PostgreSQL for Oracle DBAs

A walk in the park?

adyen

engineered
for ambition

Why?

Why?

Oracle Database and PostgreSQL are basically the same?

Why?

Oracle Database and PostgreSQL are basically the same?

Yes and No...

Why?

Oracle Database and PostgreSQL are basically the same?

Yes and No...

The devil is in the details...

Why?

Why?

Teresa Lopes

Database Engineer

Adyen

Agenda

Differences and challenges

- Learn PostgreSQL
- Differences
- Operational Challenges

What I Love and What I (do not) Miss

- Oracle - (Not) Missed
- PostgreSQL - Love

Differences and challenges

Oracle Ecosystem

- Oracle RDBMS
- Real Application Clusters (RAC)
- Oracle Cluster Ready Service (CRS)
- Automatic Storage Management (ASM)
- Dataguard - Disaster Recover
- Oracle Enterprise Manager (OEM)
- GoldenGate
- RMAN - Backups

Learn PostgreSQL

Expectation

PostgreSQL
Documentation

Learn PostgreSQL

Expectation

PostgreSQL Documentation

Blogs

- 2nd Quadrant and EDB
- CYBERTEC
- Crunchy Data
- pganalyze
- pgMustard
- Postgres.AI
- Percona
- Timescale

Learn PostgreSQL

Expectation

PostgreSQL Documentation

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- 2nd Quadrant and EDB
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- Postgres.AI
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- Timescale

Community

- Conferences (PGConf. EU, FOSDEM, POSETTE ...)
- PGDays and Meetups
- Podcasts (Postgres.fm, Talking Postgres, 5mins of Postgres)
- PostgreSQL mailing lists

Playgrounds

- Crunchy Data - Postgres Tutorials
- Supabase wasm

Learn PostgreSQL

Expectation

PostgreSQL Documentation

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Playgrounds

- Crunchy Data - Postgres Tutorials
- Supabase wasm

Special mention

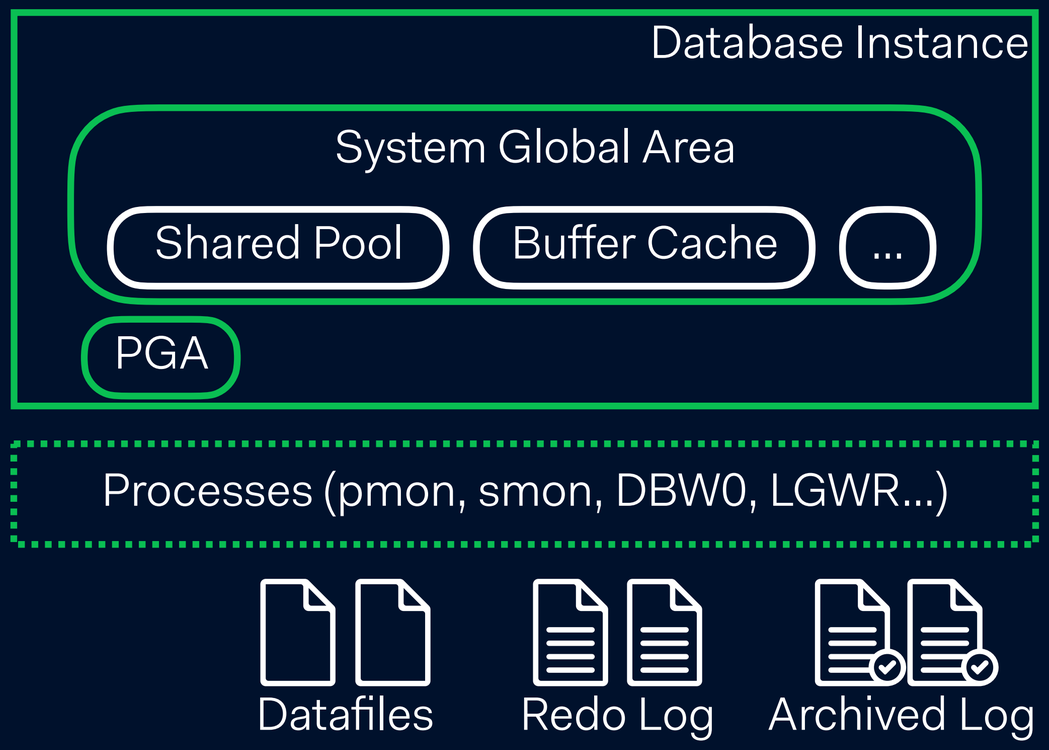
Learn PostgreSQL

~~Expectation~~ Reality

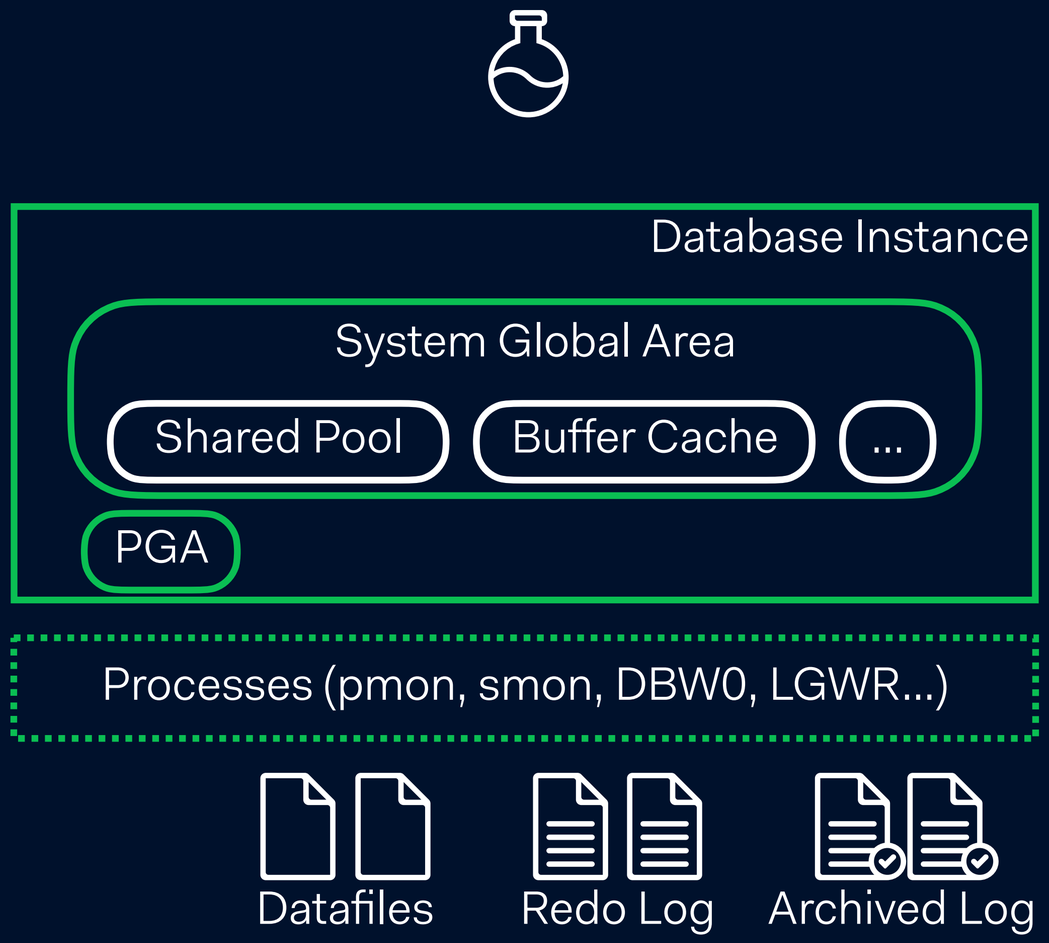
Architecture

High Level

Architecture



Architecture

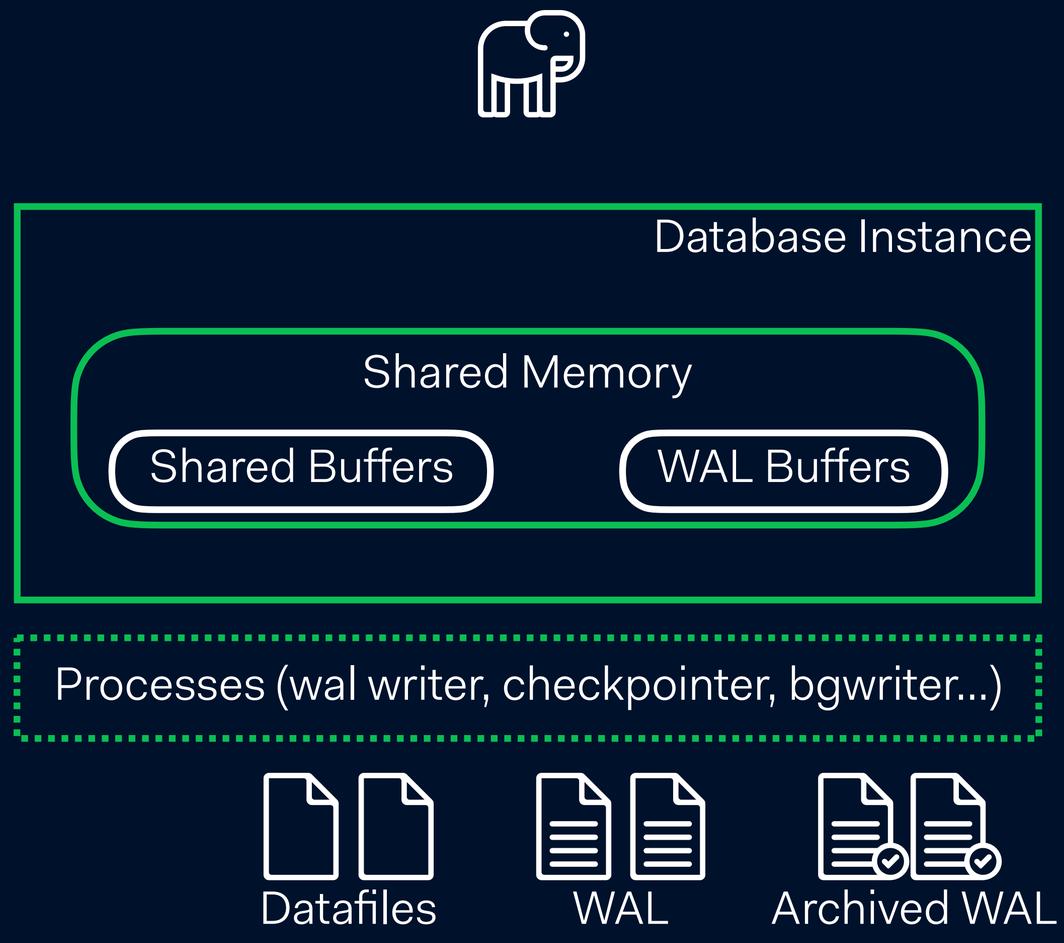


- Database Server - physical or virtual
- Database Instance (memory + background processes)
- Database (tables, indexes, schemas...)

1 DB Server => 1+ DB Instances

1 DB Instance => 1 DB

Architecture

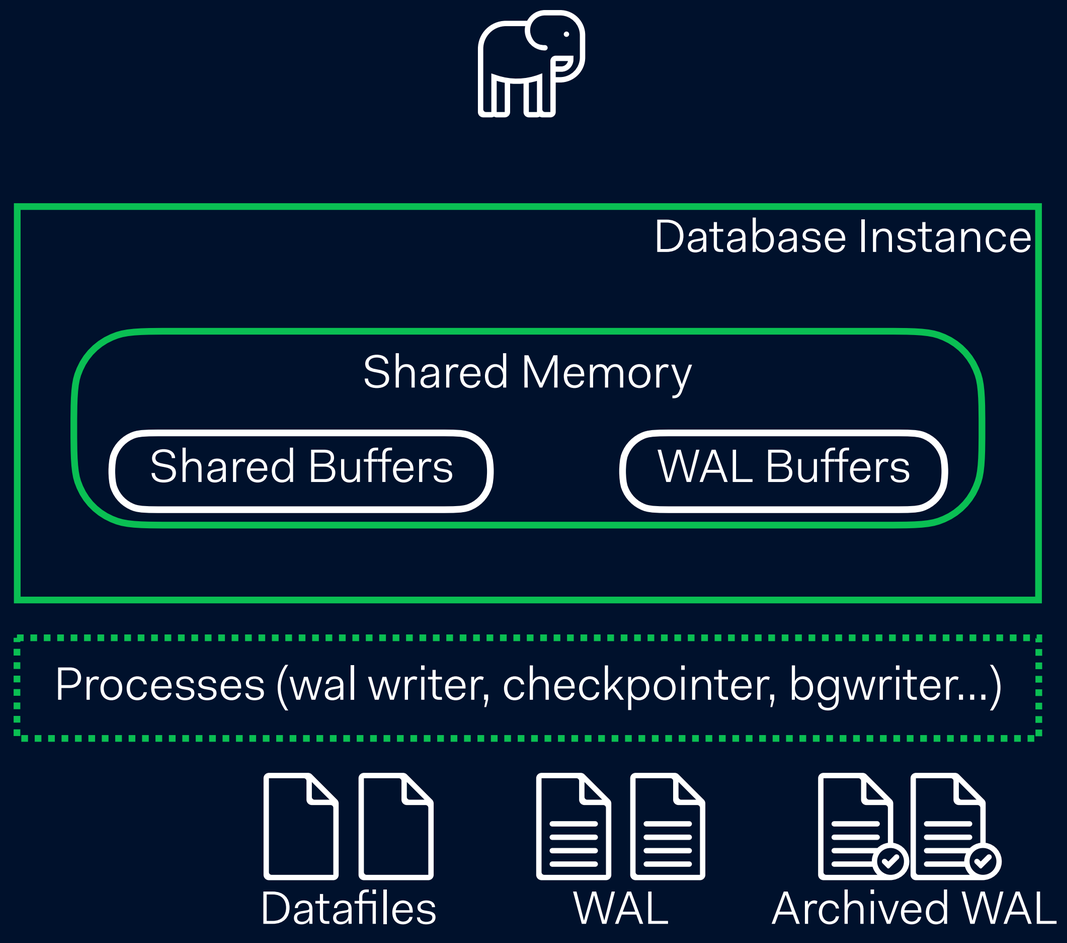


Architecture

- Database Server - physical or virtual
- Database Instance / Cluster (collection of Databases)
- Database (tables, indexes, schemas...)

