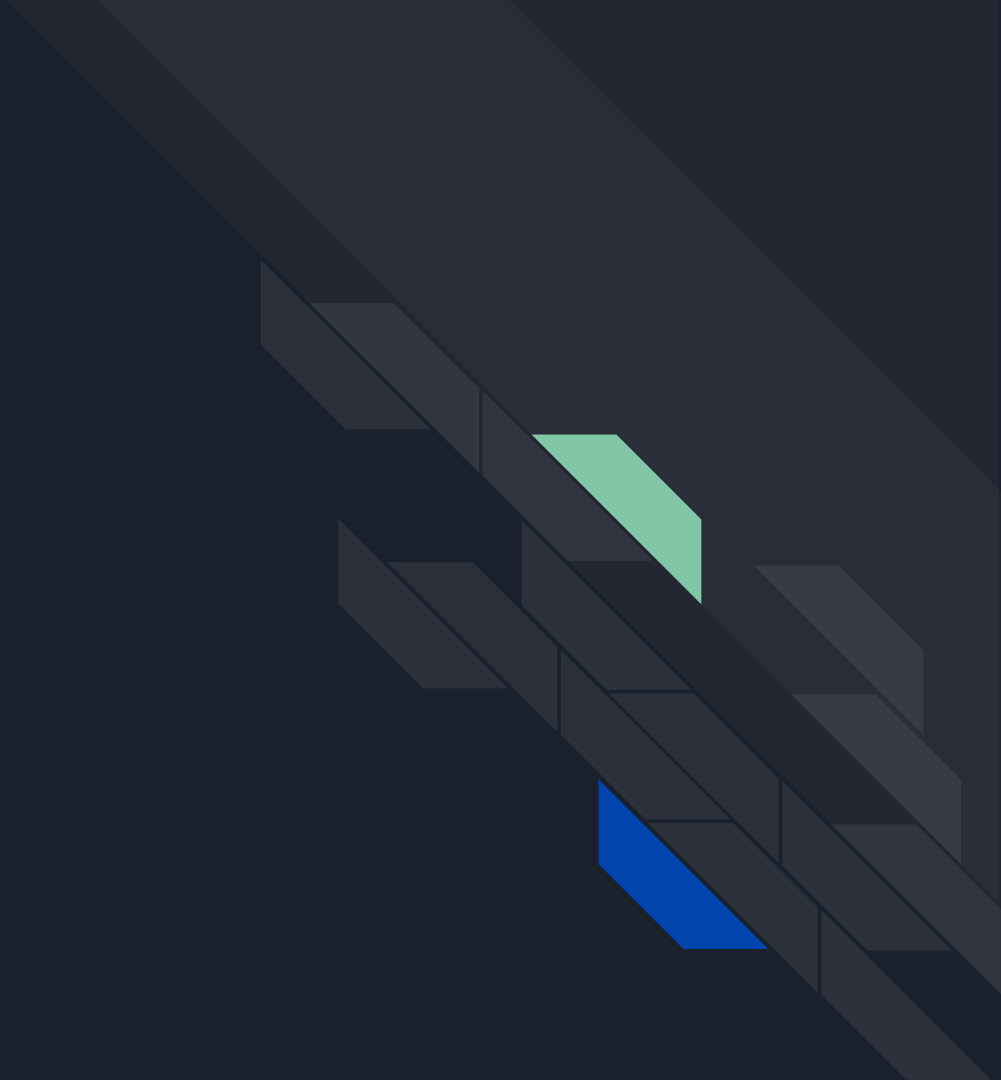# Building Trunk:

A Postgres Extension Registry and CLI Supporting Tembo Cloud

Ian Stanton
Tembo

Backstory

Backstory

Tembo

Founded November, 2022

Managed Postgres solution - Tembo Cloud

Vision

Postgres for everything. Use-case optimized flavors of Postgres, powered by extensions

