PostgreSQL

What is PostgreSQL?

- object-relational database system, that uses and extends the SQL language
- started as a project at the Berkeley University in California back in 1986
- from POSTGRES project --> Postgres95 --> PostgreSQL
- has more than 30 years of development

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

Reputation

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

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

Why use PostgreSQL?

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

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

Features found in PostgreSQL

Data Integrity

- UNIQUE, NOT NULL
- Primary Keys
- Foreign Keys
- Exclusion Constraints
- Explicit Locks, Advisory Locks

Features found in PostgreSQL

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
- Transactions, Nested Transactions (via savepoints)
- Multi-Version concurrency Control (MVCC)
- Parallelization of read queries and building B-tree indexes

Features found in PostgreSQL

Reliability, Disaster Recovery

- Write-ahead Logging (WAL)
- Replication: Asynchronous, Synchronous, Logical
- Point-in-time-recovery (PITR), active standbys
- Tablespaces

Features found in PostgreSQL

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

Conventions

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

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

Conventions

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 must be unique within each type of each object