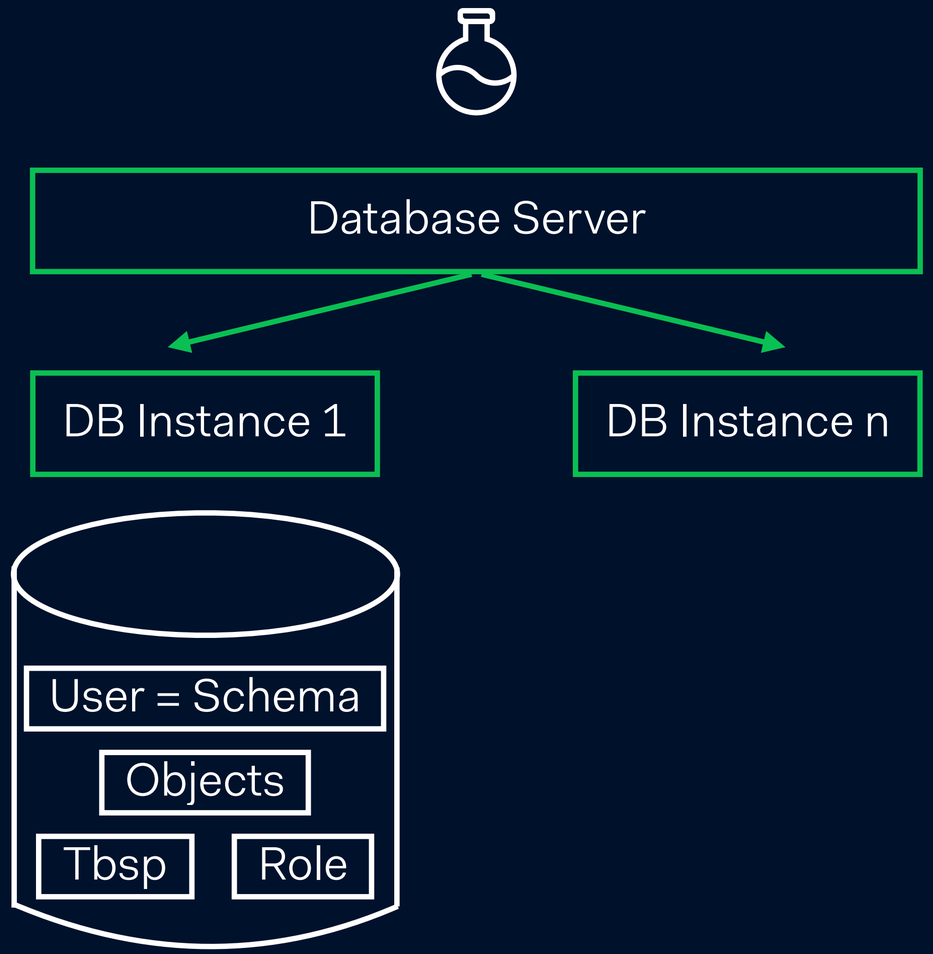
1 DB Server => 1+ DB Clusters

1 DB Cluster => 1+ DBs

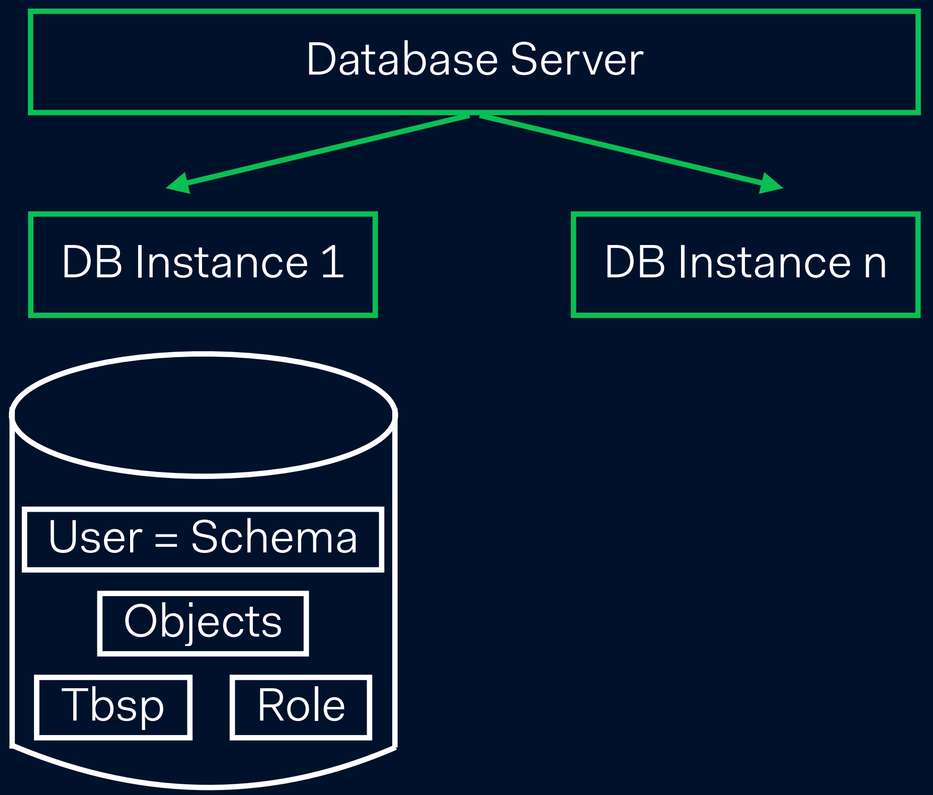


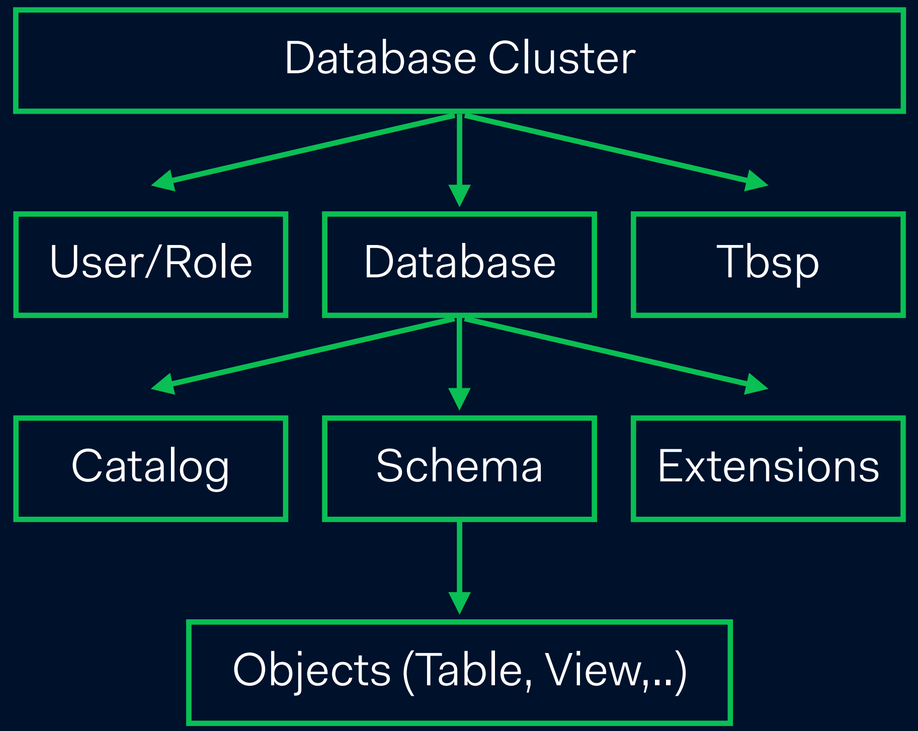
User =! Schema

User =! Schema


Database Server
DB Instance 1
DB Instance n
User = Schema
Objects
Tbsp
Role

User =! Schema


Database Server
DB Instance 1
DB Instance n
User = Schema
Objects
Tbsp
Role


Database Cluster
User/Role
Database
Tbsp
Catalog
Schema
Extensions
Objects (Table, View,..)

Tablespaces

Tablespaces

Tablespaces -> Logical units of storage

Datafiles -> Physical structures

Each Tablespace -> 1 or more Datafiles

Tablespaces

Tablespaces -> Logical units of storage

Datafiles -> Physical structures

Each Tablespace -> 1 or more Datafiles

`pg_global` and `pg_default`

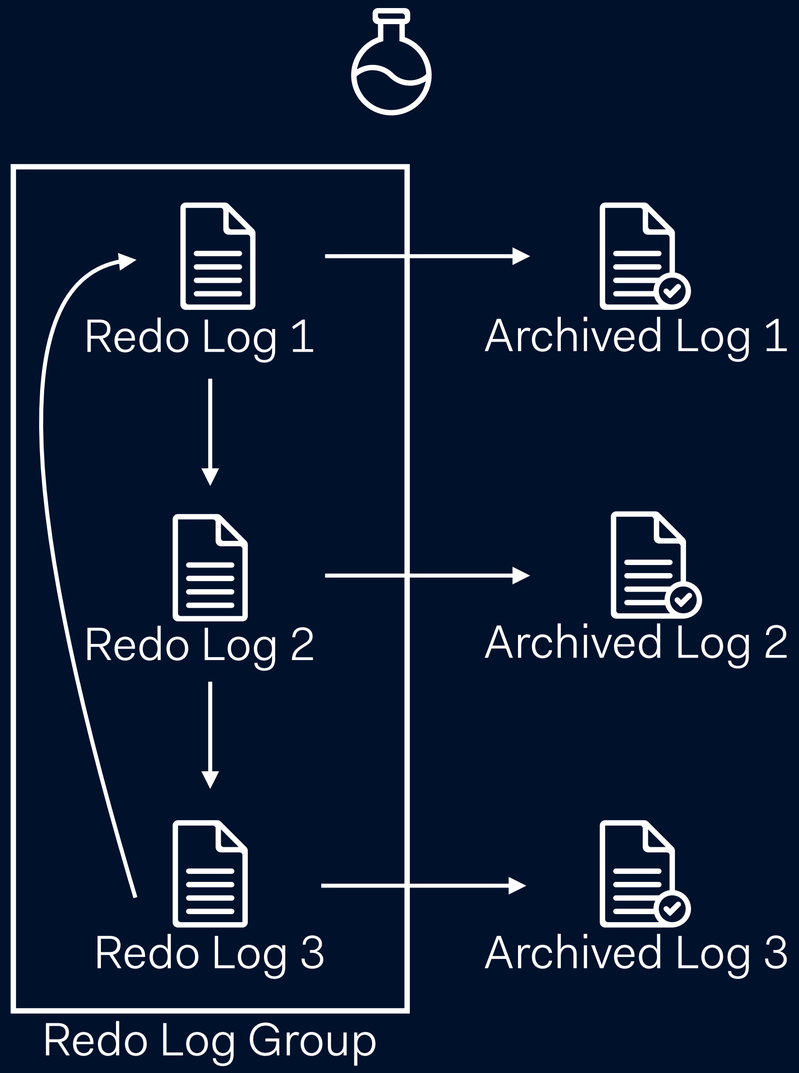
`$PGDATA/pg_tblspc`

Can be useful when:

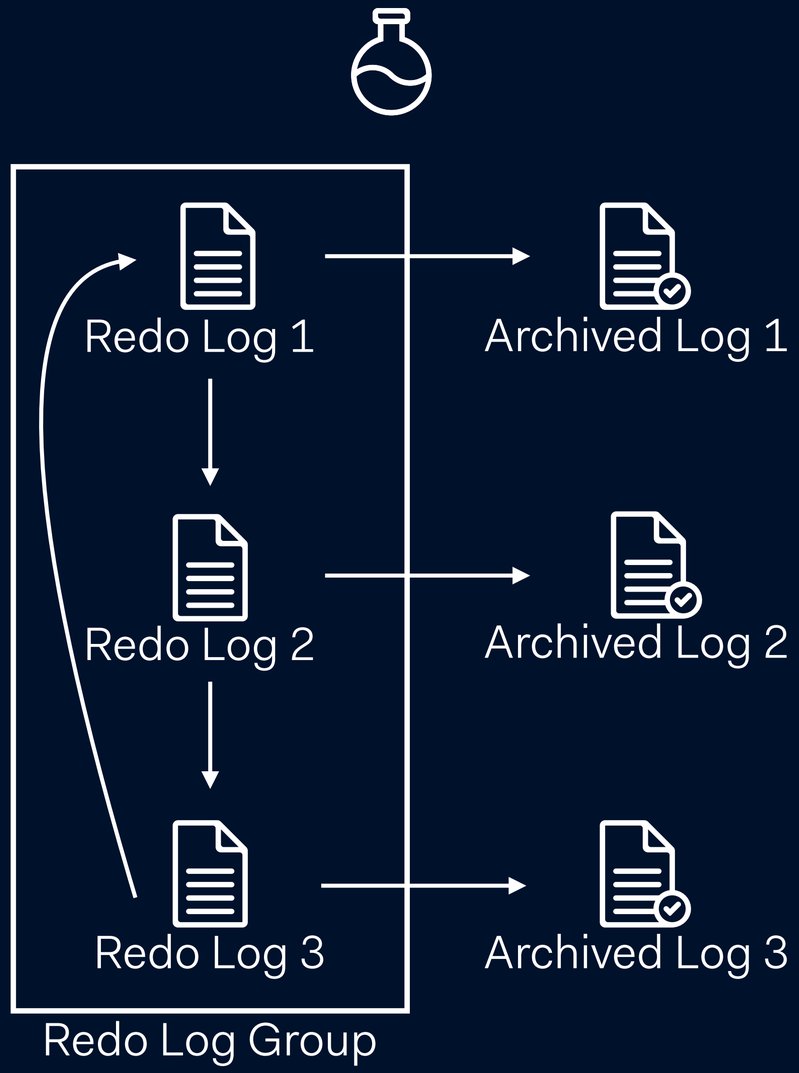
- Underlying volume cannot be extended
- Storage tiering/archiving (SSD vs HDD - historical data)