Ability to install and use any extension, even user-provided extensions

We knew we'd need some extension management system to pull this off

Backstory

Trunk

A Postgres extension registry and CLI

Binary extension packaging

Open to the community and open source

Powers Tembo Cloud's extension management experience
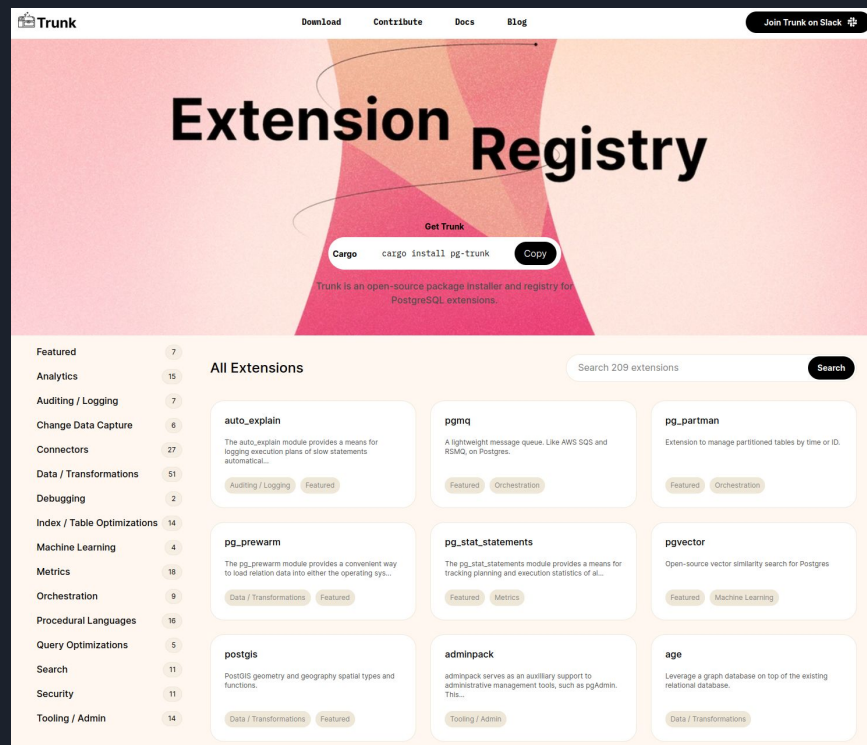
Backstory

Tembo Cloud

We spent Q1 2023 building Tembo Cloud V1

Extensions were baked into our Postgres container images

We wanted a way install extension binaries on the fly without rebuilding container images

Extension Registry

Started exploring the extension ecosystem for existing solutions

Backstory

PGXN

- + Backed by the community
- + Around since 2011
- - Source distribution, not binary
- - Little development since 2012

apt / yum

- + Backed by the community
- + Binary distribution
- - Smaller subset of extensions available
- - Review process for adding could slow us down

Building our own

- + Full control over integration with Tembo Cloud
- + Binary distribution
- + We could build new features quickly
- + We could publish new extensions quickly
- - How will the community react?
- - Recreating the wheel?

