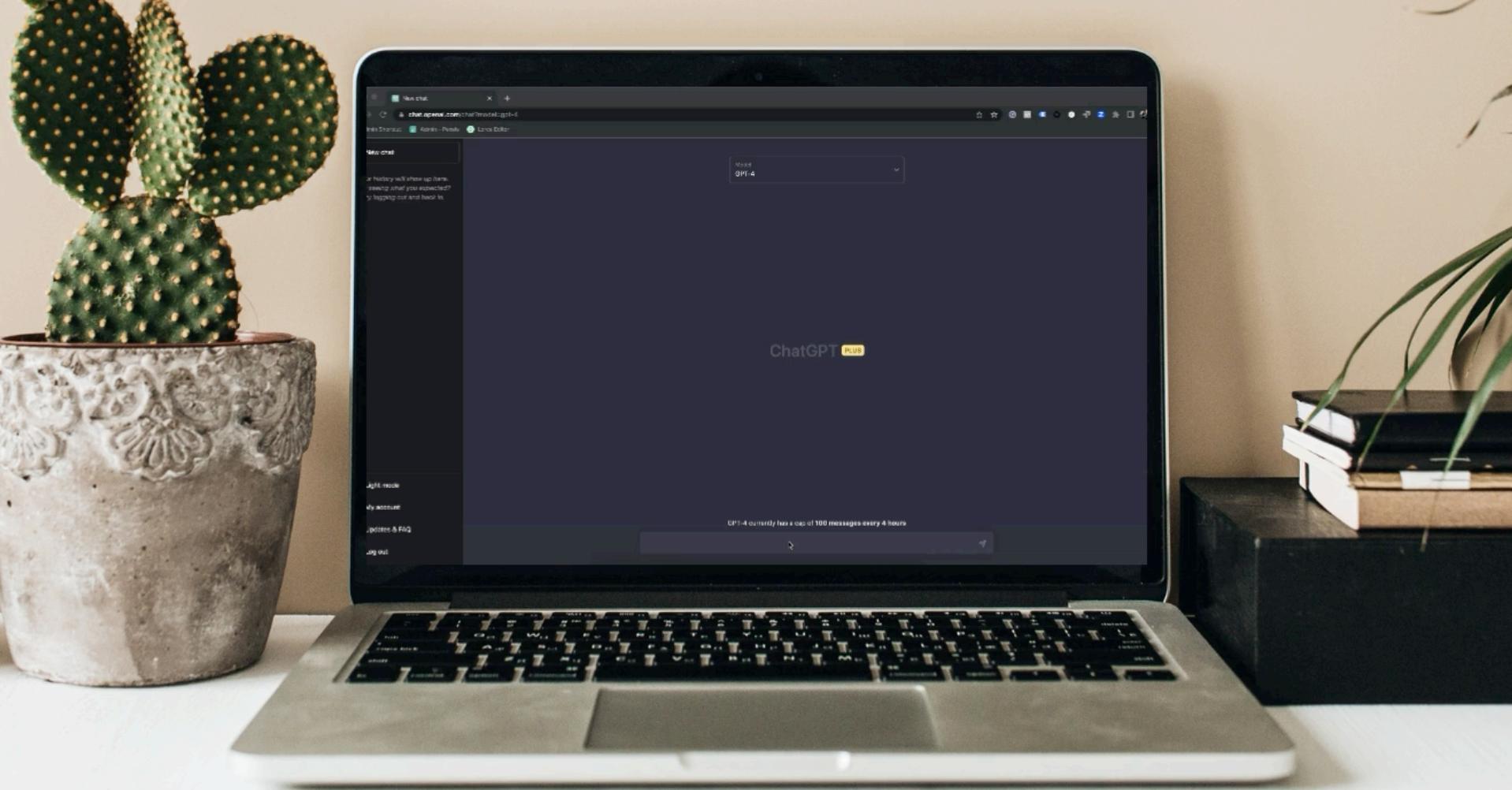


# Finding PostgreSQL's fit in the AI space

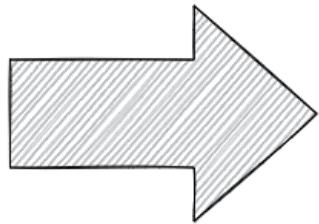
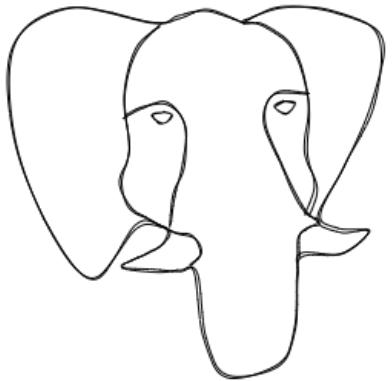
# WHY???