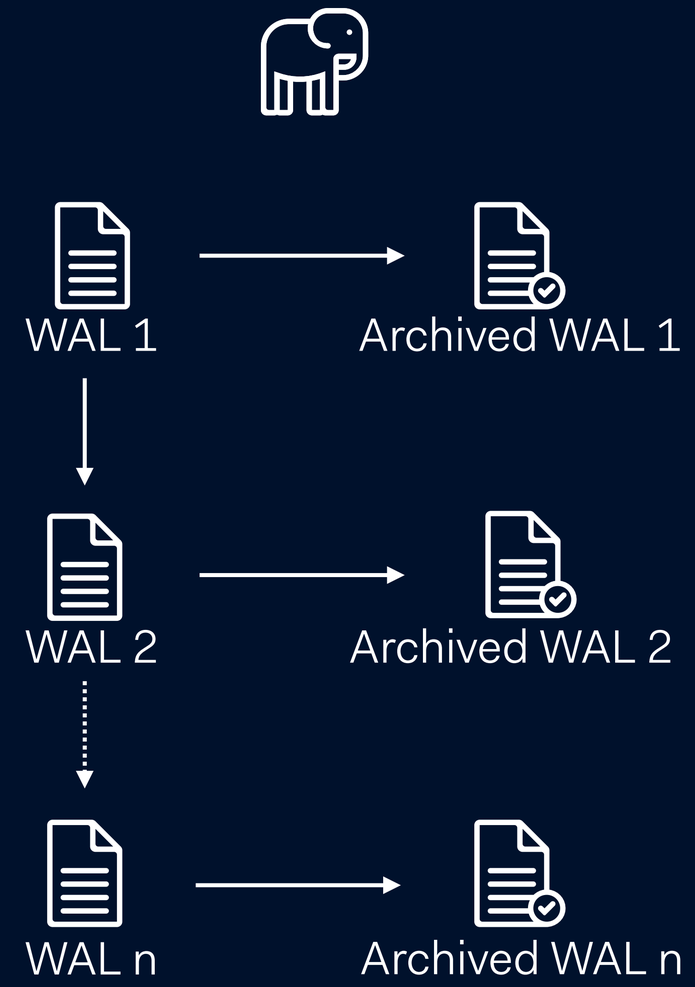
REDO vs WAL

REDO vs WAL

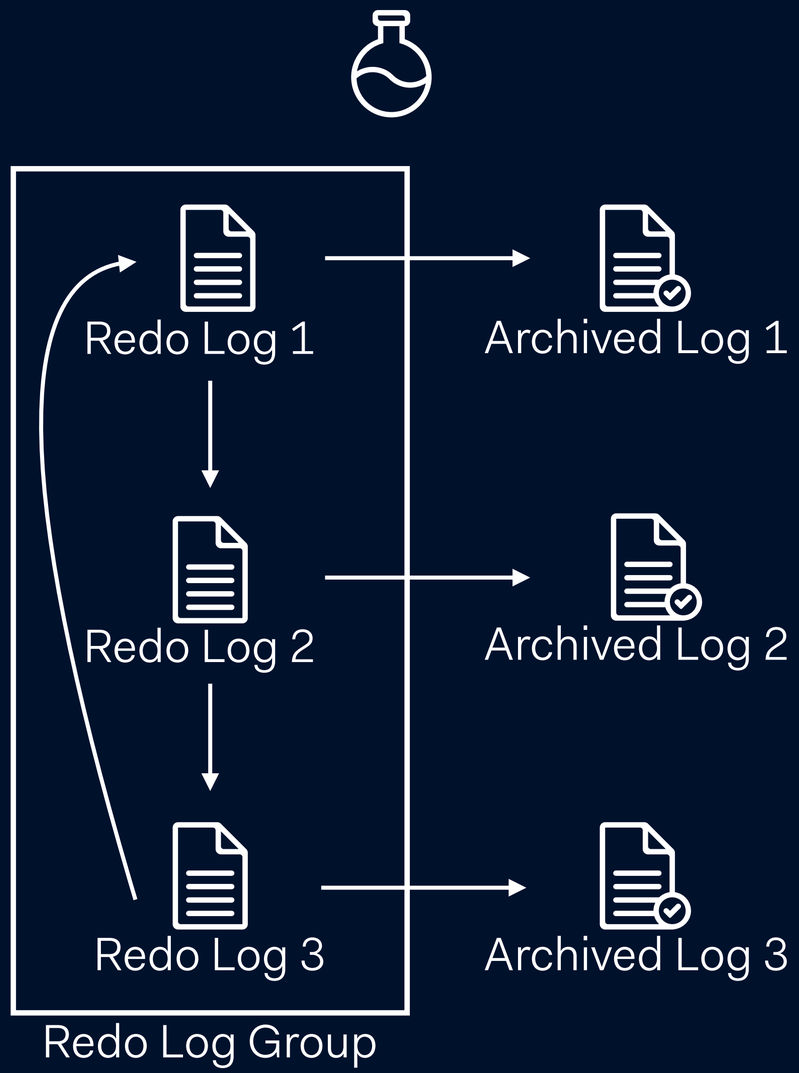

Redo Log 1
Archived Log 1
Redo Log 2
Archived Log 2
Redo Log 3
Archived Log 3
Redo Log Group

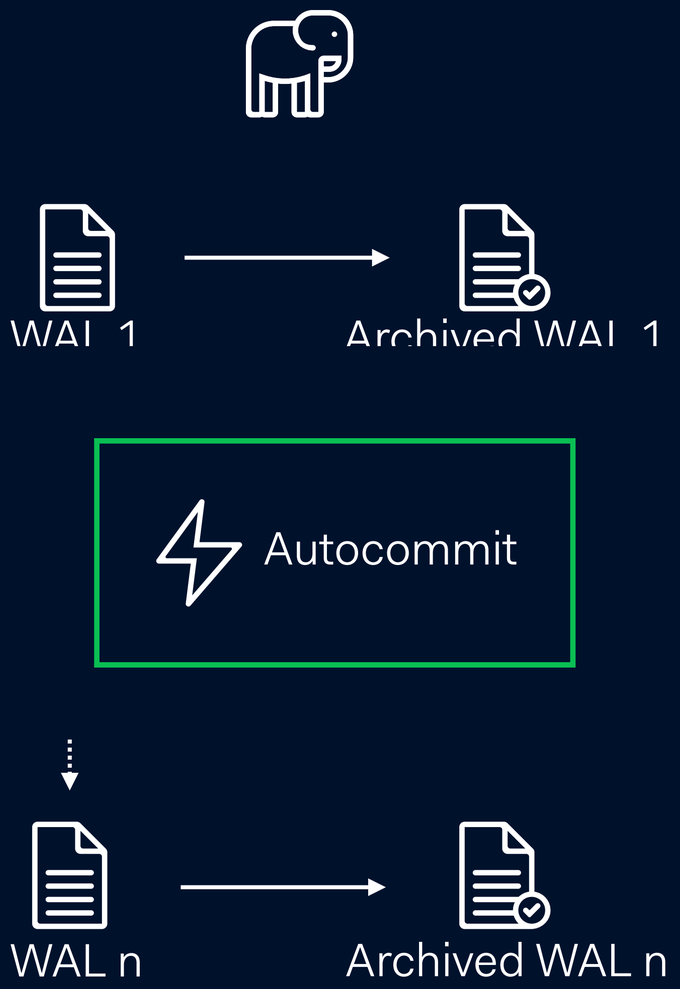
REDO vs WAL


Redo Log 1
Redo Log 2
Redo Log 3
Redo Log Group
Archived Log 1
Archived Log 2
Archived Log 3


WAL 1
WAL 2
WAL n
Archived WAL 1
Archived WAL 2
Archived WAL n

REDO vs WAL


Redo Log 1
Archived Log 1
Redo Log 2
Archived Log 2
Redo Log 3
Archived Log 3
Redo Log Group


WAL 1
Archived WAL 1
Autocommit
WAL n
Archived WAL n

Vacuum

~~Vacuum~~ Vaccum

~~Vacuum~~ ~~Vaccum~~ Vacuum

Vacuum

Vacuum

- Removes dead tuples
- Marks space as available to be reused

≠

Vacuum Full

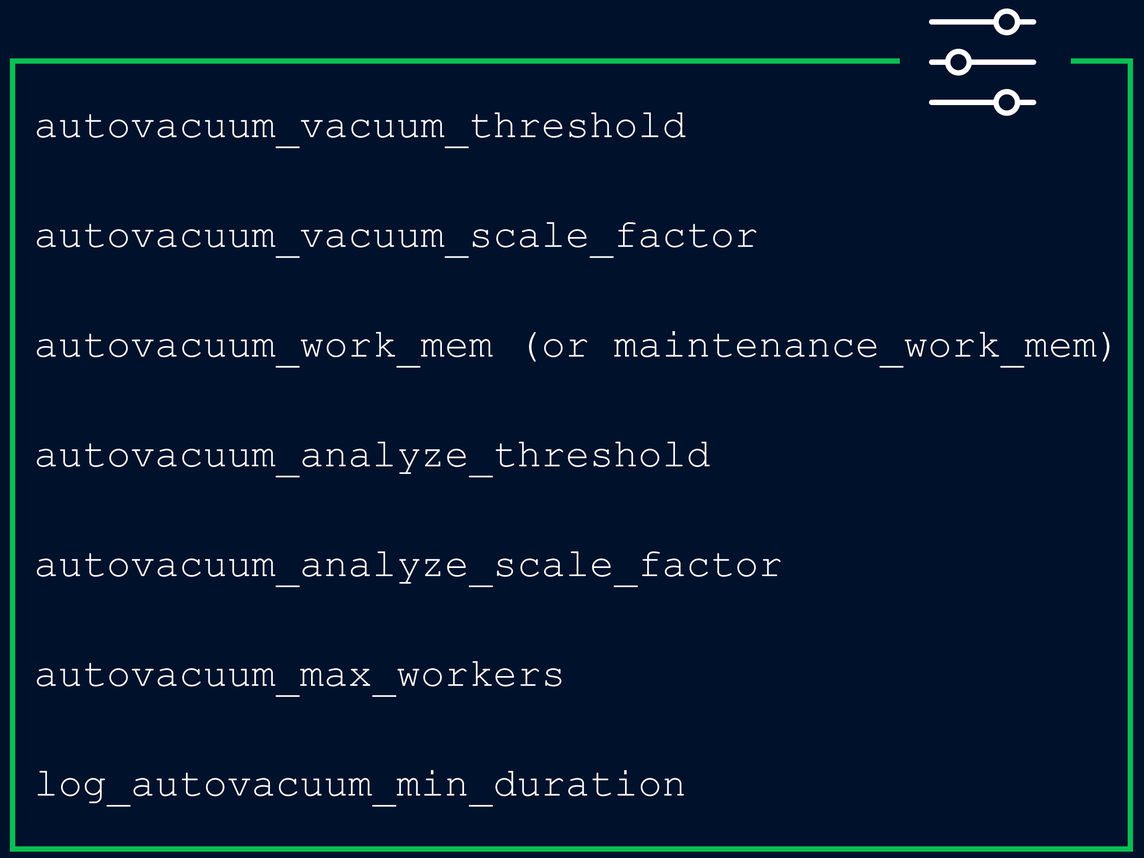
- Physically reorganizes the relations
- Reclaims disk space (but needs free disk space to run)
- Requires an **ACCESS EXCLUSIVE**!

Vacuum - why do we need it?

- Recover or reuse disk space - reduce bloat
- Update statistics - query planner
- Update visibility map
- Prevent transaction ID wraparound or multixact ID wraparound

Autovacuum

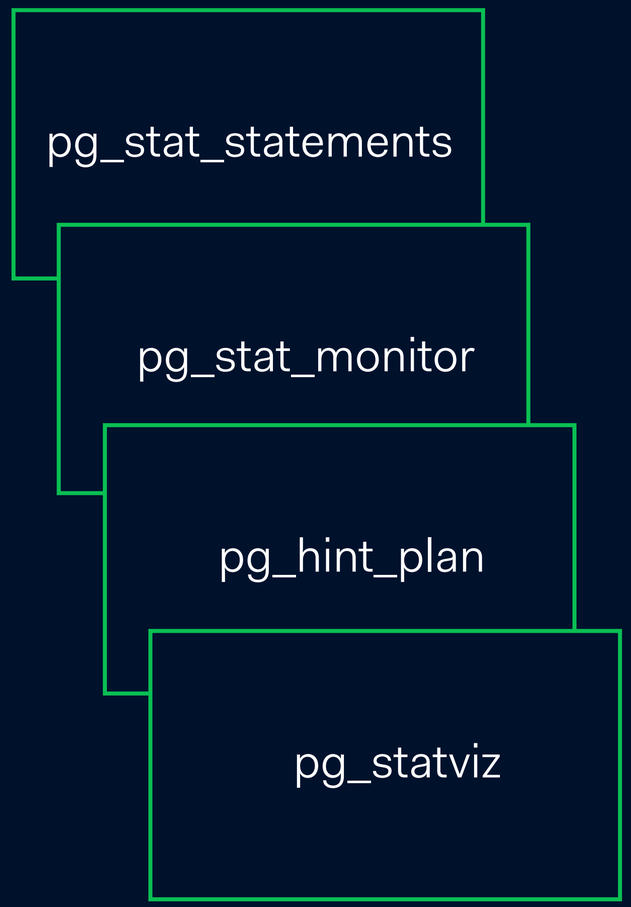
- “Automatic” vacuum -> triggered when dead tuples > 0.2 * table size + 50 (default)
- Autovacuum = vacuum + analyze
- Do not disable it, tune it!