Inspiration
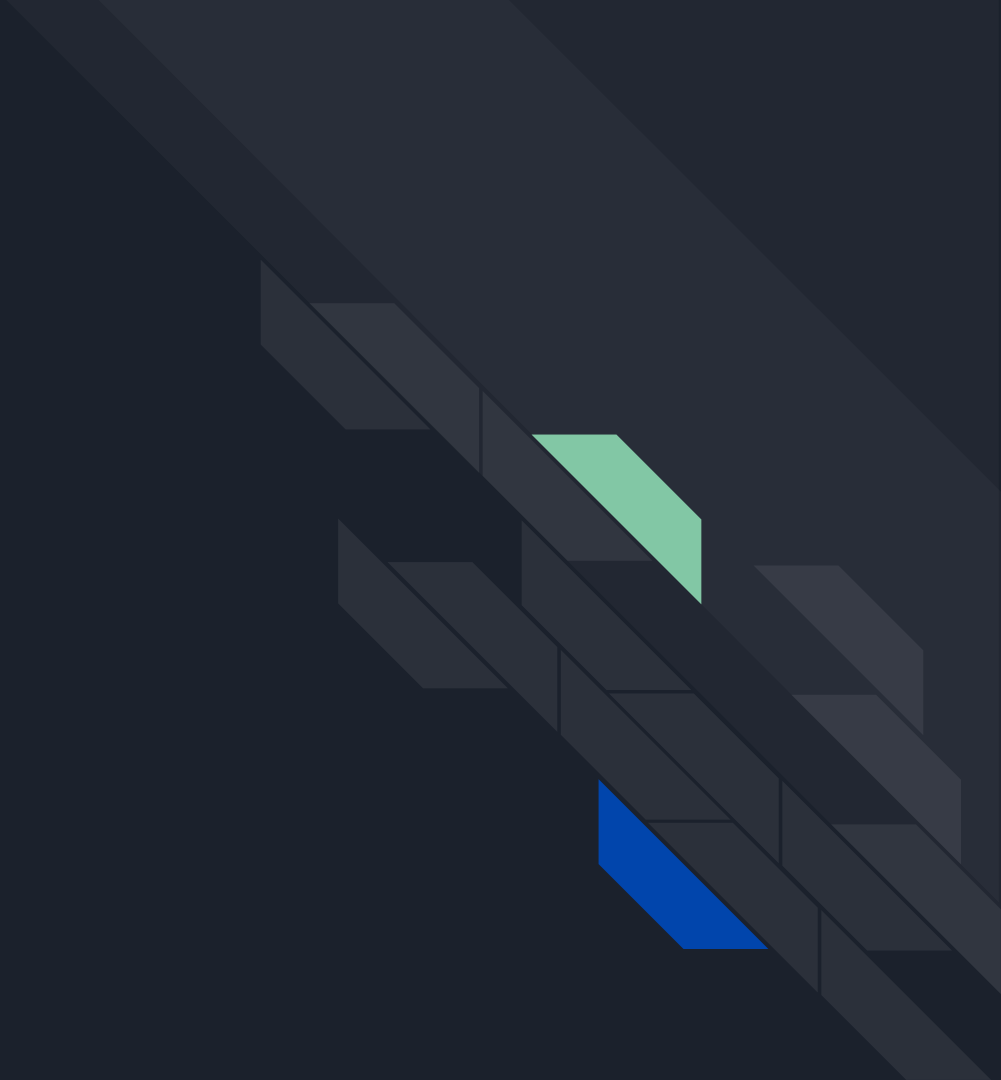
Inspiration

Astronomer Registry for Airflow

A handful of Tembo's employees worked at Astronomer - managed service for Apache Airflow

Community registry for DAGs, Providers and Modules

We wanted to build something similar, but for Postgres extensions
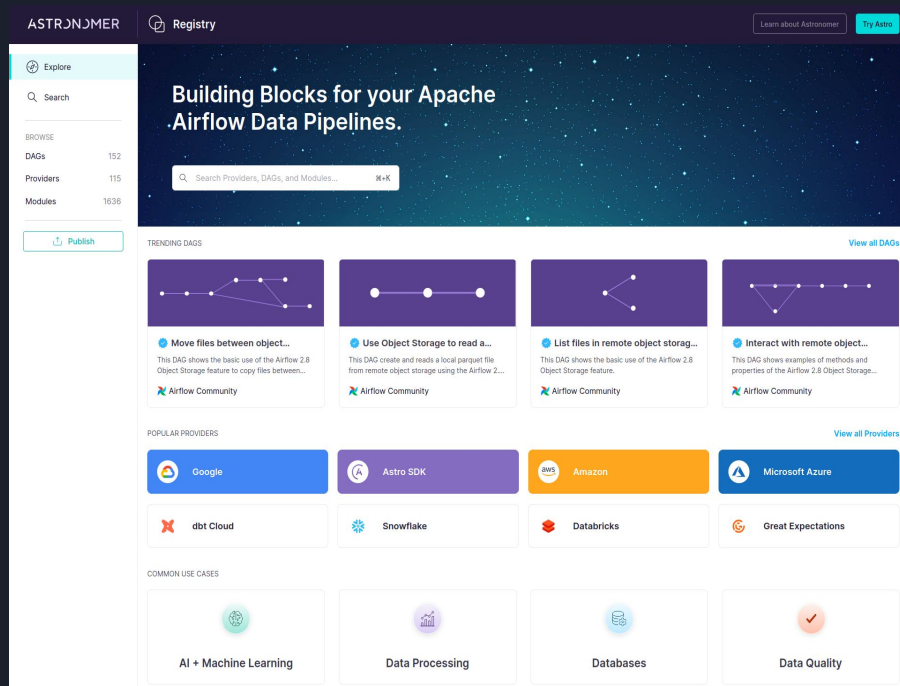
Inspiration

PGXN / apt / yum

We wanted to take the best of what the current offerings had to offer and build upon that

Crates.io

We wanted the experience to be as simple and enjoyable as building, publishing and installing Rust crates.