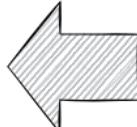
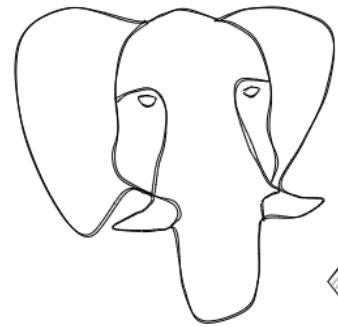




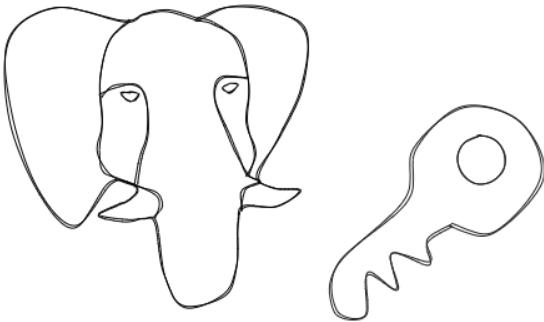
# 3 Acts



PG as Source

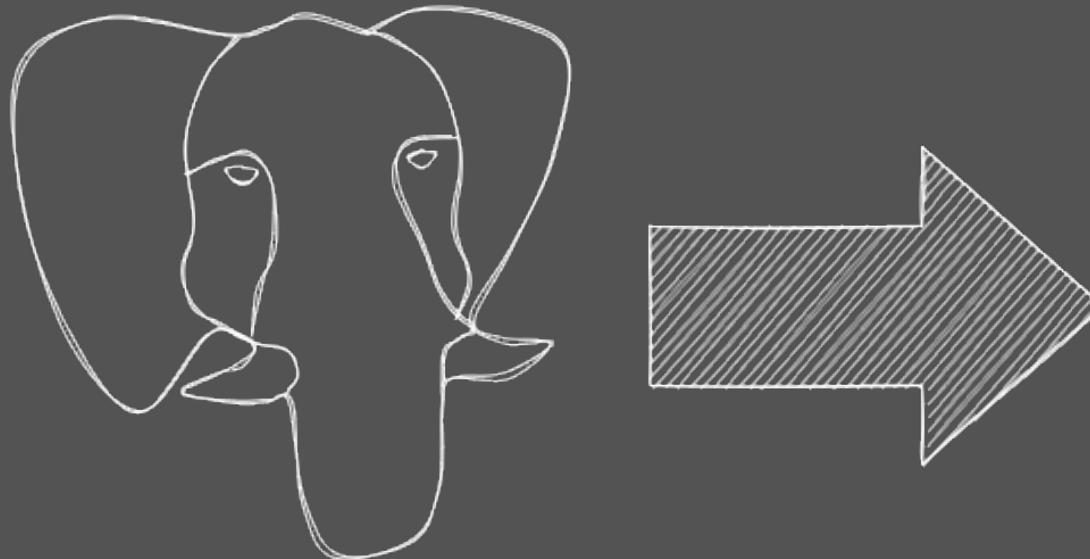


PG as Target



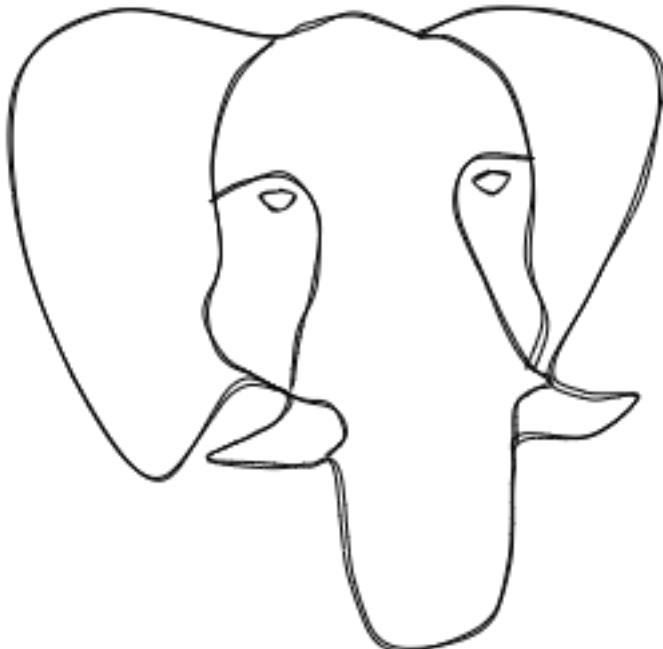
PG as key component

