

What is this guy thinking about?



How many slides does Devrim have this time?



Don't expect a happy story!



...and hi Rapperswil!



I did not use AI during talk submission,
preparing slides and speaking.





EDB
Postgres® for the AI Generation

Extend your PostgreSQL: The world of PostgreSQL extensions

(and of course, AI is involved in actual stages...)

Devrim Gündüz

Postgres Expert @ EDB

Swiss PGDay 2026

May 2026

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Instagram: [devrimgunduztr](#)

Bluesky: <https://bsky.app/profile/devrim.gunduz.org>



EDB

Postgres® for the AI Generation

Self Introduction

- PostgreSQL Major Contributor
- Responsible for PostgreSQL RPM repos (Red Hat, Rocky, AlmaLinux Fedora and SLES)
- Fedora and Rocky Linux contributor
- PostgreSQL user since 1998
- PostgreSQL community member
- Postgres expert @ EDB
- “The guy with the PostgreSQL tattoo”
- Serial traveller
- London, UK / Istanbul, TR / Chicago, US / Airport lounges, around the world.

...and sometimes:



DJing!



DJing!





EDB
Postgres® for the AI Generation

Agenda

- History
- Introduction to extensions
- Extension issues
- Favourite extensions
- RPMified extensions

Are you using PostgreSQL extensions?



Extensions

- Of course!



Extensions

- Of course!
 - *“Everyone is a pg_stat_statements fan, even if they are not. Even if you ask the Oracle guys, they are also a fan of pg_stat_statements”*
- © 2025 Devrim Gunduz
- Replace pg_stat_statement with your most favourite extension!



Pre-extension era: Contrib modules



Pre-extension era: “In-core-ish” contrib modules

- Included in the tarball



Pre-extension era: “In-core-ish” contrib modules

- Included in the tarball
- Could include:
 - new data types
 - new operator(s)
 - new function(s)
 - new index AM
 - ...



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- Could include:
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 - new index AM
 - ...
- “not in core”
- “but in core-ish”



Pre-extension era: “In-core-ish” contrib modules

- Invoke individual install/uninstall SQL scripts
 - extension_name.sql
 - uninstall_extension_name.sql



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Pre-extension era: “In-core-ish” contrib modules

- Invoke individual install/uninstall SQL scripts
 - extension_name.sql
 - uninstall_extension_name.sql
- Versioning issues
- Dependency issues
- Hard to add a new one into the core
- Historically has been very hard to merge into the core
 - tsearch2



External “contrib modules”

- Not included in the tarball



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- External development



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- Same installation/uninstallation procedures



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External “contrib modules”

- Not included in the tarball
- External development
- Same installation/uninstallation procedures
- Same issues
- PGXS: PostgreSQL Extension Build System



PostgreSQL meets “Extensions”



PostgreSQL meets extensions

- 9.1 (15 years!)



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- Title: “Packages of external objects”



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(Simon Riggs)
- Contrib modules became extensions
 - still in contrib/ directory
- Easier to maintain from user point of view



PostgreSQL meets extensions

- Dependency checking (via control file)



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 - “C” code
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 - SQL commands
 - .control file



PostgreSQL meets extensions

- Dependency checking (via control file)
- Contents:
 - “C” code
 - Could be skipped for extensions that does not require a .so file
 - SQL commands
 - .control file
- In-core PostgreSQL extensions:
 - <https://www.postgresql.org/docs/current/contrib.html>



control file

- A few basic properties of the extension.



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- `extension_name.control`



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control file

- A few basic properties of the extension.
- `extension_name.control`
- Must be available separately for each major PostgreSQL version
- Dependency tracking
 - Example: `h3_postgis.control:requires = 'h3, postgis, postgis_raster'`



.sql scripts

- extension_name--version.sql



.sql scripts

- extension_name--version.sql
- Installation scripts



.sql scripts

- extension_name--version.sql
- Installation scripts
- Upgrade scripts



.sql scripts

- extension_name--version.sql
- Installation scripts
- Upgrade scripts
- Located under `$installation_dir/share/extension` (example:
`/usr/pgsql-19/share/extension/`)



List of available extensions

- `pg_available_extensions`
- `pg_available_extension_versions`



List of available extensions

- pg_available_extensions



State of the PostgreSQL Extensions



They are everywhere

- Github



They are everywhere

- Github
- Gitlab



They are everywhere

- Github
- Gitlab
- OSGeo Gitea



They are everywhere

- Github
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- PGXN



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- Laptops (yeah)



Laptops?

