

What is PostgreSQL?

PostgreSQL is a object-relational database system that uses and extends the SQL language combined with many features that safely store and scale the most complicated data workloads. PostgreSQL started as a project at the Berkeley University in California back in 1986 and has more than 30 years of development.

From the POSTGRES project, to the name Postgres95 and finally to the name, which it is known for nowadays "PostgreSQL". By 1996, it became clear that the name "Postgres95" would not stand the test of time. We chose a new name, PostgreSQL, to reflect the relationship between the original POSTGRES and the more recent versions with SQL capability.

Many people continue to refer to PostgreSQL as "Postgres" because of tradition or the easier way to pronounce it.

Reputation

PostgreSQL has earned a strong reputation for its:

- proven architecture
- reliability
- data integrity
- robust feature set
- extensibility
- consistently delivery of performant and innovative solutions

PostgreSQL

- runs on all major operating systems
- has been ACID-compliant (the presence of four properties - atomicity, consistency, isolation and durability
- and has powerful add-ons such as the popular PostGIS geospatial database extender (contains geografic objects and functions) .

PostgreSQL has become the open source relational database of choice for many people and organisations.

Getting started with using PostgreSQL has never been easier - pick a project you want to build, and let PostgreSQL safely and robustly store your data.

Why use PostgreSQL?

PostgreSQL has many features, which should help developers build applications:

- administrators to protect data integrity and build fault-tolerant environments
- help you manage your data no matter how big or small the dataset

In addition to being free and open source, PostgreSQL can be extended by the user in many ways:

- you can define your own data types
- build out custom functions
- and even write code from different programming languages without recompiling your database
- adding new operators or index methods

PostgreSQL tries to conform with the SQL standard where such conformance does not contradict traditional features or could lead to poor architectural decisions. Many of the features required by the SQL standard are supported, though sometimes with slightly differing syntax or function. Further moves towards conformance can be expected over time. As of the version 14 release in September 2021, PostgreSQL conforms to at least 170 of the 179 mandatory features for SQL:2016 Core conformance. As of this writing, no relational database meets full conformance with this standard.

Features found in PostgreSQL

Data Types

Primitives: Integer, Numeric, String, Boolean

Structured: Date/Time, Array, Range / Multirange, UUID

Document: JSON/JSONB, XML

Geometry: Point, Line, Circle, Polygon

Customizations: Composite, Custom Types

Data Integrity

UNIQUE, NOT NULL

Primary Keys

Foreign Keys

Exclusion Constraints

Explicit Locks, Advisory Locks

Concurrency, Performance

Indexing: B-tree, Multicolumn, Expressions, Partial

Advanced Indexing: GiST, SP-Gist, KNN Gist, GIN, BRIN, Covering indexes, Bloom filters

Sophisticated query planner / optimizer, index-only scans, multicolumn statistics

Transactions, Nested Transactions (via savepoints)

Multi-Version concurrency Control (MVCC)

Parallelization of read queries and building B-tree indexes

Table partitioning

All transaction isolation levels defined in the SQL standard, including Serializable

Just-in-time (JIT) compilation of expressions

Reliability, Disaster Recovery

Write-ahead Logging (WAL)

Replication: Asynchronous, Synchronous, Logical

Point-in-time-recovery (PITR), active standbys

Tablespaces

Security

Authentication: GSSAPI, SSPI, LDAP, SCRAM-SHA-256, Certificate

Robust access-control system

Column and row-level security

Multi-factor authentication with certificates and an additional method

Extensibility

Stored functions and procedures

Procedural Languages: PL/PGSQL, Perl, Python (and many more)

SQL/JSON path expressions

Foreign data wrappers: connect to other databases or streams with a standard SQL interface

Customizable storage interface for tables

Many extensions that provide additional functionality, including PostGIS

Internationalisation, Text Search

Support for international character sets, e.g. through ICU collations

Case-insensitive and accent-insensitive collations

Full-text search

Conventions

The following conventions are used in the synopsis of a command:

- brackets ([and]) indicate optional parts
- braces "{ }" and vertical lines "|" indicate that you must choose one alternative
- dots "..." mean that the preceding element can be repeated

PostgreSQL objects include tables, views, and columns. They follow these naming conventions.

- a name can contain up to 128 characters
- the first character in a name can be a letter, @, _, or #
- a name cannot be a PostgreSQL reserved word, such as WHERE or VIEW
- a name cannot be the same as another PostgreSQL object that has the same type
- a name must be unique within each type of each object