# PG as Source



Francesco Tisiot - Staff Developer Advocate

@ftisiot

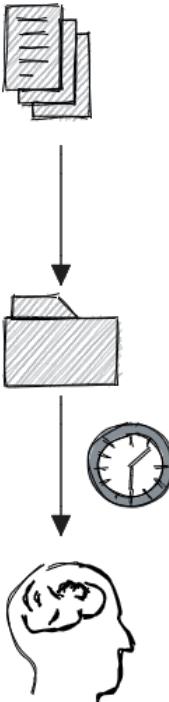


Contains data

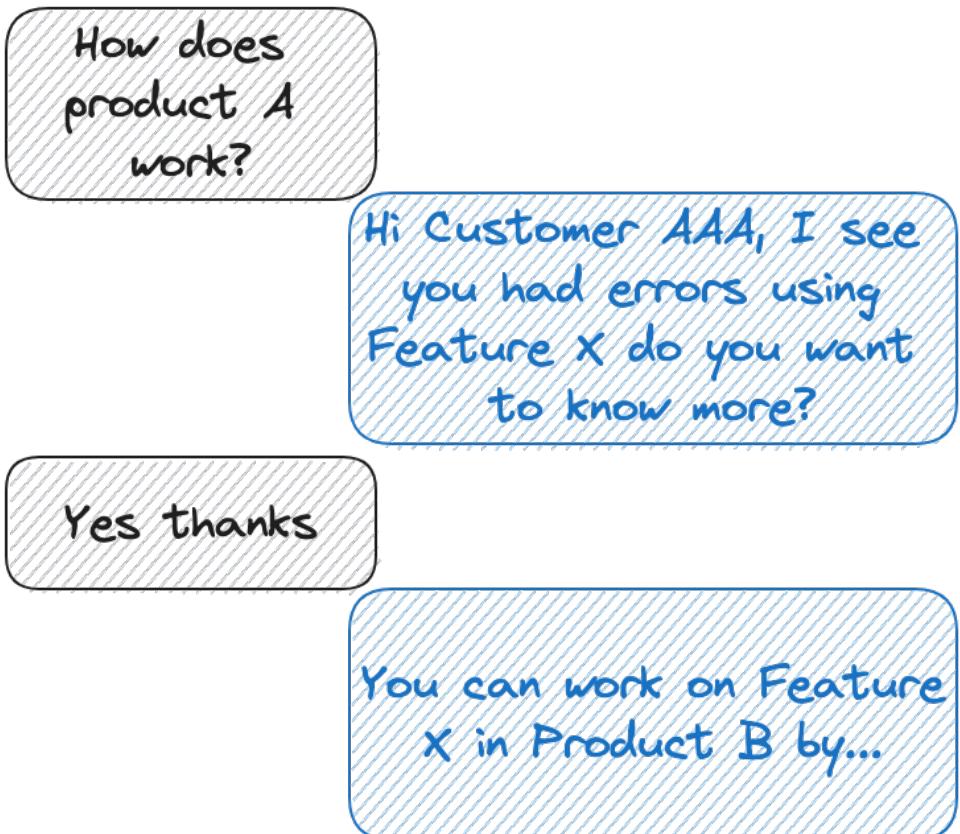
First data touchpoint

Easy to query/integrate

# Fine-Tuning



# Prompt Assembly







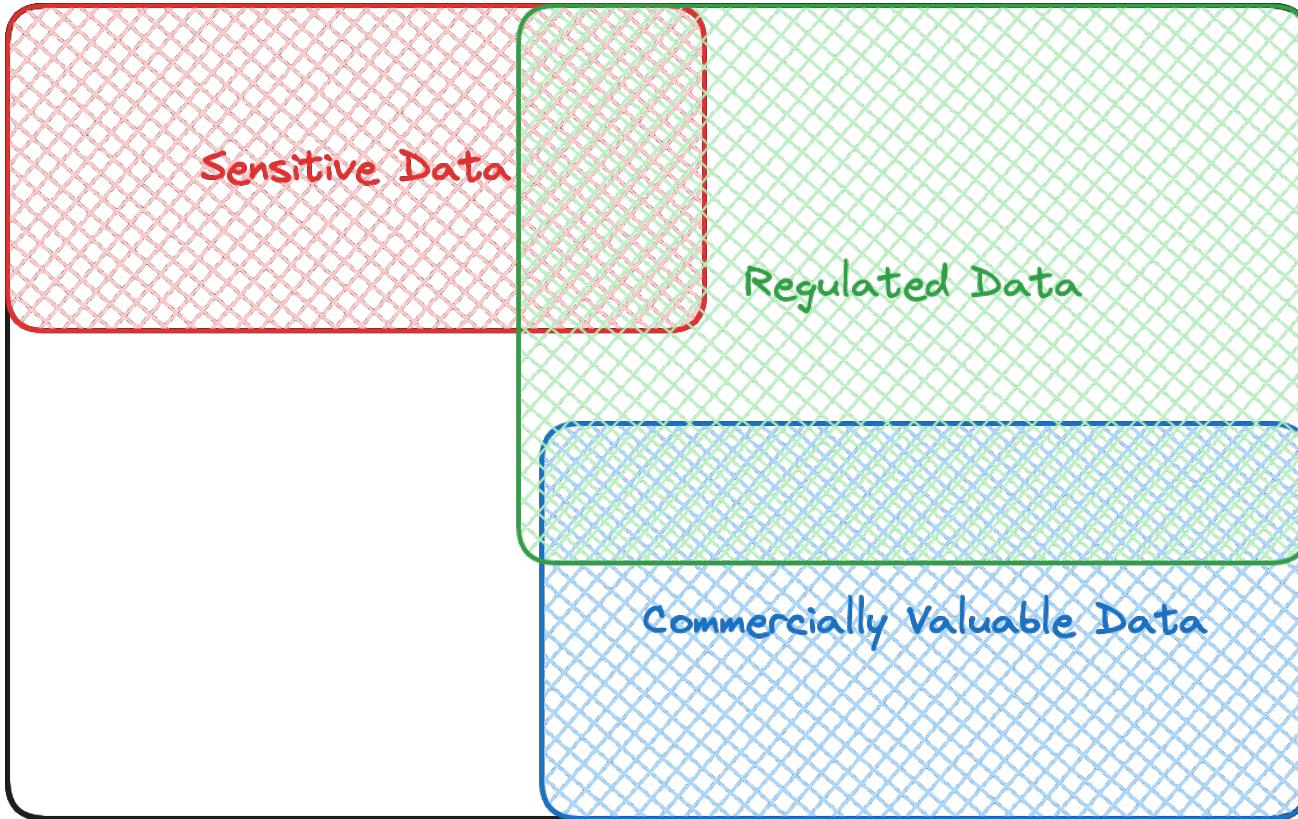