- Sometimes all I find is a tarball somewhere



Laptops?

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- There is a git repo, but:



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- Sometimes all I find is a tarball somewhere
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Releases **1**

 pper **Latest**
on May 8, 2018



Laptops?

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...and there is no recent commit!



Laptops?

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The sources are in the zip package included!



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- Keep pestering, but:



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- ...and there is no recent commit!
- There is a very recent release on PGXN, so I asked the author (*facepalm*):

The sources are in the zip package included!

- Keep pestering, but:
- 1. Yor tone seems that you think you are my boss which you are not!



Is this all?



Platform support

“It must not be hard”

```
%if 0%{?fedora} >= 43
BuildRequires:  zlib-ng-compat-devel
Requires:       zlib-ng-compat
%endif
%if 0%{?rhel} >= 8
BuildRequires:  zlib-devel
Requires:       zlib
%endif
%if 0%{?suse_version} >= 1500
BuildRequires:  zlib-devel
Requires:       libz1
%endif
```



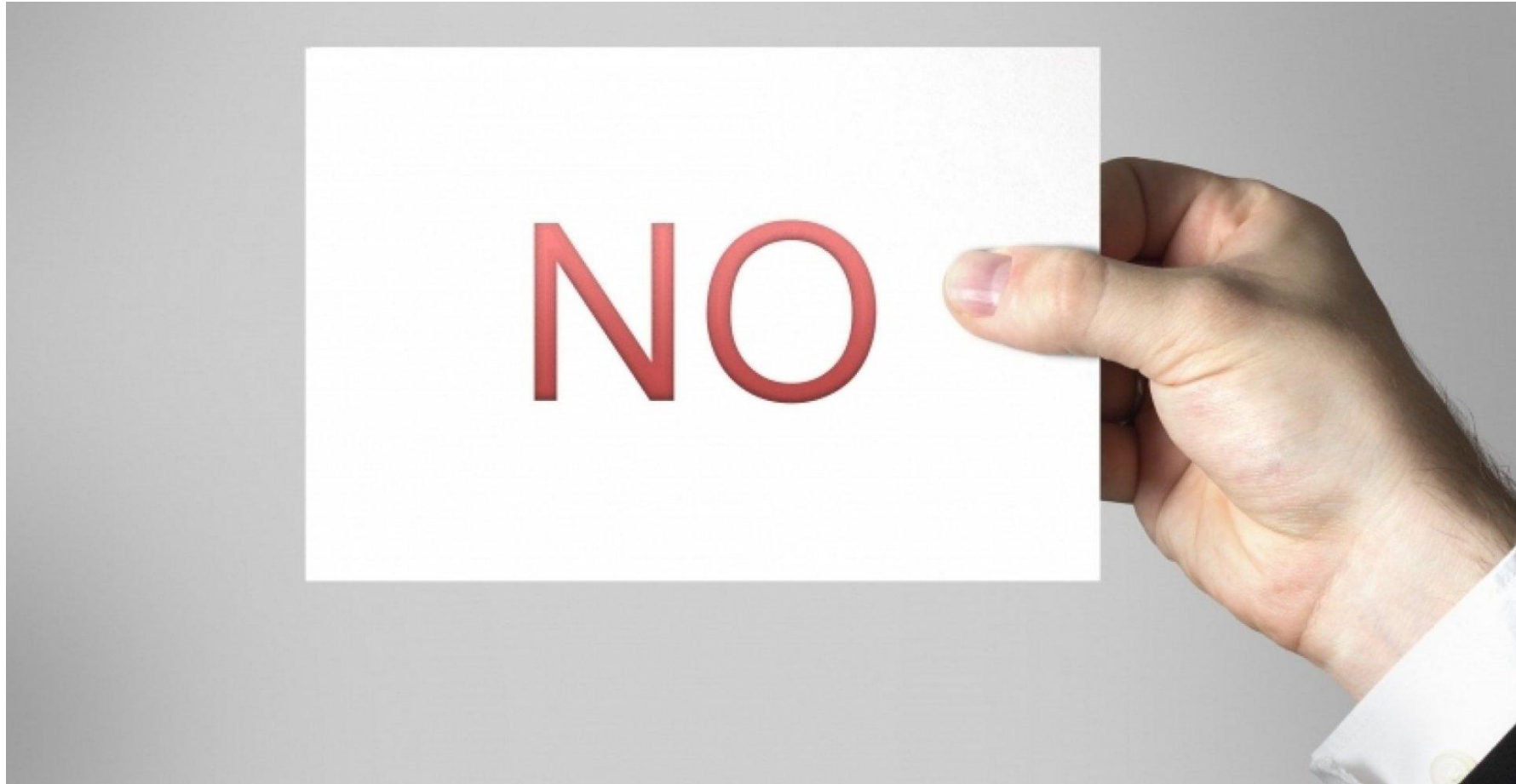
Let's move on



Is this all?