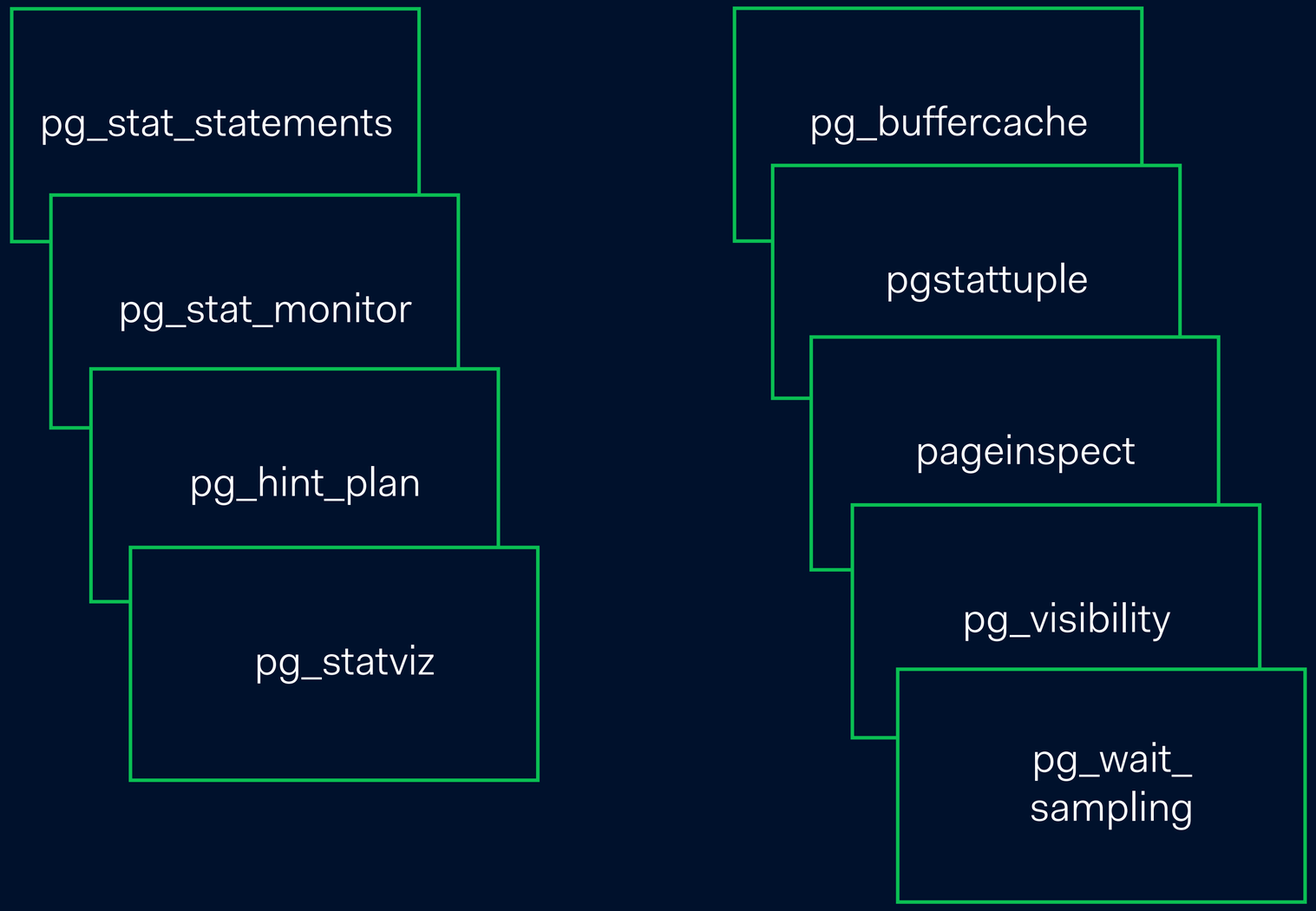
Extensions

- Which one?
- How to install?
- Support?

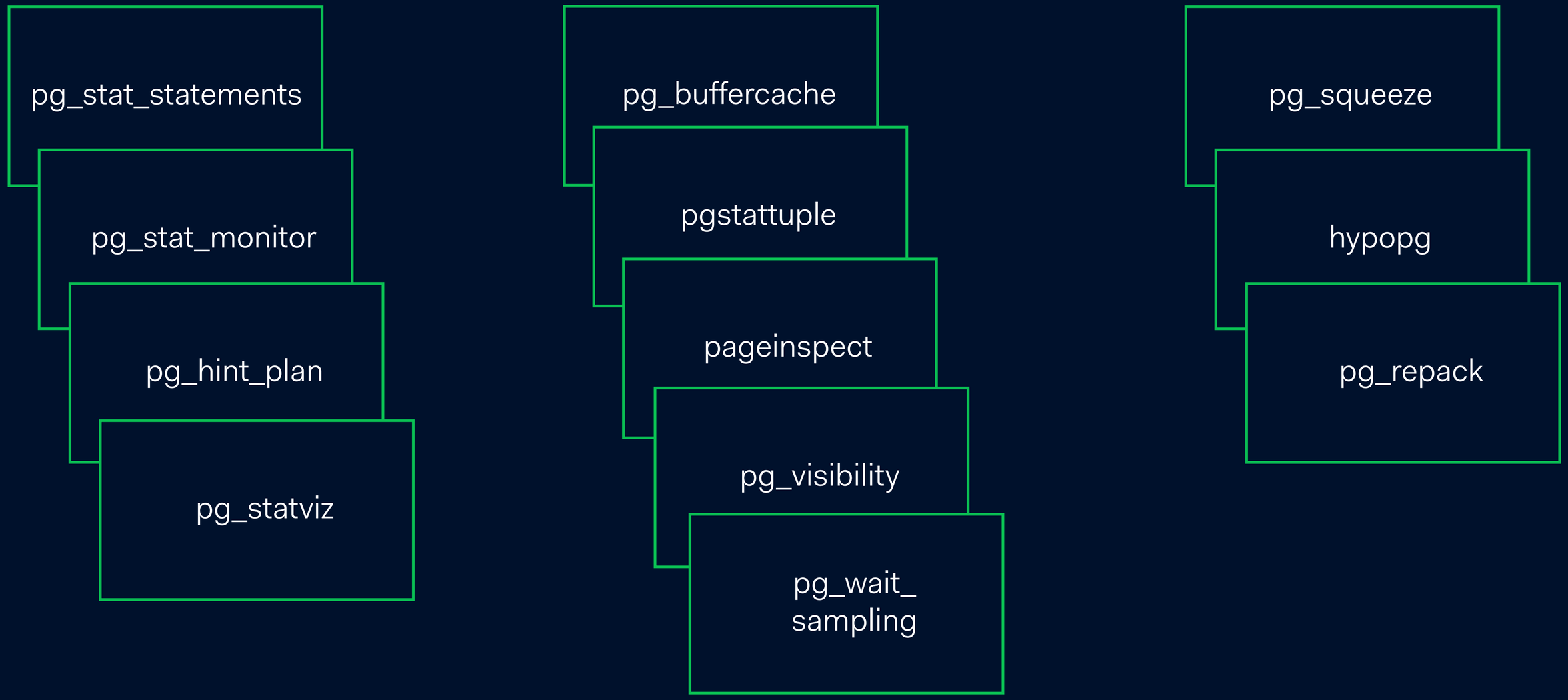
Extensions



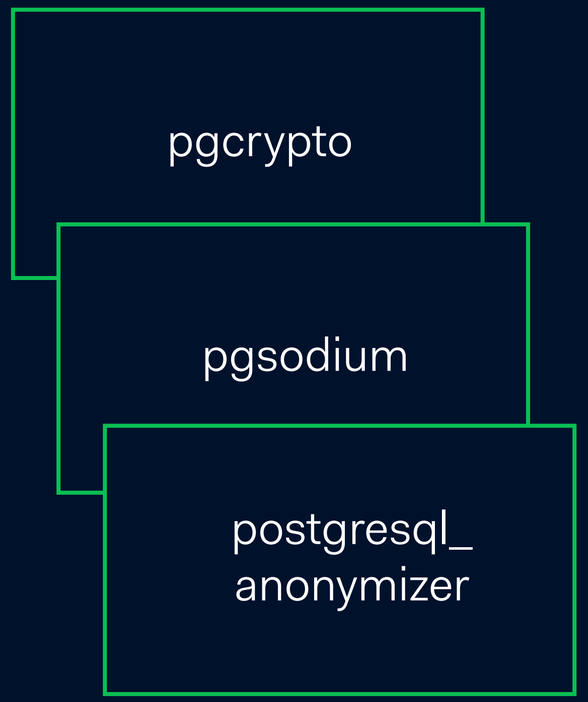
Extensions


pg_stat_statements
pg_stat_monitor
pg_hint_plan
pg_statviz
pg_buffercache
pgstattuple
pageinspect
pg_visibility
pg_wait_
sampling

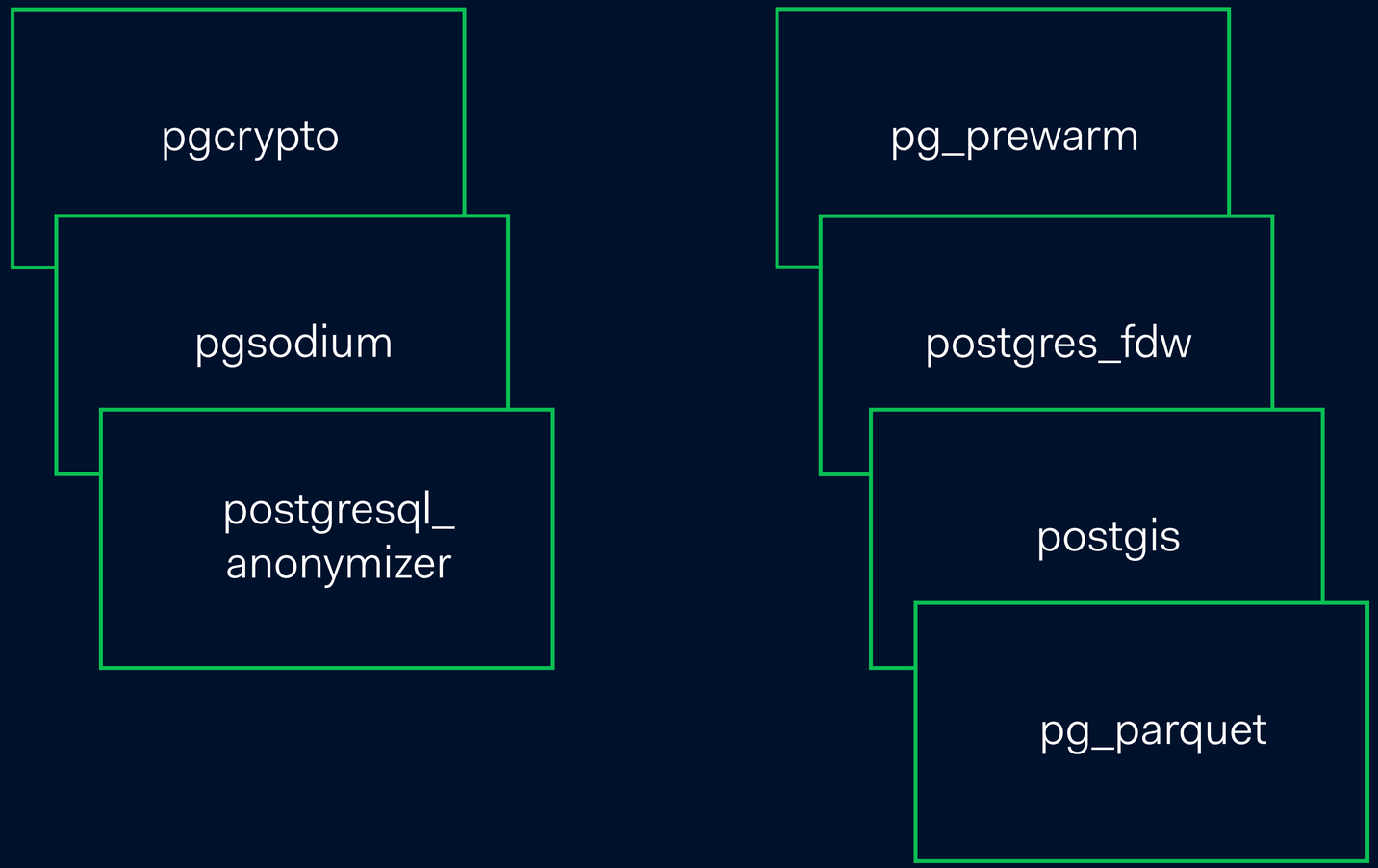
Extensions


pg_stat_statements
pg_stat_monitor
pg_hint_plan
pg_statviz
pg_buffercache
pgstattuple
pageinspect
pg_visibility
pg_wait_
sampling
pg_squeeze
hypopg
pg_repack