TECH

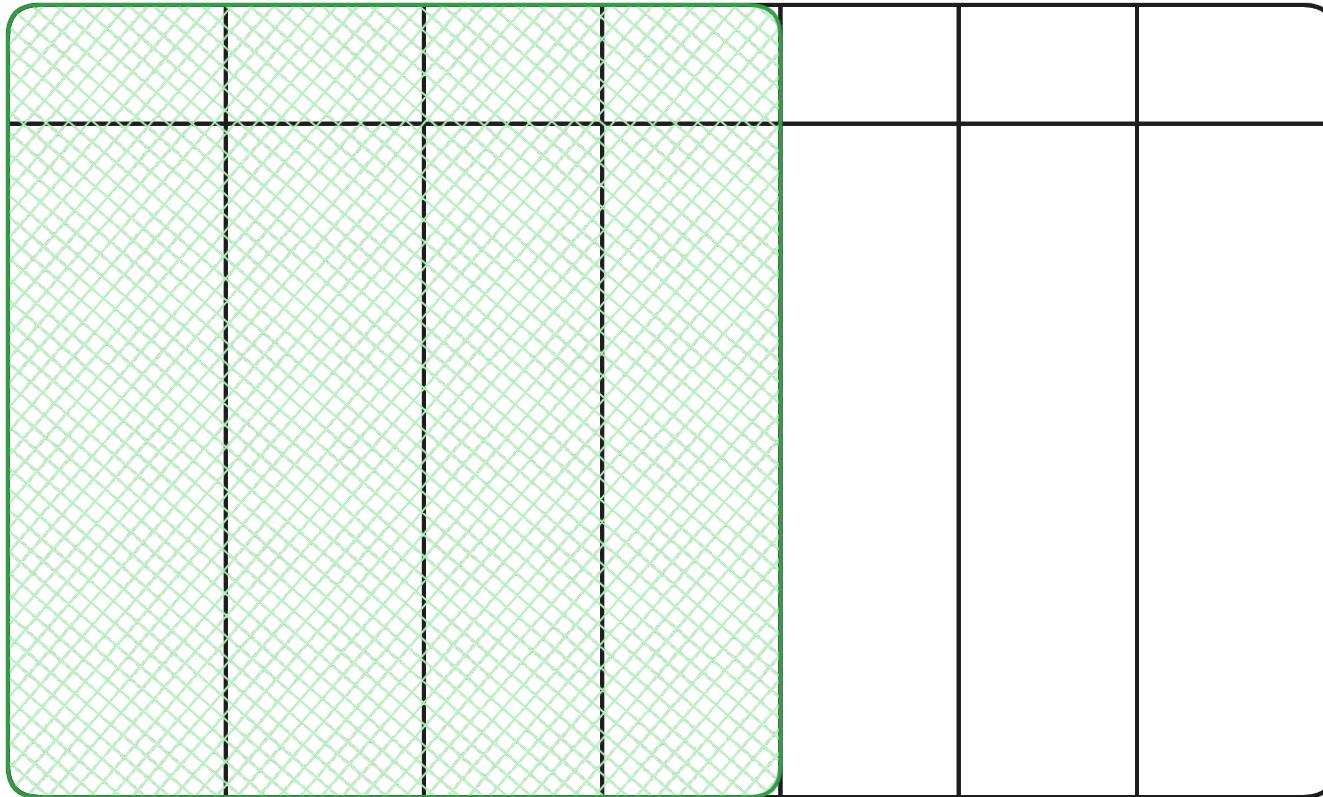
# Google researchers say they got OpenAI's ChatGPT to reveal some of its training data with just one word

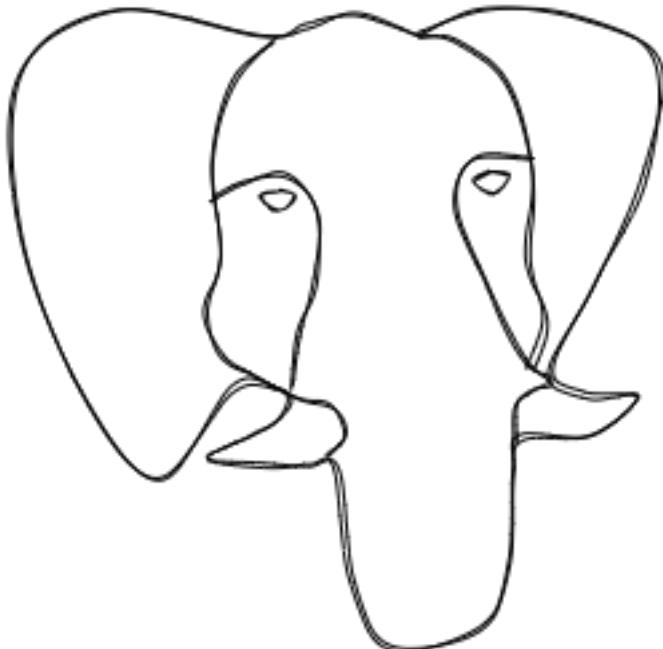
Beatrice Nolan Dec 4, 2023, 12:26 PM CET