Vision

- Discoverability
    - Categories
    - Rating system
    - Certification
    - Cloud provider support
- Build any extension
    - SQL
    - C/SQL
    - PGRX
- Simple publishing
    - Like `cargo publish`
- Simple installation
    - Like `cargo install cargo-pgrx`

Hopes and Dreams

Hopes and Dreams

Community involvement

- Extension publications
- Code contributions

Multi-platform support

Multiple versions of Postgres

The one-stop-shop for Postgres extensions

How It Works
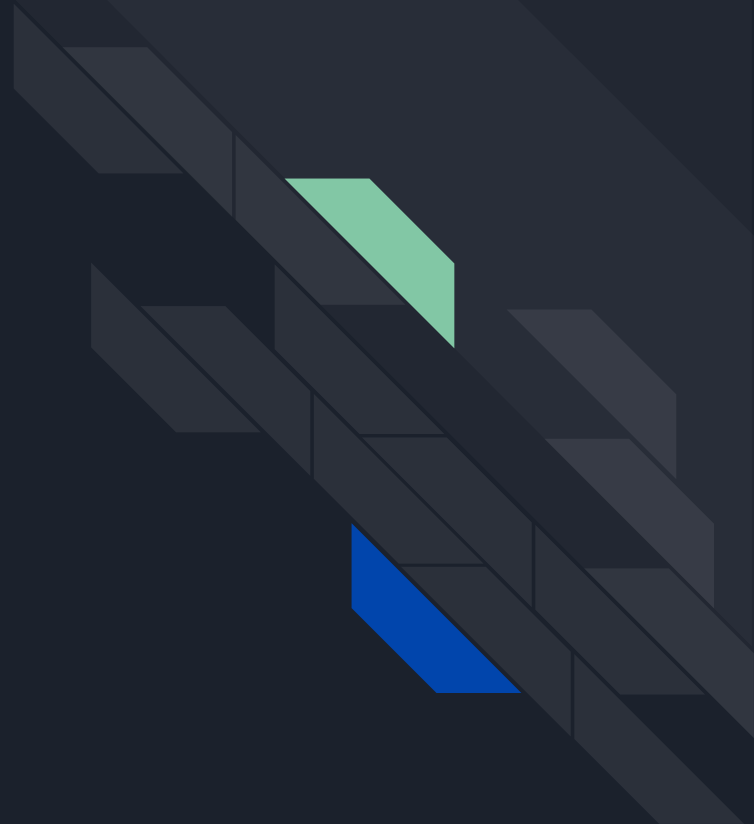
How It Works

CLI

Built in Rust

Uses different build images based on extension type detected

Packages extension extension files into `<trunk-project-name>-<version>-<pg-version>.tar.gz`