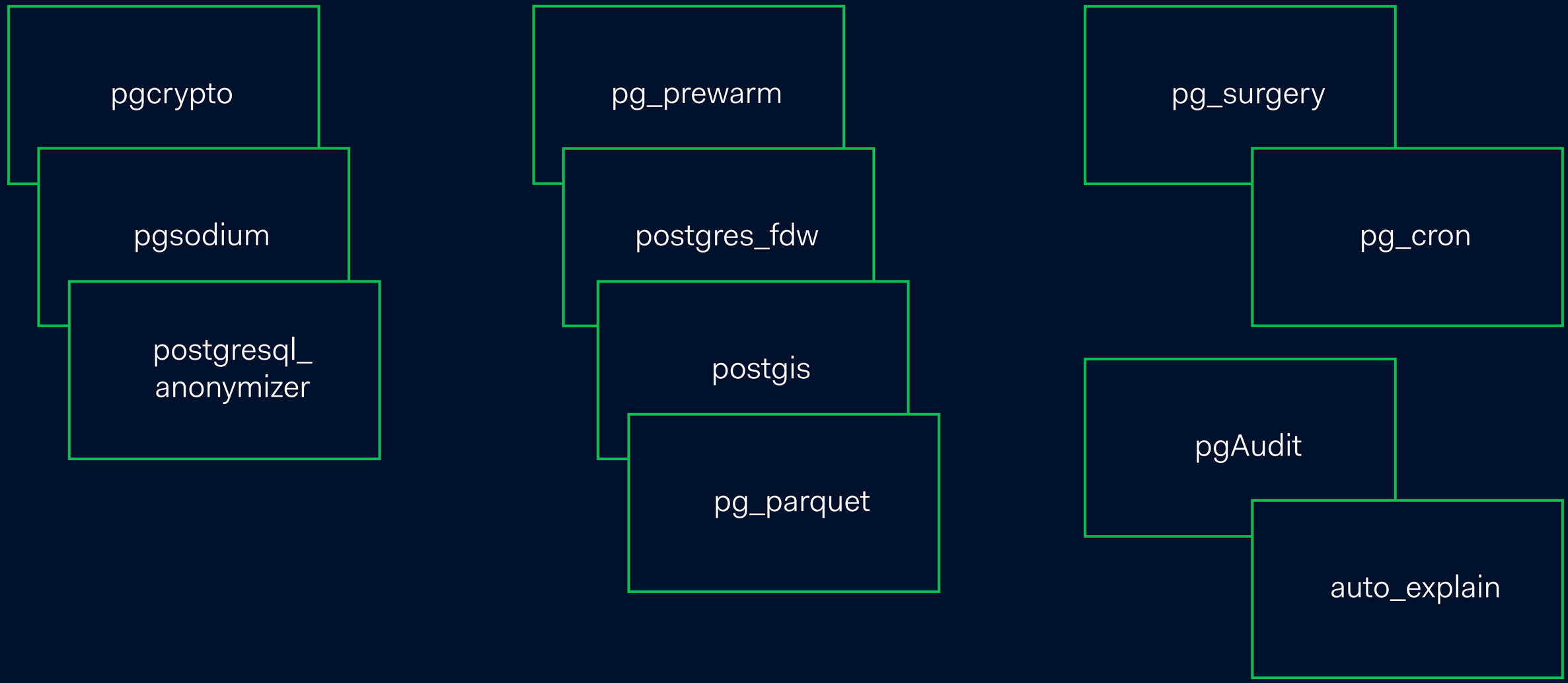
Extensions



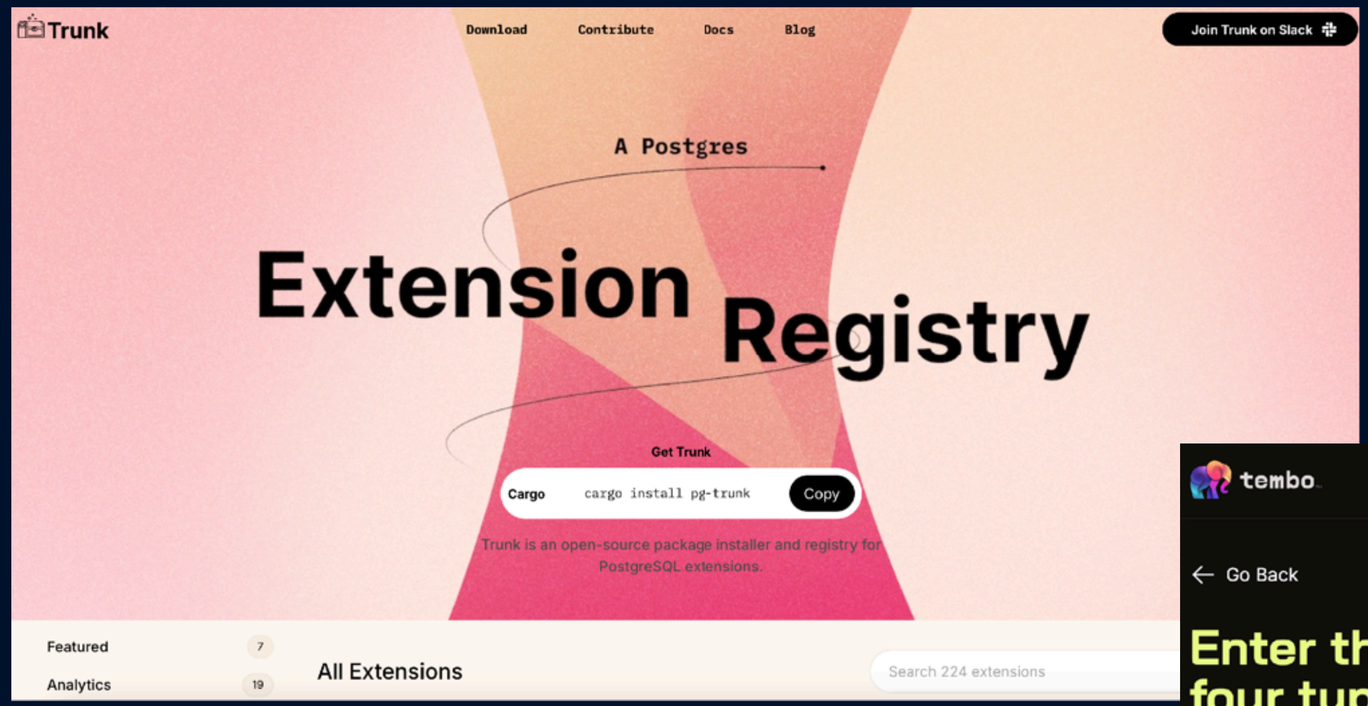
Extensions


pgcrypto
pgsodium
postgresql_
anonymizer
pg_prewarm
postgres_fdw
postgis
pg_parquet

Extensions


pgcrypto
pgsodium
postgresql_
anonymizer
pg_prewarm
postgres_fdw
postgis
pg_parquet
pg_surgery
pg_cron
pgAudit
auto_explain

Extensions


Trunk
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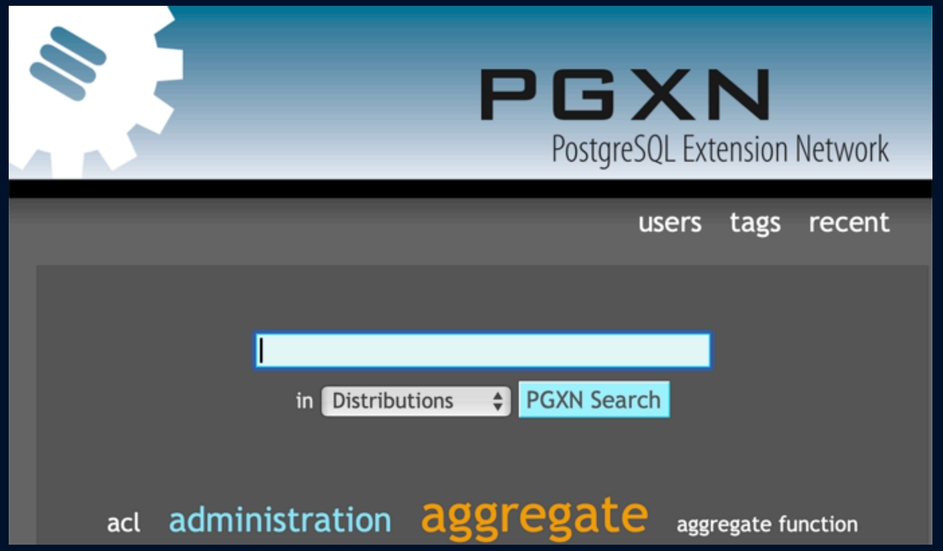
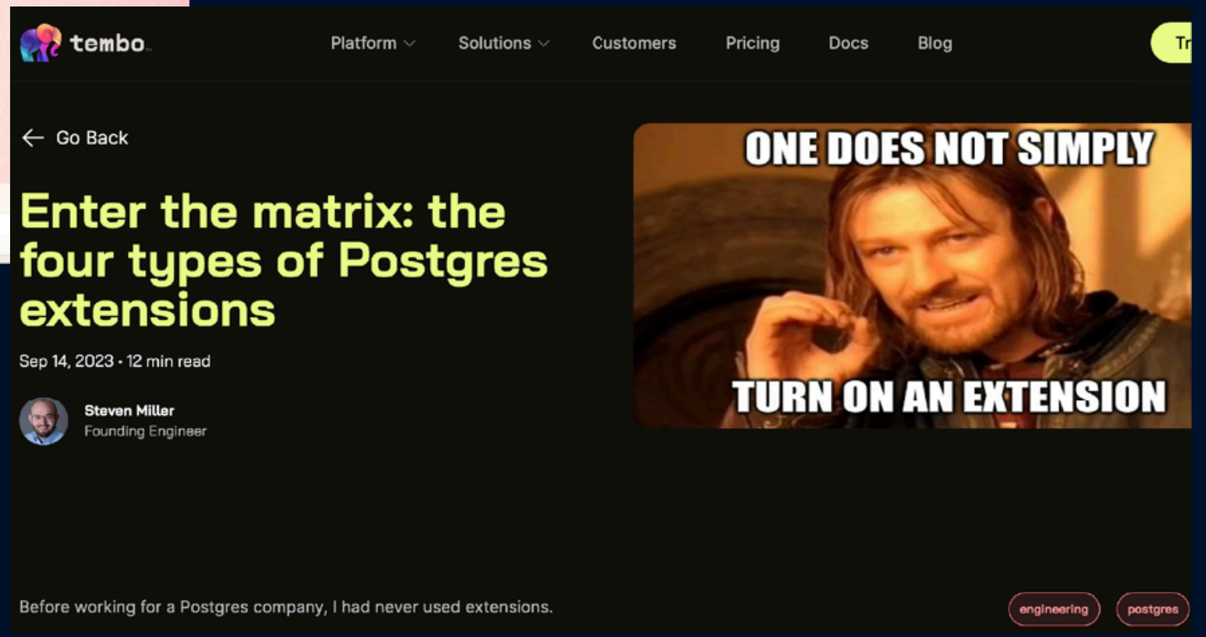
A Postgres
Extension Registry
Get Trunk
Cargo
cargo install pg-trunk
Copy
Trunk is an open-source package installer and registry for PostgreSQL extensions.
Featured 7
Analytics 19
All Extensions
Search 224 extensions


PGXN
PostgreSQL Extension Network
users tags recent
in Distributions
PGXN Search
acl administration aggregate aggregate function


tembo
Platform
Solutions
Customers
Pricing
Docs
Blog
Go Back
Enter the matrix: the four types of Postgres extensions
Sep 14, 2023 · 12 min read
Steven Miller
Founding Engineer
ONE DOES NOT SIMPLY
TURN ON AN EXTENSION
Before working for a Postgres company, I had never used extensions.
engineering
postgres

And what about the rest?

- Backups
- High Availability
- Monitoring

Backups

RMAN - Oracle Recovery Manager

datapump

pg_basebackup

pgBackRest

barman

...

pg_dump

High Availability

Real Application Clusters (RAC)

Dataguard - Physical Replication

GoldenGate - Logical Replication

Oracle Streams

~~RAC~~

Physical Replication

(Patroni, repmgr)

Logical Replication

Monitoring

Oracle Enterprise Manager (OEM)

Extensions

(pg_stat_statements, pg_monitor, ...)

Prometheus

Grafana

pgBadger - log analysis

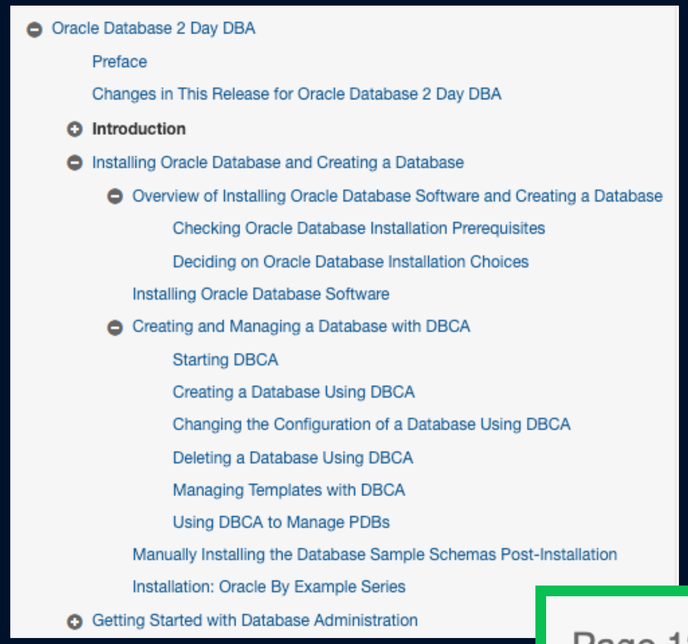
...

What I Love and What I (do not) Miss

Never Looked Back

- Installation Process
- Patching (PSU / BP -> RU / RUR)
- Upgrades
- Oracle Support
- Oracle Documentation
- Licensing Management

Installation



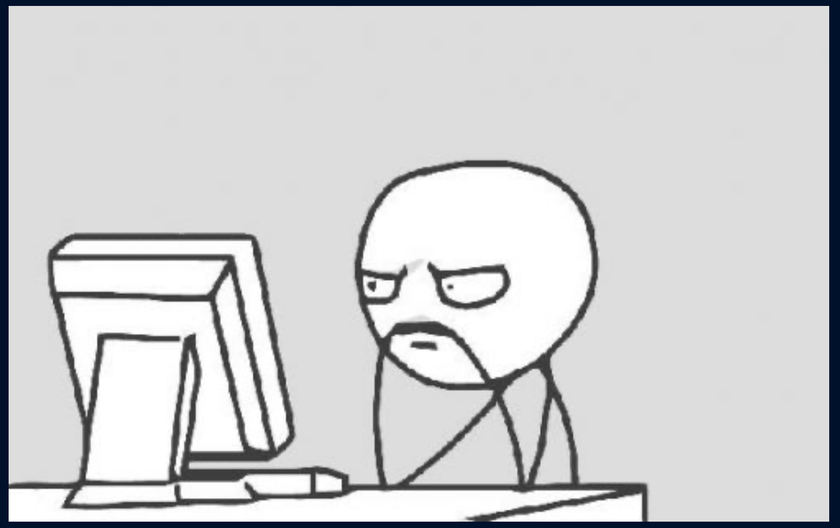
Page 12 of 340

Source: docs.oracle.com

Installation

- Oracle Database 2 Day DBA
  - Preface
  - Changes in This Release for Oracle Database 2 Day DBA
  - **Introduction**
  - Installing Oracle Database and Creating a Database
    - Overview of Installing Oracle Database Software and Creating a Database
      - Checking Oracle Database Installation Prerequisites
      - Deciding on Oracle Database Installation Choices
    - Installing Oracle Database Software
    - Creating and Managing a Database with DBCA
      - Starting DBCA
      - Creating a Database Using DBCA
      - Changing the Configuration of a Database Using DBCA
      - Deleting a Database Using DBCA
      - Managing Templates with DBCA
      - Using DBCA to Manage PDBs
    - Manually Installing the Database Sample Schemas Post-Installation
    - Installation: Oracle By Example Series
  - Getting Started with Database Administration

Page 12 of 340



Source: docs.oracle.com

Installation

Pre-reqs

Installation

Pre-reqs

/etc/sysctl.conf

```
fs.file-max = 6815744
kernel.sem = 250 32000 100 128
kernel.shmmni = 4096
kernel.shmall = 1073741824
kernel.shmmax = 4398046511104
kernel.panic_on_oops = 1
net.core.rmem_default = 262144
net.core.rmem_max = 4194304
net.core.wmem_default = 262144
net.core.wmem_max = 1048576
net.ipv4.conf.all.rp_filter = 2
net.ipv4.conf.default.rp_filter = 2
fs.aio-max-nr = 1048576
net.ipv4.ip_local_port_range = 9000 65500
```

Installation

Pre-reqs

/etc/sysctl.conf

/etc/security/limits.d/oracle-rdbms-server-<version>-preinstall.conf

Installation

Pre-reqs

/etc/sysctl.conf

/etc/security/limits.d/oracle-rdbms-server-<version>-preinstall.conf

Additional required packages

```
yum install binutils
yum install compat-libstdc++-33
yum install compat-libstdc++-33.i686
yum install gcc
yum install gcc-c++
yum install glibc
yum install glibc.i686
yum install glibc-devel
yum install glibc-devel.i686
yum install ksh
yum install libgcc
yum install libgcc.i686
```