No!



No!

- Developer: “I’ve got a great idea! Let me write an extension for that”



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- Packagers: “There is a new PostgreSQL release and it does not compile”



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- Packagers: “There is a new PostgreSQL release and it does not compile”
- Developer: “ZzzzzzzZZzzzzzz”



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- Packagers: “There is a new PostgreSQL release and it does not compile”
- Developer: “ZzzzzzzZZzzzzzz”
- Packagers: “PostgreSQL \$NewMajorVersion.0 is due soon”



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“Non-responsive maintainers”



“Non-responsive maintainers”

- A major problem



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- A major problem
- Extensions get stalled



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- Some good people send a PR, but doors are closed



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- A major problem
- Extensions get stalled
- Some good people send a PR, but doors are closed
- Fork?



“Non-responsive maintainers”

- Not good for the users



“Non-responsive maintainers”

- Not good for the users
- Not good for the community



“Non-responsive maintainers”

- Not good for the users
- Not good for the community
- Not good for the packagers



Life of a packager



Life of a packager



Life of a packager

- Wrong slide, sorry!



Life of a packager

- Wrong slide, sorry!
- We do some actual work



Life of a packager

- Wrong slide, sorry!
- We do some actual work
- Actually it is a lot of work
 - APT based distros
 - RPM based distros
 - Windows
 - MacOS



Let the breakage begin



Breakage?

- New PostgreSQL release



Breakage?

- New PostgreSQL release
- New GCC version



Breakage?

- New PostgreSQL release
- New GCC version
- New LLVM version



Breakage?

- New PostgreSQL release
- New GCC version
- New LLVM version
- New “dependency” version



Wish it was that easy...



Road to the major release

- https://wiki.postgresql.org/wiki/PostgreSQL_17_Extension_Bugs
- https://wiki.postgresql.org/wiki/PostgreSQL_18_Extension_Bugs
- https://wiki.postgresql.org/wiki/PostgreSQL_19_Extension_Bugs



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- Good people already follow the development of PostgreSQL, so they apply the fixes immediately



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- Many extensions just work
 - Work: builds fine and passes tests
- We start annoying the extension authors
- Good people already follow the development of PostgreSQL, so they apply the fixes immediately
- But then:
 - GOTO -1



Slackers!



devrimgunduz commented on Aug 12

Author ...

ping.



devrimgunduz commented 2 weeks ago

Author ...

ping. GA is due soon.



devrimgunduz commented last week

Author ...











Anyone there? GA is due this Thursday



Slackers!

Known PostgreSQL 18 problems in extension modules

Extensions that fail to build

- jdbc_fdw: https://github.com/pgspider/jdbc_fdw/issues/52 
- odbc_fdw: https://github.com/CartoDB/odbc_fdw/issues/144 
- pgcopydb: <https://github.com/dimitri/pgcopydb/issues/916> 
- pgfincore: <https://github.com/klando/pgfincore/issues/10> 
- pgl_ddl_deploy: https://github.com/enova/pgl_ddl_deploy/issues/78 
- pgspider_ext: https://github.com/pgspider/pgspider_ext/issues/6 
- pg_store_plans: https://github.com/ossc-db/pg_store_plans/issues/52 
- PL/Lua: <https://github.com/pllua/pllua/issues/18> 
- sqlite_fdw: https://github.com/pgspider/sqlite_fdw/issues/117 
- wal2mongo: <https://github.com/HighgoSoftware/wal2mongo/issues/5> 



Sure. Take your time. No rush. We can wait. Users can wait.
Everyone can wait.

@devrimgunduz Thank you for your report. We have already started for supporting PostgreSQL 17 using its on beta version and it works fine but the source code is not published yet. We are planning to release new [REDACTED] soon after PostgreSQL 17.0 was released and tested SC [REDACTED] on the new PostgreSQL.