Share | Save





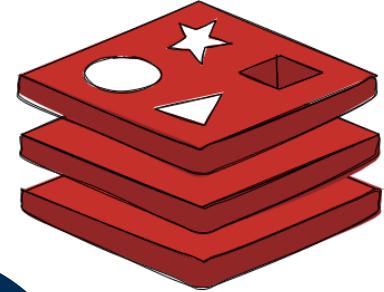
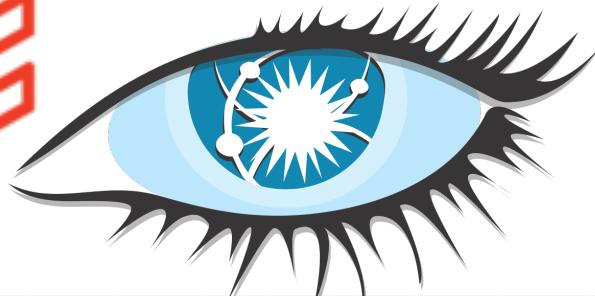
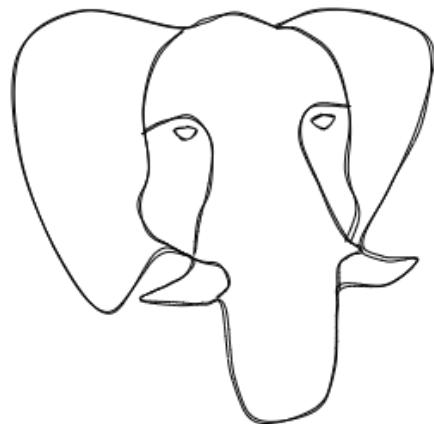
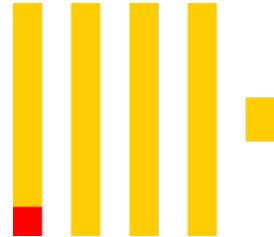
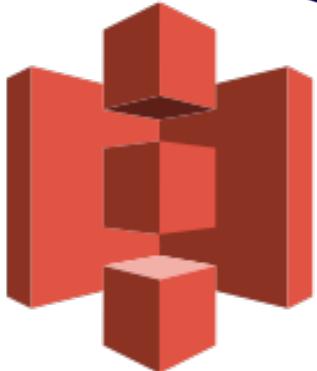
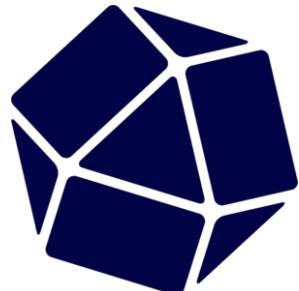
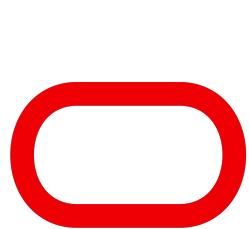