Installation

Pre-reqs

/etc/sysctl.conf

/etc/security/limits.d/oracle-rdbms-server-<version>-preinstall.conf

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yum install glibc.i686
yum install glibc-devel
yum install glibc-devel.i686
yum install ksh
yum install libgcc
yum install libgcc.i686
```

```
yum install libstdc++
yum install libstdc++.i686
yum install libstdc++-devel
yum install libstdc++-devel.i686
yum install libaio
yum install libaio.i686
yum install libaio-devel
yum install libaio-devel.i686
yum install libXext
yum install libXext.i686
yum install libXtst
yum install libXtst.i686
yum install libX11
```

Installation

Pre-reqs

/etc/sysctl.conf

/etc/security/limits.d/oracle-rdbms-server-<version>-preinstall.conf

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```

```
yum install libstdc++
yum install libstdc++.i686
yum install libstdc++-devel
yum install libstdc++-devel.i686
yum install libaio
yum install libaio.i686
yum install libaio-devel
yum install libaio-devel.i686
yum install libXext
yum install libXext.i686
yum install libXtst
yum install libXtst.i686
yum install libX11
```

```
yum install libX11.i686
yum install libXau
yum install libXau.i686
yum install libxcb
yum install libxcb.i686
yum install libXi
yum install libXi.i686
yum install make
yum install sysstat
yum install unixODBC
yum install unixODBC-devel
yum install zlib-devel
yum install zlib-devel.i686
```

Installation

Pre-reqs

/etc/sysctl.conf

/etc/security/limits.d/oracle-rdbms-server-<version>-preinstall.conf

Additional required packages

OS users and groups

Installation

Pre-reqs

/etc/sysctl.conf

/etc/security/limits.d/oracle-rdbms-server-<version>-preinstall.conf

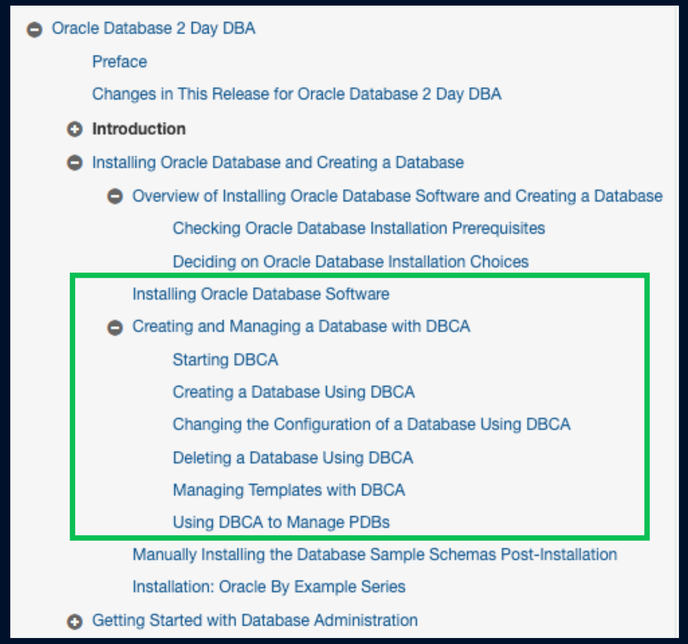
Additional required packages

OS users and groups

Next: Installation

Installation

Installation - dbca



Installation

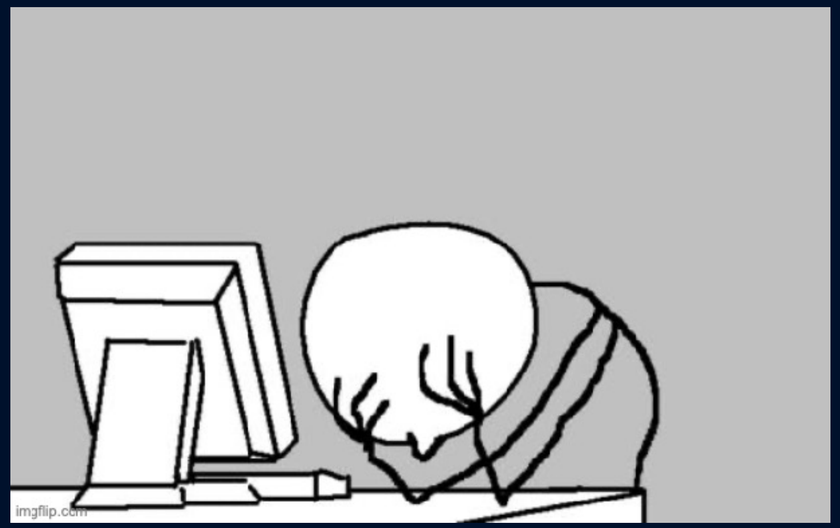
Installation - dbca

```
[oracle@host01~]# dbca
```

Installation

Installation - dbca

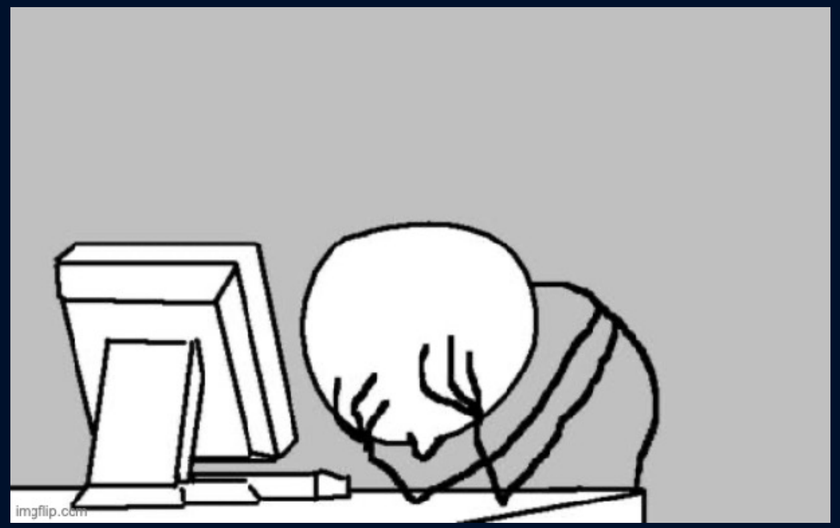
```
[oracle@host01~]# dbca
Error: Can't open display:
```

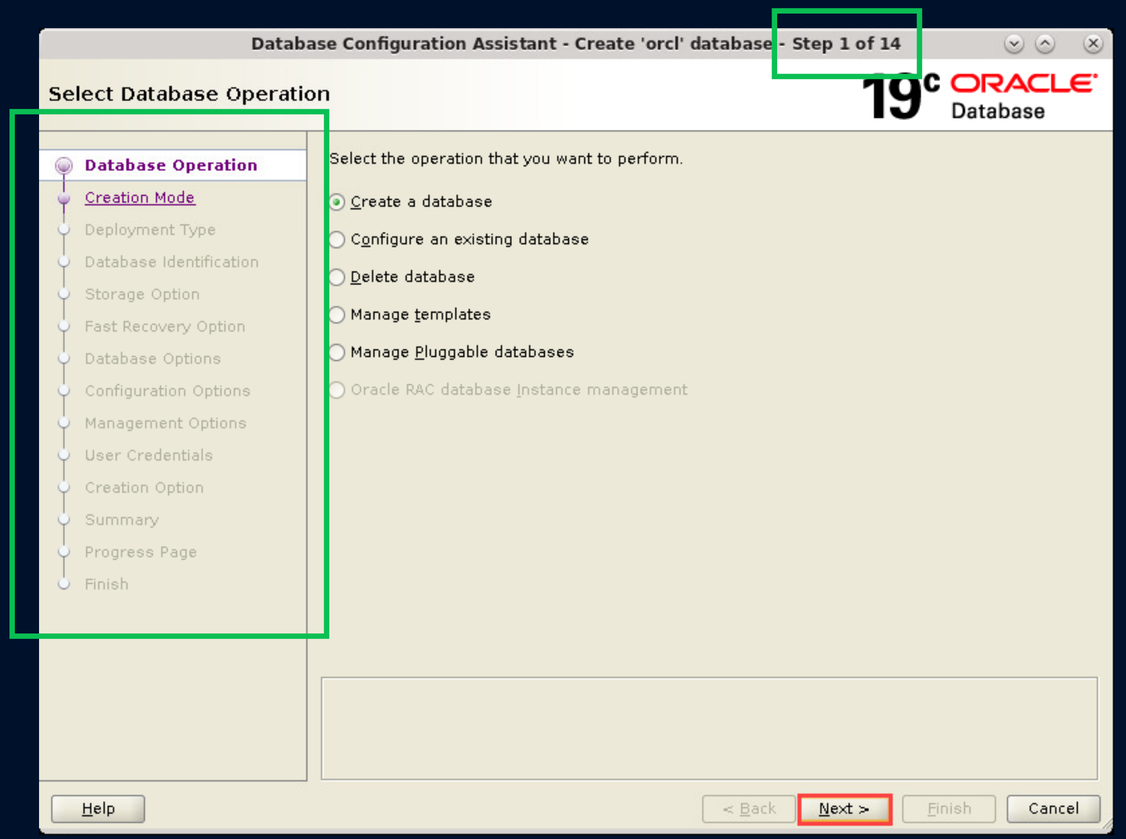


Installation

Installation - dbca

```
[oracle@host01~]# dbca
Error: Can't open display:
```



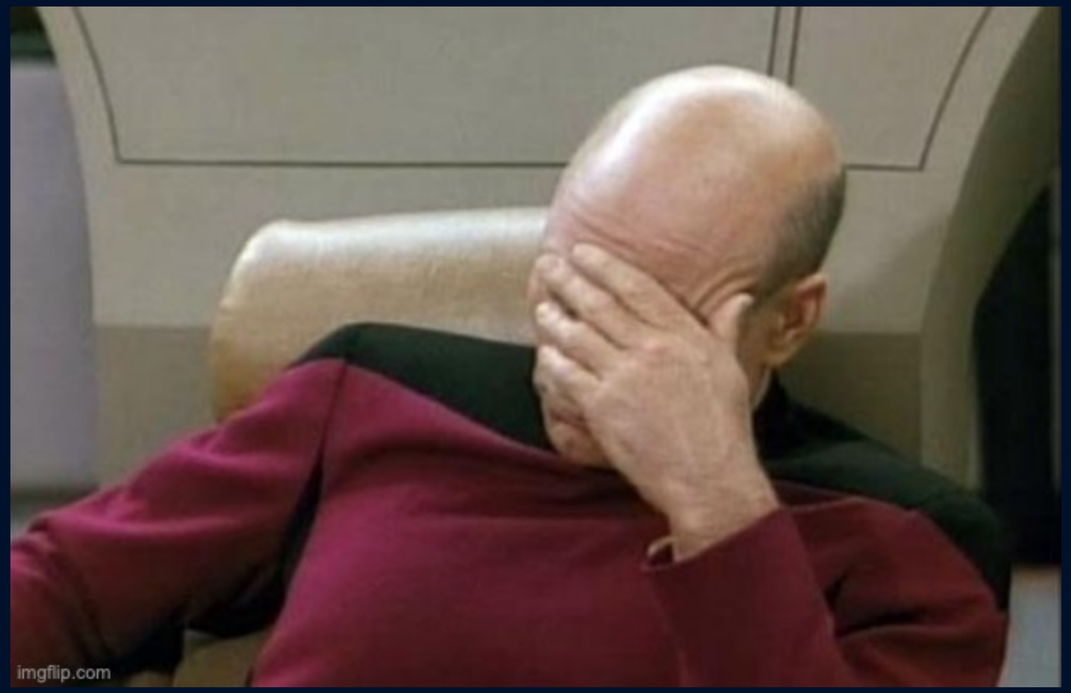


Source: docs.oracle.com

Installation

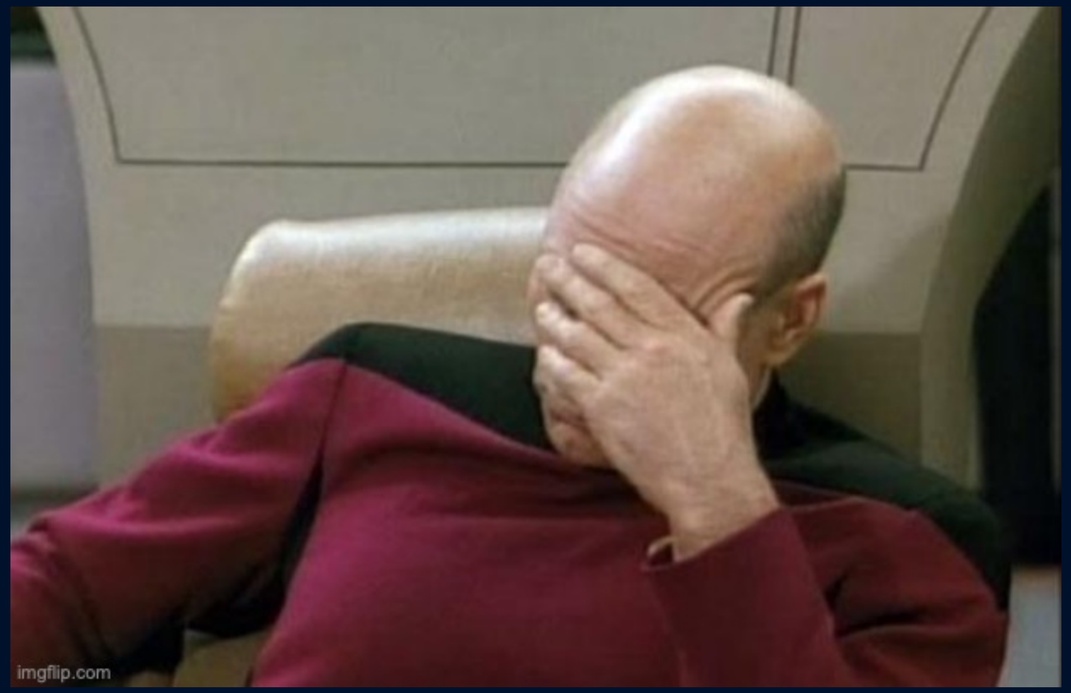
Installation

~~Installation~~ Patching



Installation

~~Installation~~ Patching



Oracle Base Version 19.3

+

DB RU/PSU

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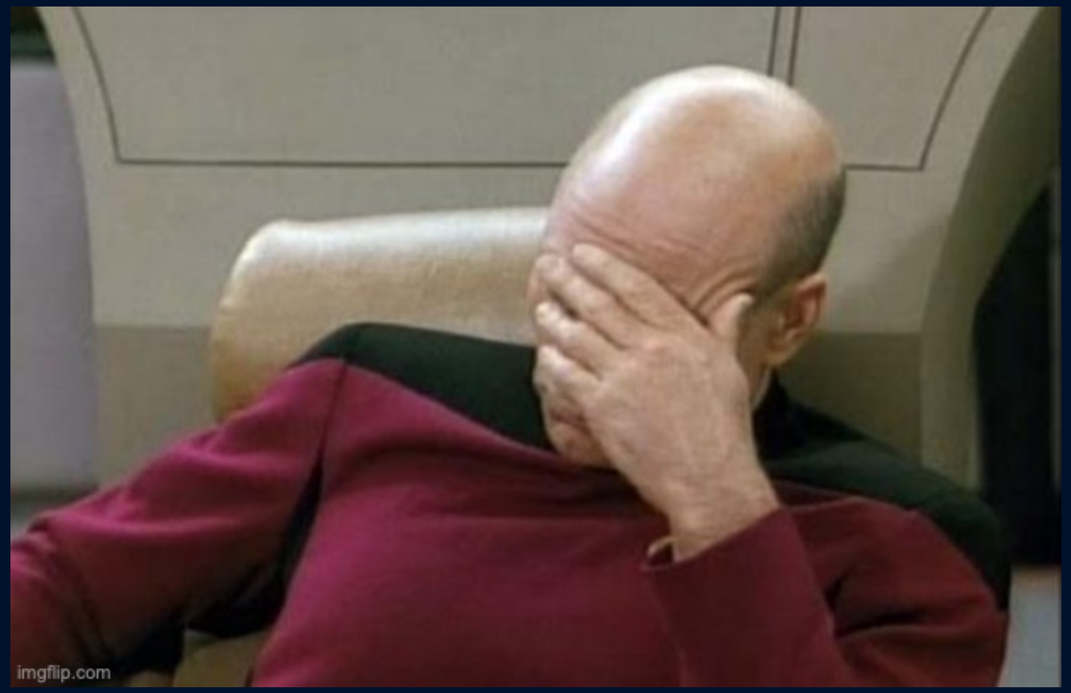
Oracle DB 19.10

Installation

~~Installation~~ ~~Patching~~ Post Installation



/etc/oratab

Installation

Installation