Publishes to registry with `trunk publish`

Installs from registry `trunk install`

Registry

Built in Rust

Backend stores extension metadata

S3 bucket stores `tar.gz` file

```
Create Trunk bundle:
        bitcode/src/semver/src/semver.bc
        bitcode/src/semver.index.bc
        semver.so
        licenses/LICENSE
        extension/semver--0.10.0--0.11.0.sql
        extension/semver--0.11.0--0.12.0.sql
        extension/semver--0.12.0--0.13.0.sql
        extension/semver--0.13.0--0.15.0.sql
        extension/semver--0.15.0--0.16.0.sql
        extension/semver--0.16.0--0.17.0.sql
        extension/semver--0.17.0--0.20.0.sql
        extension/semver--0.2.1--0.2.4.sql
        extension/semver--0.2.4--0.3.0.sql
        extension/semver--0.20.0--0.21.0.sql
        extension/semver--0.21.0--0.22.0.sql
        extension/semver--0.22.0--0.30.0.sql
        extension/semver--0.3.0--0.4.0.sql
        extension/semver--0.30.0--0.31.0.sql
        extension/semver--0.31.0--0.31.1.sql
        extension/semver--0.31.1--0.31.2.sql
        extension/semver--0.31.2--0.32.0.sql
        extension/semver--0.32.1.sql
        extension/semver--0.5.0--0.10.0.sql
        extension/semver--unpackaged--0.2.1.sql
        extension/semver.control
        extension/semver.sql
        manifest.json
Packaged to ./.trunk/pg_semver-0.32.1-pg15.tar.gz
```

```
▼ 1:
      name:                          "pg_semver"
      description:                   "A semantic version data type for PostgreSQL."
      documentation_link:           https://github.com/theory/pg-semver
      repository_link:               https://github.com/theory/pg-semver
      version:                       "0.32.1"
   ▼ postgres_versions:
         0:                          15
         1:                          14
         2:                          16
   ▼ extensions:
      ▼ 0:
            extension_name:          "semver"
            version:                 "0.32.1"
            trunk_project_name:      "pg_semver"
            dependencies_extension_names:   null
            loadable_libraries:      null
            configurations:          null
         ▼ control_file:
               absent:               false
            ▼ content:               "# semver extension\ncomment = 'Semantic version data type'\ndefault_version = '0.32.1'\nmodule_pathname = '$libdir/semver'\nrelocatable = true\n"
   ▼ downloads:
      ▼ 0:
         ▼ link:                     https://cdb-plat-use1-prod-pgtrunkio.s3.amazonaws.com/extensions/pg_semver/pg_semver-pg14-0.32.1.tar.gz
            pg_version:              14
            platform:                "linux/amd64"
         ▼ sha256:                   "f412cfb4722eac32a38dbcc7cd4201d95f07fd88b7abc623cd84c77aecc8d4bb"
      ▼ 1:
         ▼ link:                     https://cdb-plat-use1-prod-pgtrunkio.s3.amazonaws.com/extensions/pg_semver/pg_semver-pg15-0.32.1.tar.gz
            pg_version:              15
            platform:                "linux/amd64"
         ▼ sha256:                   "9213771ffc44fb5a88726770f88fd13e62118b0f861e23271c3eeee427a23be9"
      ▼ 2:
         ▼ link:                     https://cdb-plat-use1-prod-pgtrunkio.s3.amazonaws.com/extensions/pg_semver/pg_semver-pg16-0.32.1.tar.gz
            pg_version:              16
            platform:                "linux/amd64"
         ▼ sha256:                   "8ffe4fa491f13a1764580d274e9f9909af4461aacbeb15857ab2fa235b152117"
```

pg_semver

A semantic version data type for PostgreSQL.

Install

`trunk install pg_semver`

semver 0.32.0

`pgxn` `0.32.1`
`CI` `passing`

This library contains a single PostgreSQL extension, a data type called "semver". It's an implementation of the version number format specified by the Semantic Versioning 2.0.0 Specification.

Installation

To build semver:

```
make
make install
make installcheck
```

If you encounter an error such as:

Details

About

Category	Data / Transformations
Version	0.32.1
Last updated	about 2 months ago
License	PostgreSQL
Architecture	x86-64
Operating system	Debian/Ubuntu