So, what did I do?





Devrim Gündüz ✓

@DevrimGunduz



Please complain to the extension author, not the packagers, if your favourite [#PostgreSQL](#) extension cannot be installed against v17.

See the full list of the extensions here which fail to build against v17:

[wiki.postgresql.org/wiki/PostgreSQL...](https://wiki.postgresql.org/wiki/PostgreSQL_extensions_failing_to_build_against_v17)



So, what do I do nowadays? (Yes, AI!)



What do I do nowadays?

- AI is a part of our lives
 - “People who cannot use AI may/will lose their jobs”



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- Prepared patches, created forks, submitted PRs(s)
- 14 PRs in the last 2 weeks, more will come in the upcoming weeks
- Not just build failures, also caught startup issues
- We are a unique community, and we love to help each other.



What do I do nowadays?

-
- 🔗 **devringunduz** mentioned this [last week](#)
 - ✔️ [4.7 fails to build against v19 beta 1 HexaCluster/credcheck#72](#)
 - 🕒 [0.30 regression tests fail against v19 beta1 lacanoid/pgddl#36](#)
 - ✔️ [1.4.2 fails to build against PostgreSQL 19 beta1 HypoPG/hypopg#108](#)
 - ✔️ [1.10.0 fails to build against PostgreSQL 19 beta1 dverite/icu_ext#22](#)
 - 🕒 [1.2 fails to build against PostgreSQL 19 beta 1 postgrespro/jsquery#59](#)
 - 🕒 [2.1.5 fails to build against PostgreSQL 19 beta 1 munakoiso/loqerrors#32](#)
 - 🕒 [v1.7 fails to build against PostgreSQL 19 beta1 splendiddata/login_hook#23](#)
 - 🕒 [PostgreSQL 19 support EnterpriseDB/monqo_fdw#197](#)
 - ✔️ [Doesn't compile against PG19 pramsey/pqsql-ogr-fdw#274](#)
 - 🔧 [Fix passwordpolicy build and startup errors against PostgreSQL 19 fmbiete/passwordpolicy#1](#)
 - ✔️ [3.0 fails to build against PostgreSQL 19 beta 1 \(patch included\) RafiaSabih/pq_auth_mon#24](#)
 - 🕒 [2.2 fails to build against v19 beta1 hapostgres/pq_auto_failover#1123](#)
 - 🕒 [1.2-20250903 fails to build against PostgreSQL 19 beta1 pqbiqm/pq_biqm#34](#)
 - 🔧 [PostgreSQL 19 fixes ossc-db/pq_bulkload#184](#)
 - 🔧 [Two fixes for PostgreSQL 19 credativ/pq_checksums#15](#)
 - ✔️ [0.17 fails to build against PostgreSQL 19 beta1 dimitri/pqcopydb#970](#)
 - 🕒 [1.6.7 fails to build against PostgreSQL 19 beta 1 citusdata/pq_cron#432](#)
 - ✔️ [1.0 fails to build against PostgreSQL 19 beta 1. HexaCluster/pq_kpart#3](#)
 - ✔️ [pq_dbms_locks vs pq_background 2.0.x HexaCluster/pq_dbms_lock#10](#)
 - ✔️ [0.2.4 fails to build against PostgreSQL 19 beta1 pqexporter/pqexporter_ext#30](#)



What do I do nowadays?

■

- 🔗 **devrimgunduz** mentioned this 4 days ago
 - 🕒 [v19 support ChenHuajun/pg_roaringbitmap#69](#)
 - 🔗 [Fix build failures against PostgreSQL 19 HexaCluster/pg_dbms_errlog#12](#)
 - 🕒 [17.4 build error against PostgreSQL 19 beta1 df7cb/pg_filedump#41](#)
 - 🚫 [Fix pgfincore build failures against PostgreSQL 18/19 klando/pgfincore#14](#)
 - 🕒 [PostgreSQL 19: release plans ossc-db/pg_hint_plan#246](#)
 - 🔗 [PostgreSQL 19 compatibility fixes sraoss/pg_ivm#165](#)
 - 🔗 [v18+ fixes and compiler warning fix enova/pgl_ddl_deploy#85](#)
 - 🔗 [Fix build failure on PG19 \(clang+LTO and gcc\) caused by implicit fun... okbob/pgmeminfo#4](#)
 - 🕒 [Regression test failure against PostgreSQL 19 beta1 dvarrazzo/pgmp#57](#)
 - 🕒 [v19 support pqaudit/pqaudit#319](#)
 - 🔗 [Fix build against PostgreSQL 19 fmbiete/pqauditloqtofile#66](#)
 - 🕒 [PostgreSQL 19 support zubkov-andrei/pg_profile#162](#)
- 🔗 **dimitri** mentioned this 2 days ago
 - 🔗 [fix: build compatibility with PostgreSQL 16-19 meson-built installations \(#970\) dimitri/pgcopydb#998](#)
- 🔗 **devrimgunduz** mentioned this in 2 pull requests 9 minutes ago
 - 🔗 [Port pg_net to PostgreSQL 19 supabase/pg_net#258](#)
 - 🔗 [Fix PG 19 startup crash by adding HASH_BLOBS to ShmemInitHash\(\) RafiaSabih/pg_auth_mon#25](#)