```
# Configure the repository

# Install PostgreSQL
 yum install postgresql17-server

# Initialize the database and enable PostgreSQL service
/usr/pgsql-17/bin/postgresql-17-setup initdb
systemctl enable postgresql-17

# Start PostgreSQL service
systemctl start postgresql-17
```

Patching

Patching

Find the (correct) PSU/BP

Patching

Find the (correct) PSU/BP → Read the README

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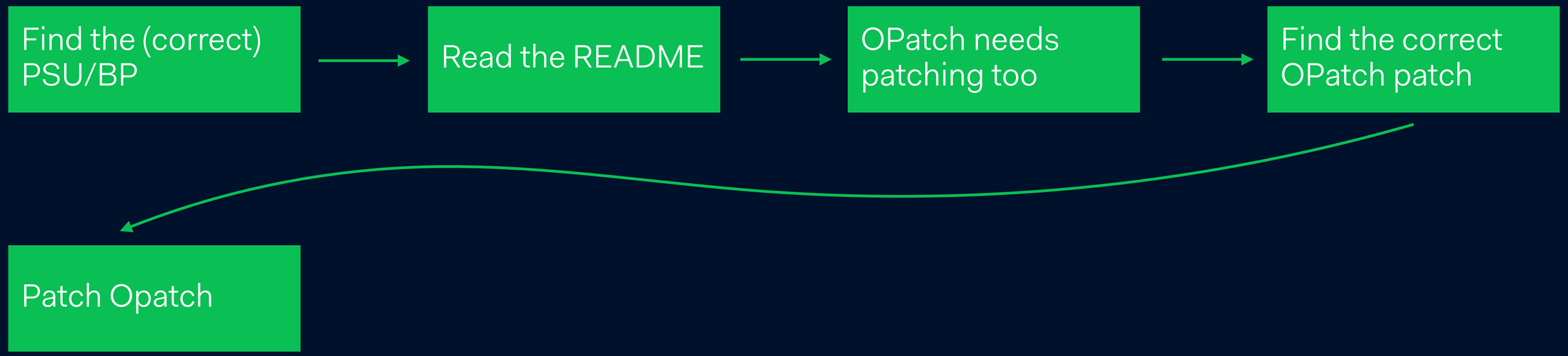
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Patching

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NO! Patch conflits!

Need to rollback a OneOff Patch I applied due to a bug last month.

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Patching

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Oh wait, how about OCW / G patch?

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OneOff patch removed!

What was I doing in the 1st place?

Patching (Minor Upgrades)

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```
# Stop PostgreSQL

# Update the postgresql package
yum update postgresql17

# Start PostgreSQL
```

Licensing and Support

Licensing and Support

~~Licensing~~ and Support

Things I still miss

- Active Session History (ASH)
- Automatic Workload Repository (AWR)
- Objects (and users) creation/modification time
- Session Tracing
- SQL Plan Management (SPM)
- Invisible Indexes
- FLASHBACK

What I immediately loved about PostgreSQL?

- PostgreSQL = **Freedom of choice**
- Extensibility and Innovation
- Easy to install
- Easy to perform minor upgrades
- Physical replication and logical replication out of the box
- Documentation
- Community Support
- Meetups, PGDay, Conferences

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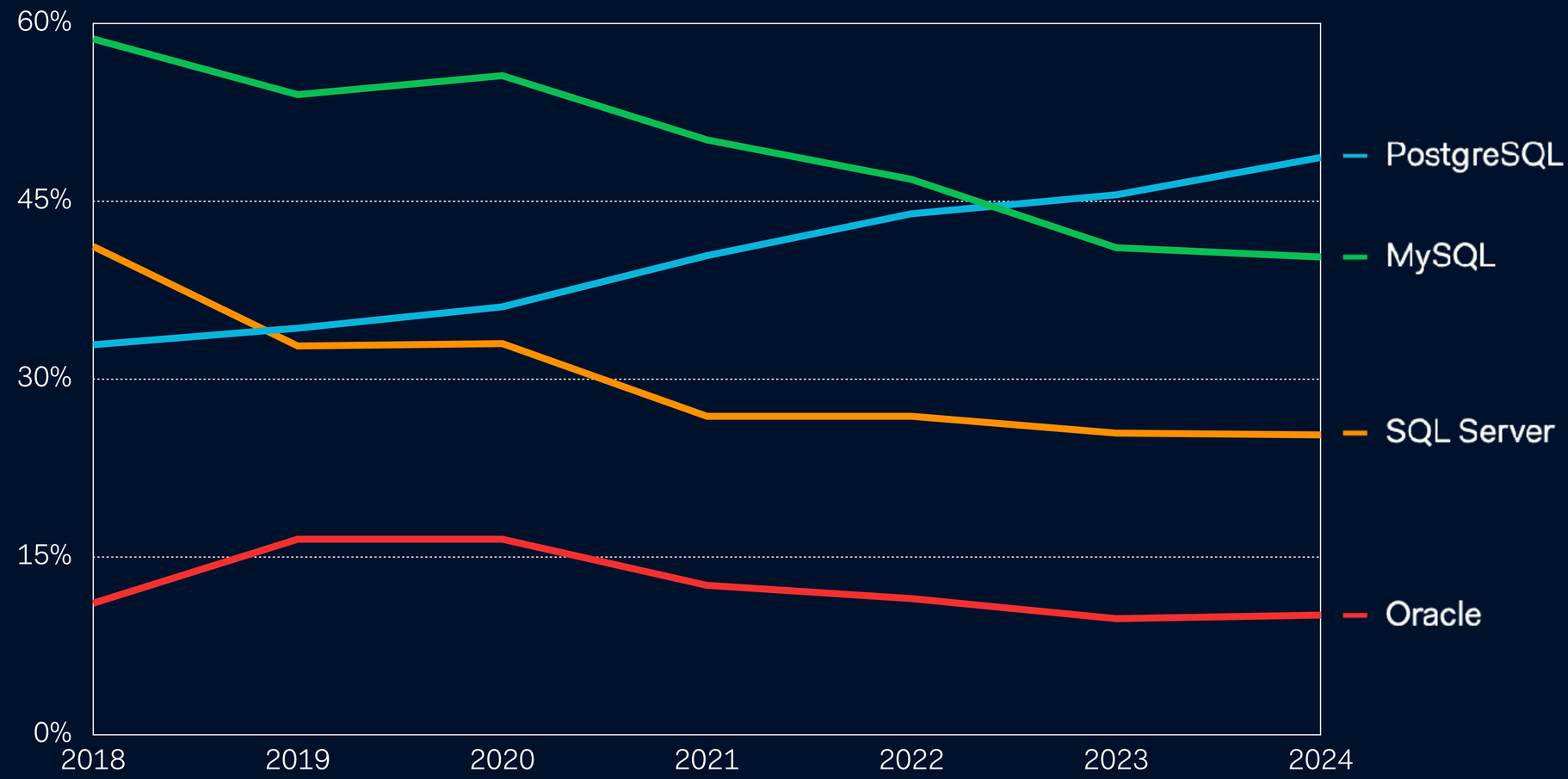
Adoption

Most popular technologies - Databases

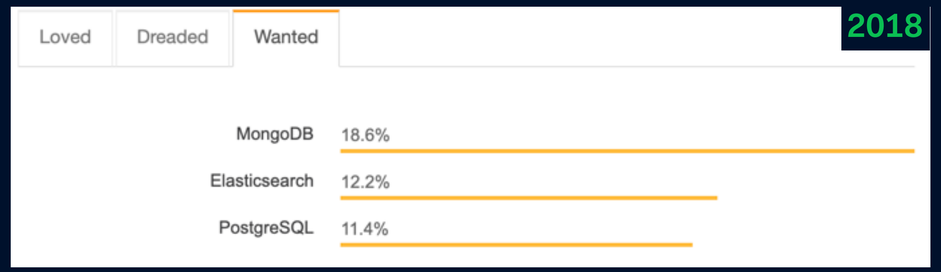
Data source: Stackoverflow Developer Survey 2018, 2019, 2020, 2021, 2022, 2023 and 2024



Adoption

Loved / Wanted / Desired - Databases

Data source: Stackoverflow Developer Survey 2018 to 2024



Adoption

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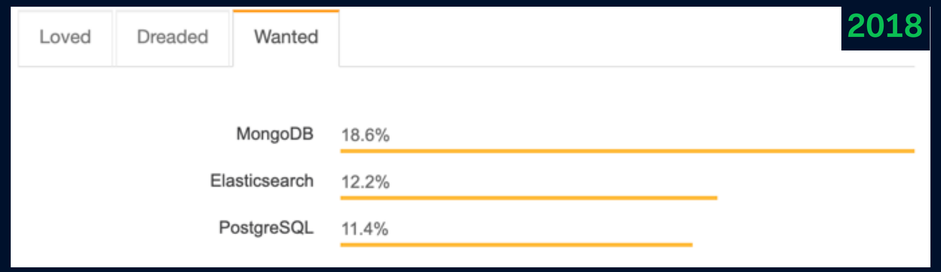

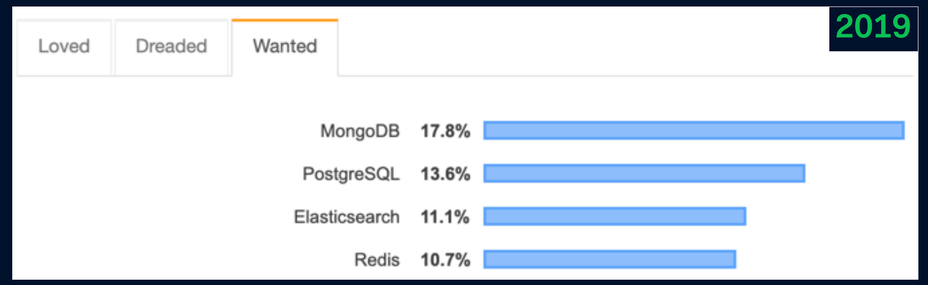

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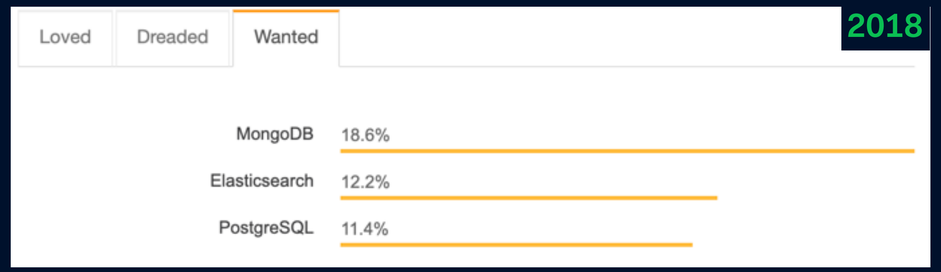

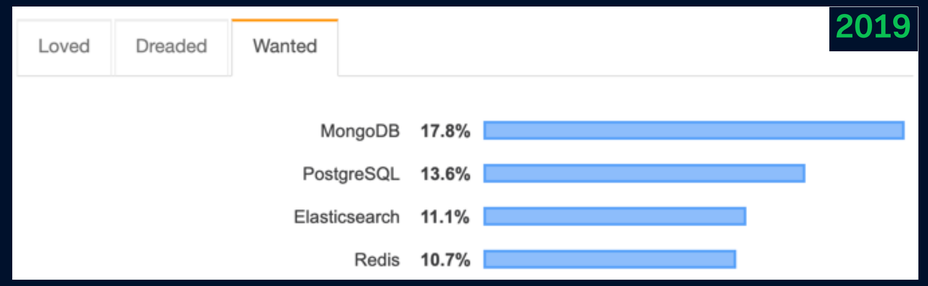

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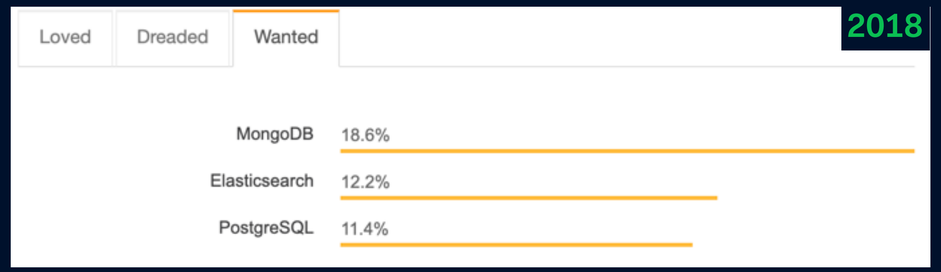