github.com/theory/pg-semver

```
❯ trunk install pg_semver
Using pkglibdir: "/usr/lib/postgresql/16/lib"
Using sharedir: "/usr/share/postgresql/16"
Using Postgres version: 16
info: Downloading from: https://cdb-plat-use1-prod-pgtrunkio.s3.amazonaws.com/extensions/pg_semver/pg_semver-pg16-0.32.1.tar.gz
info: Dependent extensions to be installed: []
info: Installing pg_semver 0.32.1
[+] bitcode/src/semver/src/semver.bc => /usr/lib/postgresql/16/lib
[+] bitcode/src/semver.index.bc => /usr/lib/postgresql/16/lib
[+] semver.so => /usr/lib/postgresql/16/lib
info: Skipping license file licenses/LICENSE
[+] extension/semver--0.10.0--0.11.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.11.0--0.12.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.12.0--0.13.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.13.0--0.15.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.15.0--0.16.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.16.0--0.17.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.17.0--0.20.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.2.1--0.2.4.sql => /usr/share/postgresql/16
[+] extension/semver--0.2.4--0.3.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.20.0--0.21.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.21.0--0.22.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.22.0--0.30.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.3.0--0.4.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.30.0--0.31.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.31.0--0.31.1.sql => /usr/share/postgresql/16
[+] extension/semver--0.31.1--0.31.2.sql => /usr/share/postgresql/16
[+] extension/semver--0.31.2--0.32.0.sql => /usr/share/postgresql/16
[+] extension/semver--0.32.1.sql => /usr/share/postgresql/16
[+] extension/semver--0.5.0--0.10.0.sql => /usr/share/postgresql/16
[+] extension/semver--unpackaged--0.2.1.sql => /usr/share/postgresql/16
[+] extension/semver.control => /usr/share/postgresql/16
[+] extension/semver.sql => /usr/share/postgresql/16


****************************
* POST INSTALLATION STEPS *
****************************

Install the following system-level dependencies:
        On systems using apt:
                libc6

Enable the extension with:
        CREATE EXTENSION IF NOT EXISTS semver CASCADE;
```
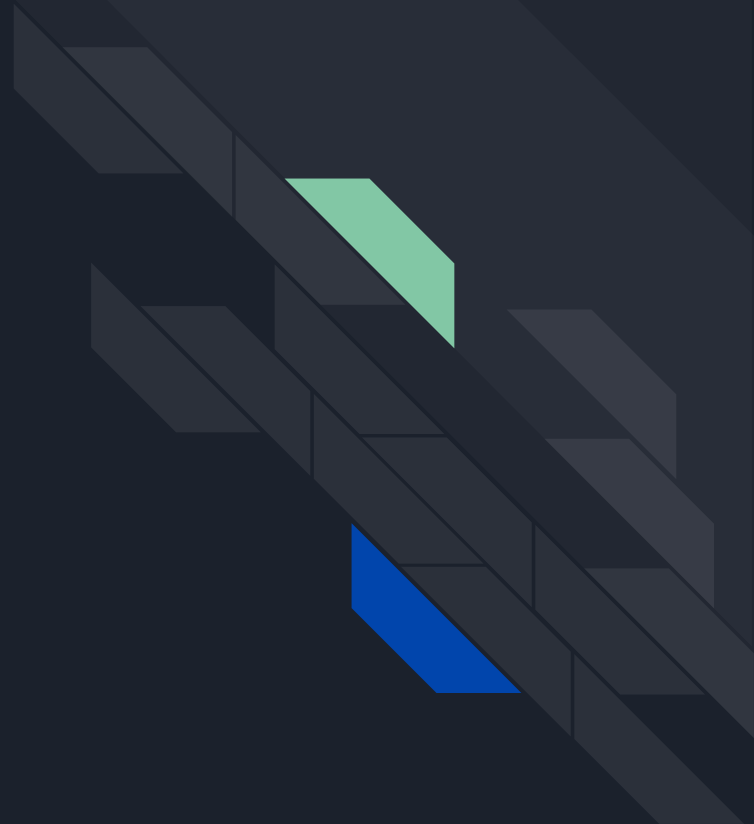
State of the Project

State of the Project

Tembo Cloud

200+ extensions
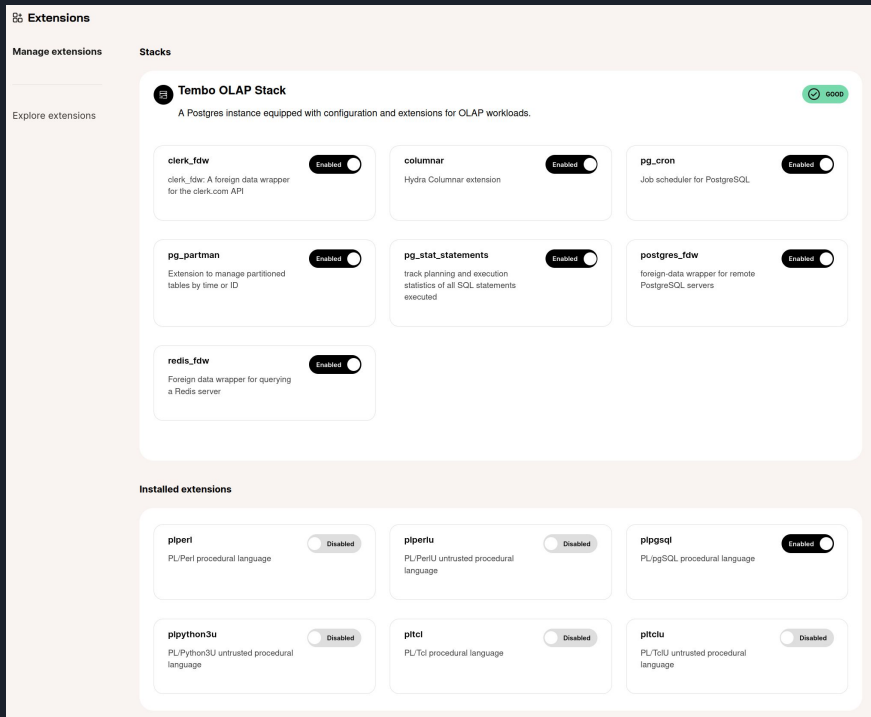
Powers extension management experience