▲ 11 - 11:11



Installing an extension



Installation

- First of all: Install the extension package for the specific PostgreSQL version
 - Preferred: RPM, DEB, etc.
 - Compilation from source
 - Other installation options



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 - Preferred: RPM, DEB, etc.
 - Compilation from source
 - Other installation options
- **May require adding extension name to `shared_preload_libraries` and restarting the server**
 - [postgres] # CREATE EXTENSION citus;
 - ERROR: Citus can only be loaded via `shared_preload_libraries`
 - HINT: Add citus to `shared_preload_libraries` configuration variable in `postgresql.conf` in master and workers. Note that citus should be at the beginning of `shared_preload_libraries`.



Installation

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 - Preferred: RPM, DEB, etc.
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[postgres] # CREATE EXTENSION citus;  
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HINT: Add citus to shared_preload_libraries configuration variable in  
postgresql.conf in master and workers. Note that citus should be at  
the beginning of shared_preload_libraries.
```
- May require dependencies to be installed
 - Package managers often solve this problem



Installation

- CREATE EXTENSION
 - VERSION
 - CASCADE
 - SCHEMA



Installation

- CREATE EXTENSION
 - VERSION
 - CASCADE
 - SCHEMA
- Dependencies:
[postgres] # CREATE EXTENSION h3_postgis ;
ERROR: required extension "postgis_raster" is not installed
HINT: Use CREATE EXTENSION ... CASCADE to install required extensions too.



Installation

- CREATE EXTENSION
 - VERSION
 - CASCADE
 - SCHEMA
- Dependencies:
[postgres] # CREATE EXTENSION h3_postgis ;
ERROR: required extension "postgis_raster" is not installed
HINT: Use CREATE EXTENSION ... CASCADE to install required extensions too.
- CASCADE:
[postgres] # CREATE EXTENSION h3_postgis CASCADE;
NOTICE: installing required extension "postgis_raster"



or, read!



Find many information in one website

Installing PostgreSQL Extensions via RPMs

This document includes detailed information about installing and configuring PostgreSQL extensions on RPM based systems.

Extension how-to docs

- Foreign Data Wrappers
- DBA Tools
- Application Developers
- Data types and extra functions
- Replication
- Procedural Languages
- Monitoring
- Analytics
- Oracle compatibility
- Indexes
- Security
- Geospatial
- Major Features
- Other features

<https://yum.postgresql.org/extensions>



Updating an extension



Updating an extension

- Install the updated extension



Updating an extension

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- `ALTER EXTENSION ... UPDATE;`



Updating an extension

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- ALTER EXTENSION ... UPDATE;
- Some extension versions may not need this
 - “Upgrade path”
 - “NOTICE: version "12.1-1" of extension "foobar" is already installed”
 - Problem?
 - Restart?



Updating an extension

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 - “Upgrade path”
 - “NOTICE: version “12.1-1” of extension “foobar” is already installed”
 - Problem?
 - Restart?
- Duplicate .so files?



Uninstalling an extension



Updating an extension

- DROP EXTENSION ... ;



Updating an extension

- DROP EXTENSION ... ;
- Dependencies:
 - [postgres] # DROP EXTENSION postgis_raster ;
 - ERROR: cannot drop extension postgis_raster because other objects depend on it
 - DETAIL: extension h3_postgis depends on extension postgis_raster
 - HINT: Use DROP ... CASCADE to drop the dependent objects too.



Updating an extension

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 - ERROR: cannot drop extension postgis_raster because other objects depend on it