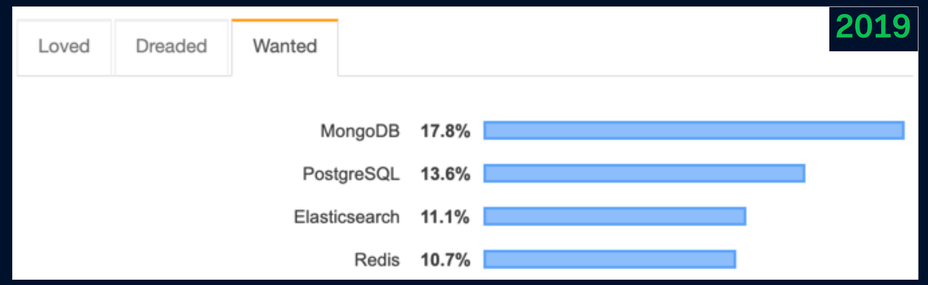

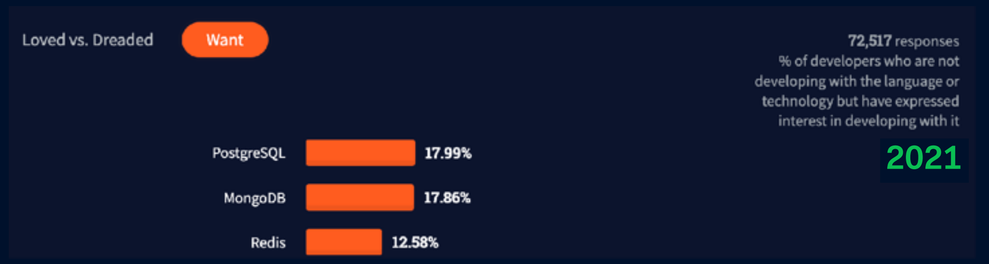

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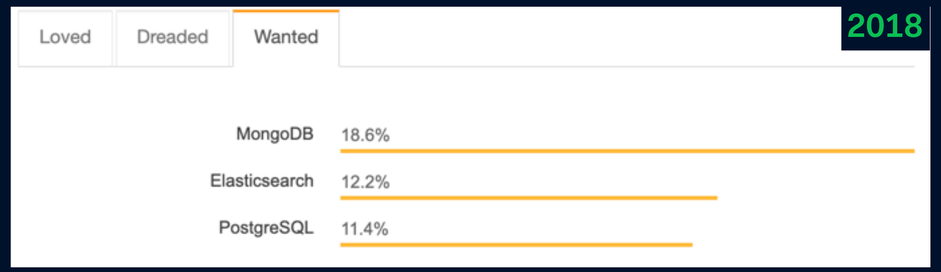

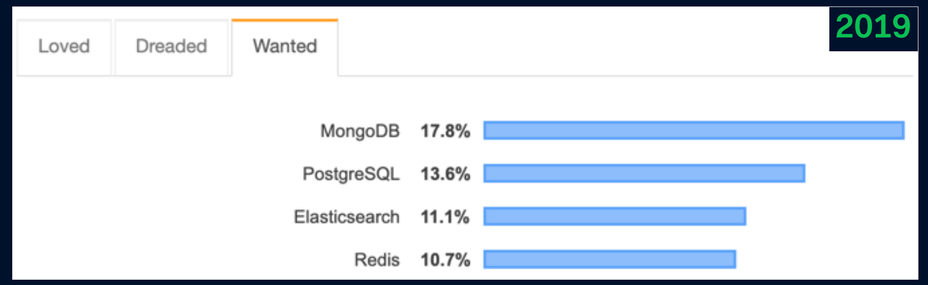

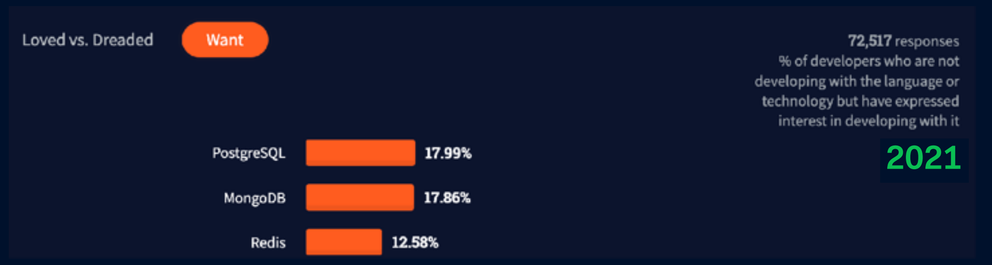

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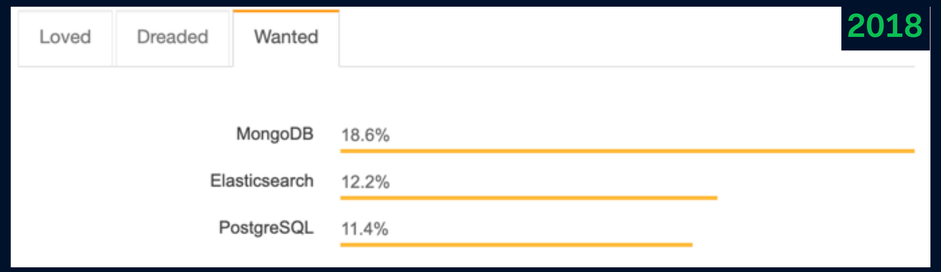

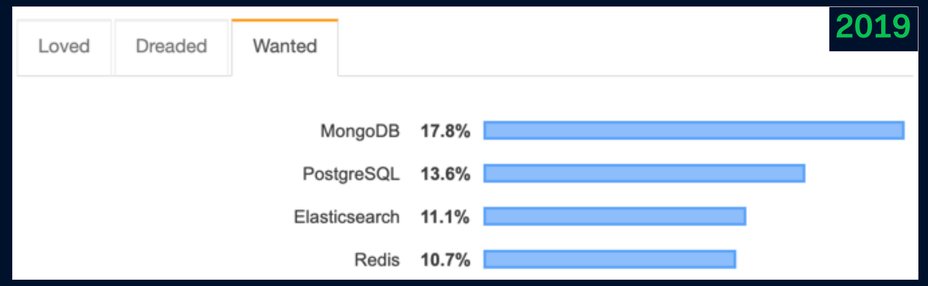

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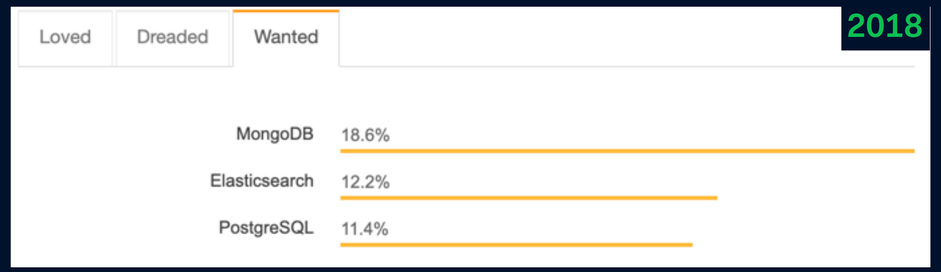
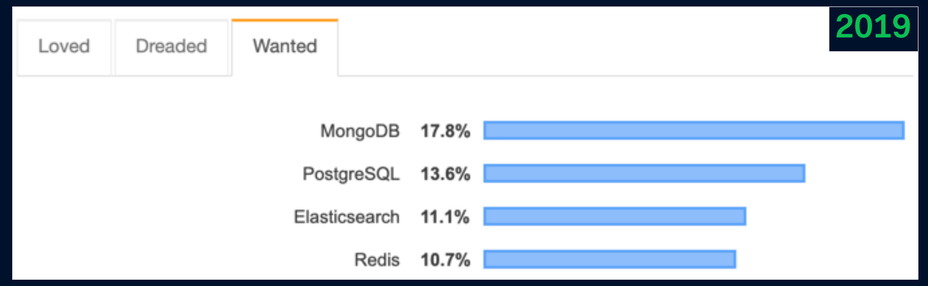
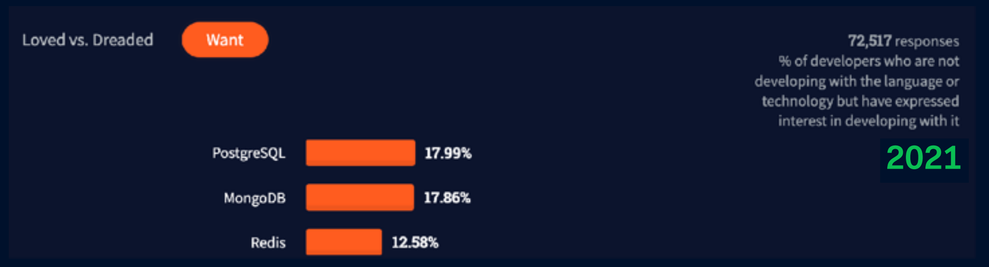
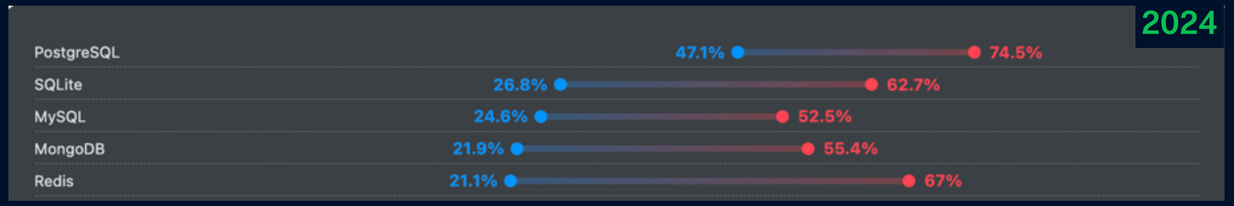








Wrap Up

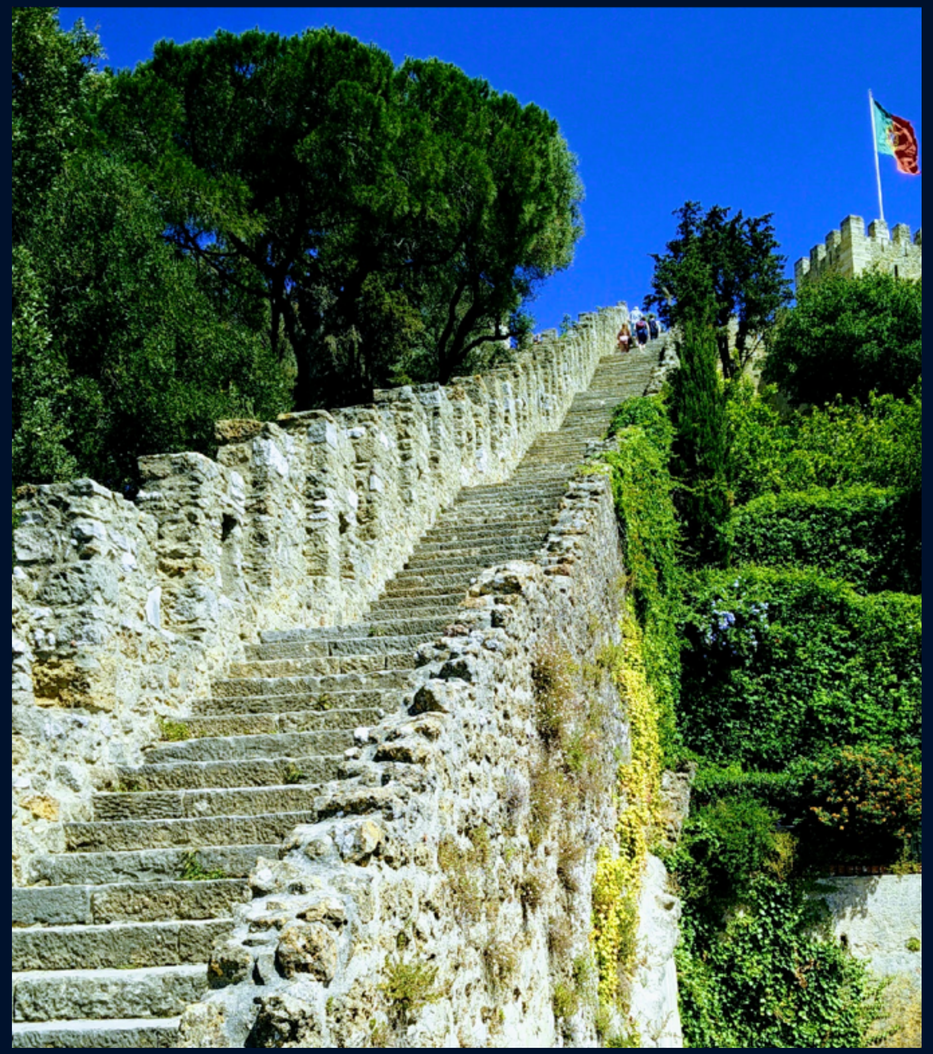
- Differences
  - Architecture
  - User != Schema
  - Tablespaces
  - REDO ~ WAL
- New
  - Vaccum
  - Extensions
- Operational
  - Backups
  - Monitoring
  - HA
- Never looked back
  - Instalation and patching - way more simple in PostgreSQL
  - Licensing and Support
- What I love about Postgres
  - Extensibility
  - Community
  - Documentation
- Somethings I miss from Oracle
  - Observability
- PostgreSQL Adoption

Wrap Up

- Change is not easy and might be scary - but it can be done!
- Mistakes will happen = Learning Opportunities
- Oracle and PostgreSQL are not the same, but was that ever the goal?

“It is not because things are difficult that we do not dare; It is because we do not dare that things are difficult.”

Seneca



adyen

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for ambition

PostgreSQL for Oracle DBAs

A walk in the park?

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