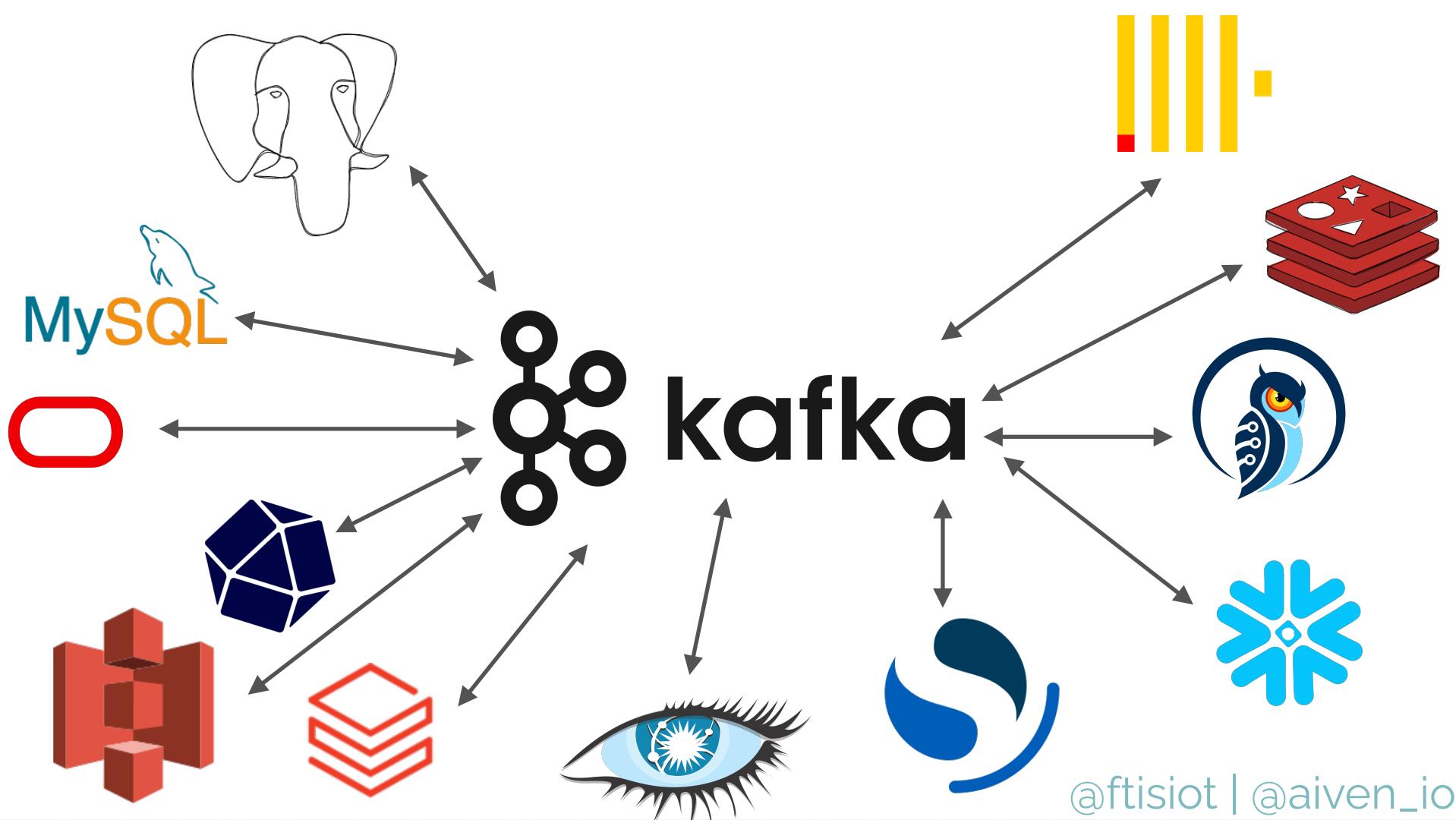
# Anonymisation

# Aggregation

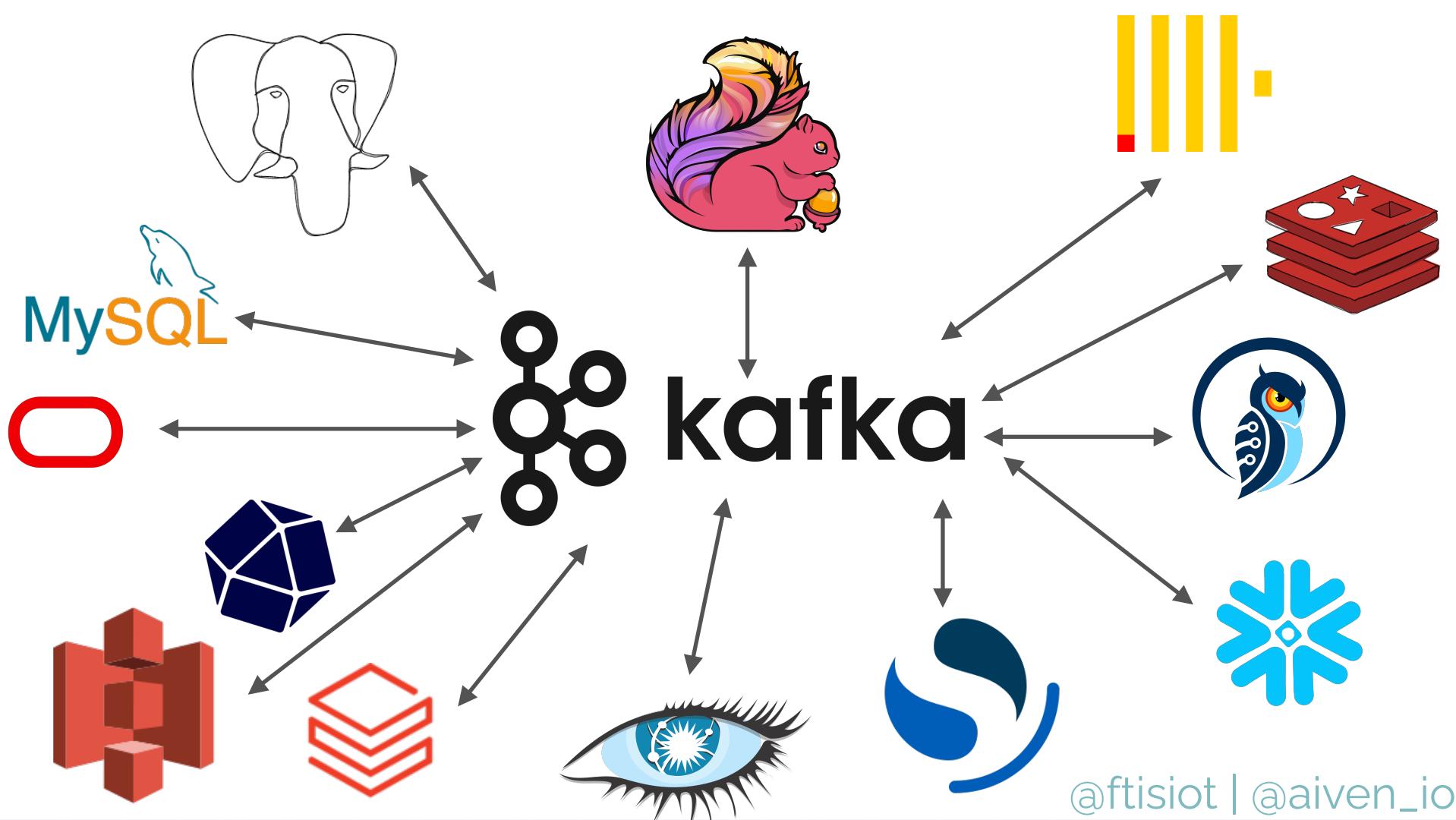
# Masking



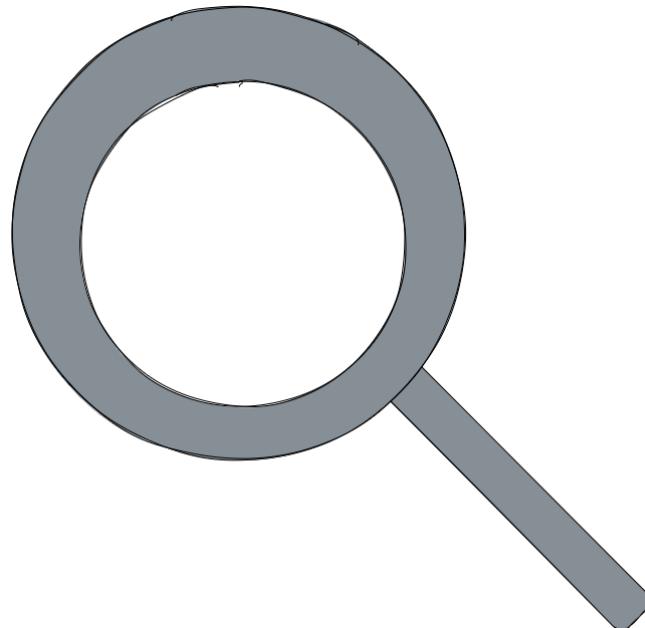
@ftisiot | @aiven\_io



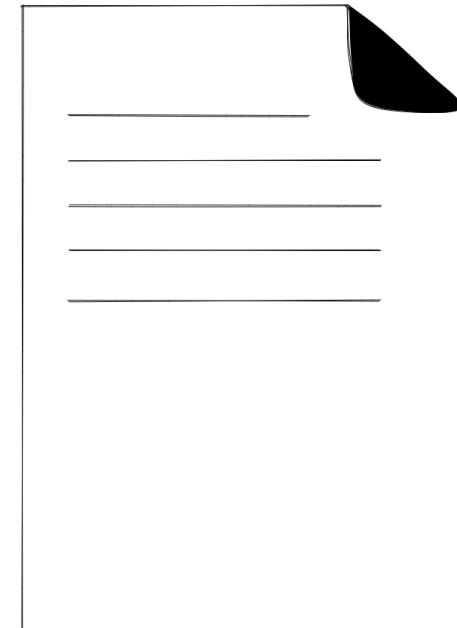
@ftisiot | @aiven\_io



Query based



Log based



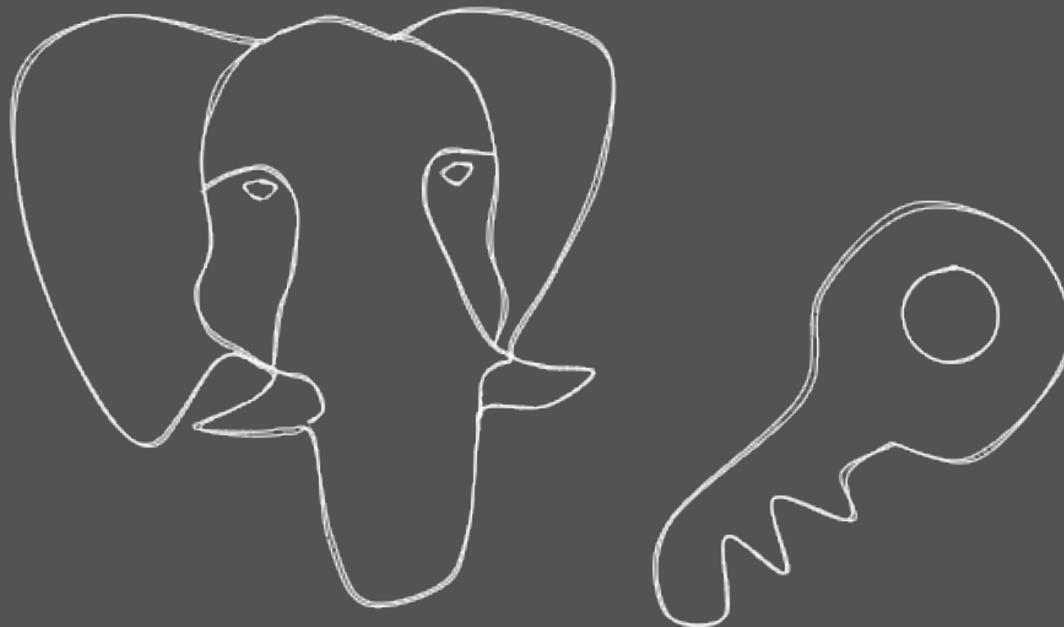
# Outbox pattern

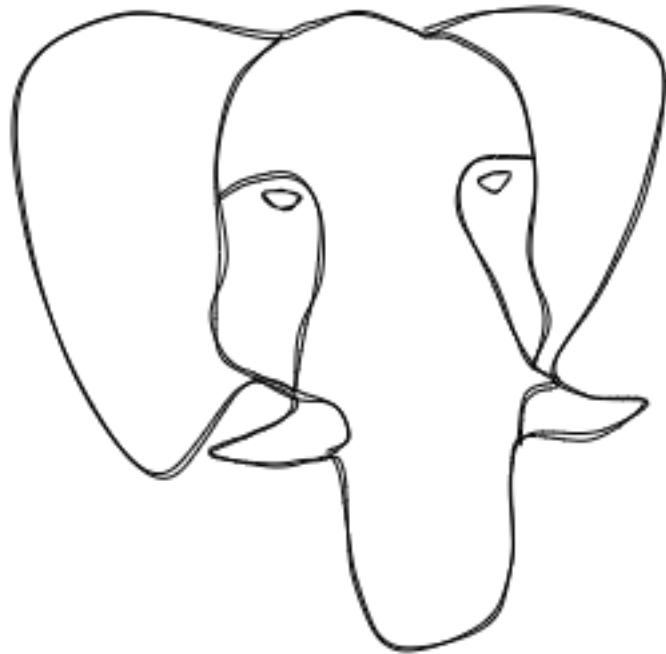


Dedicated Table

Logical decoding messages

# PG as Key Component





**Store  
AI data  
in PG**

Low engagement

Good client

Churning Behaviour

Labels

0.7  
1.0  
0.1  