 - DETAIL: extension h3_postgis depends on extension postgis_raster
 - HINT: Use DROP ... CASCADE to drop the dependent objects too.
- CASCADE:
 - [postgres] # DROP EXTENSION postgis_raster CASCADE;
 - NOTICE: drop cascades to extension h3_postgis
 - DROP EXTENSION



Updating an extension

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- Dependencies:
 - [postgres] # DROP EXTENSION postgis_raster ;
 - ERROR: cannot drop extension postgis_raster because other objects depend on it
 - DETAIL: extension h3_postgis depends on extension postgis_raster
 - HINT: Use DROP ... CASCADE to drop the dependent objects too.
- CASCADE:
 - [postgres] # DROP EXTENSION postgis_raster CASCADE;
 - NOTICE: drop cascades to extension h3_postgis
 - DROP EXTENSION
- CASCADE: Also drops objects that depends on the extension!



So, favourite extensions



PLs

- PL/pgSQL (only default “extension”)
- PL/Python
- PL/Perl
- PL/TCL
- PL/Java
- PL/Lua
- PL/Bash (sh)
- PL/R

Also:

- plpgsql_check
- plprofiler



PostGIS

- Really an extension? ;)
- Spatial database “extender” for PostgreSQL
- <https://postgis.net>



pgRouting

- Extends PostGIS, with routing and network analysis functionality.
- Comes with great number of routing algorithms.
- Available in many packaging formats, including RPMs.
- Depends on CGAL and Boost (...)
- <https://www.pgrouting.org>



pg_stat_statements

- A must-install for everyone
- If you disagree with it, just do agree :)



pg_partman

- Makes PostgreSQL partitioning manageable and usable
- Actively developed



pgvector

- Vector similarity search for Postgres
- Stores your vectors with the rest of your data



pgtt

- Create, manage and use Oracle-style Global Temporary Tables
- Useful while moving off from Oracle.
 - PostgreSQL 20 may have this feature:
<https://commitfest.postgresql.org/patch/6918/>



Citus

- Horizontal scaling of PostgreSQL
- sharding & replication
- 100% open source



TimescaleDB

- PostgreSQL based time-series database
- Partial open source
- automatic partitioning across time and space (partitioning key)



pgAudit

- Auditing extension for PostgreSQL
 - Very extensive!
- Recently changed versioning numbers
 - pgaudit 19.x (beta1 is out) :PostgreSQL 19 (
 - pgaudit 18.x :PostgreSQL 18
 - pgaudit 17.x :PostgreSQL 17
 - pgAudit 16.x : PostgreSQL 16
 - pgAudit 1.7.x : PostgreSQL 15
 - pgAudit 1.6.x: PostgreSQL 14
 - ...



FDWs

- postgres_fdw
- oracle_fdw
- tds_fdw
- mysql_fdw
- hdfs_fdw
- mongo_fdw
- sqlite_fdw
- firebird_fdw
- jdbc_fdw
- odbc_fdw
- ogr_fdw
- pgbouncer_fdw
- file_fdw



Some other extensions

- count_distinct
- credcheck
- ddlx
- emaj
- h3-pg
- hll
- hypopg
- ip4r
- login_hook
- multicorn2
- pg_cron
- pg_dbms_job
- pg_dbms_lock
- pg_catcheck
- pg_background
- postgresql-anonymizer
- pg_auth_mon
- pg_extra_time
- pg_tle
- pg_repack
- pg_ivm
- pg_net
- pg_squeeze
- pg_uri
- pgtt
- rum
- set_user
- topn
- wal2json
- wal2mongo
- postgresql-unit



Some other extensions

- plproxy
- pg_readonly
- pg_qualstats
- pg_prioritize
- pg_hint_plan
- pg_store_plans
- pg_stat_kcache
- pgplsh
- pg_statement_rollback
- pgmemcache
- pgl_ddl_deploy
- pgauditlogtofile
- pgsphere
- pgsodium
- pldebugger
- plpgsql_check
- plprofiler
- pgsql_http
- pgsql_gzip
- pgsql_tweaks
- pointcloud
- semver
- PL/xslt
- pgpcrc
- q3c
- pg_roaringbitmap
- icu_ext
- ...



Thank you.





EDB
Postgres® for the AI Generation

Extend your PostgreSQL: The world of PostgreSQL extensions

(and of course, AI is involved in actual stages...)

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Swiss PGDay 2026

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