Good ', 'day', NULL);
-- result: Good day
```

OTHER USEFUL TEXT FUNCTIONS

To get the count of characters in a string:

```
SELECT LENGTH('LearnSQL.com');
-- result: 12
```

To convert all letters to lowercase:

```
SELECT LOWER('LEARNSQL.COM');
-- result: learnsql.com
```

To convert all letters to uppercase:

```
SELECT UPPER('LearnSQL.com');
-- result: LEARNSQL.COM
```

To capitalize the first letter of each word in a string, use INITCAP():

```
SELECT INITCAP('hello world');
-- result: 'Hello World'
```

To get a part of a string:

```
SELECT SUBSTRING('LearnSQL.com', 9);
-- result: .com
SELECT SUBSTRING('LearnSQL.com', 1, 5);
-- result: Learn
```

To replace a part of a string:

```
SELECT REPLACE('LearnSQL.com', 'SQL',
'Python'); -- result: LearnPython.com
```

NUMERIC FUNCTIONS

Use +, -, *, / for basic math.

To get the number of seconds in a week:

```
SELECT 60 * 60 * 24 * 7; -- result: 604800
```

In PostgreSQL, the division operator / performs an integer division on integer arguments. For example:

```
SELECT 25 / 4; -- result 6
```

Avoid integer division by including at least one non-integer argument:

```
SELECT 25::numeric / 4; -- result 6.25
SELECT 25.0 / 4; -- result 6.25
```

To get the remainder of a division:

```
SELECT MOD(13, 2); -- result: 1
SELECT 13 % 2; -- result: 1
```

To round a number to its nearest integer:

```
SELECT ROUND(1234.56789); -- result: 1235
```

To round a number to three decimal places (NUMERIC arguments only):

```
SELECT ROUND(1234.56789, 3);
-- result: 1234.568
```

To get the absolute value of a number:

```
SELECT ABS(-12); -- result: 12
```

To get the square root of a number:

```
SELECT SQRT(9); -- result: 3
```

USEFUL NULL FUNCTIONS

To fetch the names of the cities whose rating values are not missing:

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

COALESCE(x, y, ...)

To replace NULL in a query with something meaningful:

```
SELECT domain,
COALESCE(domain, 'domain missing')
FROM contacts;
COALESCE() takes any number of arguments and returns the value of the first non-NULL argument.
```

NULLIF(x, y)

To save yourself from *division by 0* errors:

```
SELECT last_month, this_month,
this_month * 100.0
/ NULLIF(last_month, 0)
AS better_by_percent
FROM video_views;
NULLIF(x, y) returns NULL if x equals y; else it returns the value of x.
```

DATE AND TIME

There are 5 main time-related types in PostgreSQL:

DATE – a date with a resolution of one day; stores the year, month, and day in the YYYY-MM-DD format.

TIME – a time of day with a resolution of one microsecond; stores the hours, minutes, seconds, and fractional seconds in the HH:MM:SS.SSSSSS format.

TIMESTAMP WITH TIME ZONE – a timestamp with the time zone; stores the date and the time along with the corresponding time zone information. The range is from '4713-11-24 00:00:00' BC to '294276-12-31 23:59:59' AD.

TIMESTAMP – a timestamp without the time zone; stores the date and the time. PostgreSQL handles TIMESTAMP values automatically with time zone conversion.

INTERVAL – a duration of time, such as 3 days, 4 hours, and 30 minutes.

WHAT TIME IS IT?

To answer this question, use:

- CURRENT_TIME – to get the current time.
- CURRENT_DATE – to get the current date.
- CURRENT_TIMESTAMP – to get the current timestamp with both of the above.

CREATING DATE/TIME VALUES

To create a date, time, or datetime value, write it as a string and cast it to the desired type.

```
SELECT '2023-12-31'::date;
SELECT '15:31'::time;
SELECT '2023-12-31 23:59:29'::timestamp;
```

You may also use CAST() or DATE().

You may skip casting in simple conditions. The database knows what you mean.

```
SELECT airline, flight_number,
departure_time
FROM airport_schedule
WHERE departure_time < '12:00';
```

INTERVALS

An interval is the duration between two points in time.

To define an interval: **INTERVAL '3 days'**;

This syntax consists of the INTERVAL keyword, a value, and a time part keyword (YEAR, QUARTER, MONTH, WEEK, DAY, HOUR, MINUTE, SECOND, MICROSECOND).

You may combine different INTERVALS using the + or – operator:

```
INTERVAL '1 year' + INTERVAL '3 months'
```

EXTRACTING PARTS OF DATES

To extract a part of a date, use EXTRACT():

```
SELECT
EXTRACT(MONTH FROM '2023-12-31'::DATE);
-- result: 12
```

You may also use DATE_PART(). It extracts specific components from a date or timestamp.

```
SELECT DATE_PART('day', '2023-12-31'::DATE); -- result: 31
Common arguments include 'day', 'month', 'year', 'quarter', 'hour', 'minute', and 'second', among others.
```

DATE ARITHMETICS

To add or subtract an INTERVAL from a date, time, or timestamp:

```
SELECT '2023-10-31'::DATE
+ INTERVAL '2 months';
-- result: '2023-12-31'
SELECT '2024-04-05'::DATE
+ INTERVAL '-3 days';
-- result: '2024-04-02'
SELECT '2023-06-10 07:55:00'::TIMESTAMP
+ INTERVAL '2 months';
-- result: '2023-08-10 07:55:00'
SELECT '2023-02-12 10:20:24'::TIMESTAMP
+ INTERVAL '-12:43:02';
-- result: '2023-02-11 21:37:22'
```

To find the difference between two dates in days:

```
SELECT '2024-01-01'::date
- '2023-01-02'::date AS date_diff;
-- result: 364
```

DATE_TRUNC() in PostgreSQL truncates date or timestamp values to the specified time units.

```
SELECT DATE_TRUNC('hour',
'2023-01-15 14:38:00'::TIMESTAMP);
-- result: '2023-01-15 14:00'
SELECT DATE_TRUNC('month',
'2023-12-30'::DATE);
-- result: '2023-12-01'
```

DATE_TRUNC() is often used to group by year, month, week, etc.

```
SELECT
DATE_TRUNC('month', birth_date) AS
month,
COUNT(*)
FROM animal
GROUP BY DATE_TRUNC('month', birth_date)
ORDER BY DATE_TRUNC('month', birth_date);
```