Likely Trunk's #1 user

Community

A lot of site traffic

Minimal community involvement

Repo is not contributor friendly

State of the Project

Did We Solve The Problem?

For Tembo Cloud… yes!

For the community… no!

But we helped bring more awareness to opportunities for improving the extension ecosystem

And more extension management tools were introduced

Why we're all here today!

The Database Package Manager

For Postgres Trusted Language Extensions

Getting started   Documentation

Download and install
Install extensions via a SQL command

`select dbdev.install(olirice-index_advisor);`

PUBLISHER HANDLE   EXTENSION NAME

> extensions, made easy

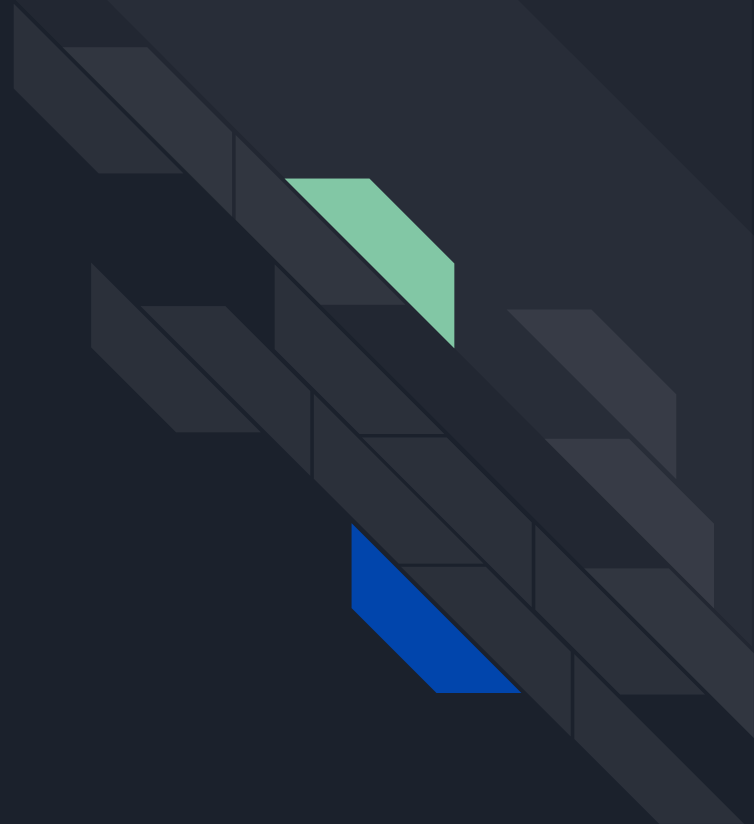npm for PostgreSQL

Brew   Curl

`brew install pgxman/tap/pgxman`

Lessons Learned

Lessons Learned

It's a really hard problem to solve!

The extension ecosystem is the wild west!

Community involvement is crucial!

We should have reached out to David in the very beginning!

The Future of Trunk

The Future of Trunk

Trunk will continue to be a core component of the extension management solution in Tembo Cloud

It's paved the way for binary packaging and distribution in PGXN v2

Will inform and be the basis of binary packaging / distribution / installation features in PGXN v2

Thank You!