0.99  
0.13  
0.17  
0.18

Raw numbers

[0.1,0.544542,0.373784,0.88987,0.1111,0.42...]

Vectors

# pgvector

README.md

## pgvector

Open-source vector similarity search for Postgres

Store your vectors with the rest of your data. Supports:

- exact and approximate nearest neighbor search
- L2 distance, inner product, and cosine distance
- any [language](#) with a Postgres client

Plus [ACID](#) compliance, point-in-time recovery, JOINS, and all of the other [great features](#) of Postgres

 build passing

### Installation

Compile and install the extension (supports Postgres 11+)

```
cd /tmp
git clone --branch v0.5.1 https://github.com/pgvector/pgvector.git
cd pgvector
make
make install # may need sudo
```

<https://github.com/pgvector/pgvector>

@ftisiot | @aiven\_io

```
SELECT picture_name  
FROM pictures  
ORDER BY  
embedding <-> '[1,0.6656,0.9888,...]'
```

```
SELECT picture_name
FROM pictures
WHERE day='2023/04/22'
    AND event='dinner'
ORDER BY
embedding <-> '[1,0.6656,0.9888,...]'
```

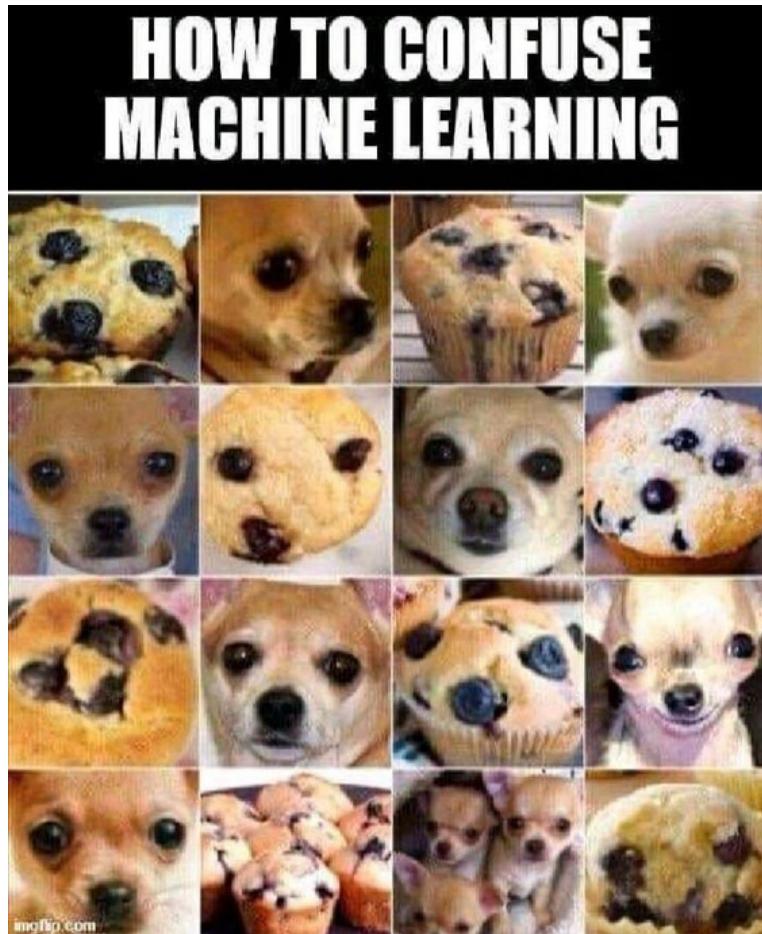


167	168	134	168	160	162	129	160	172	161	168	164
185	182	169	74	75	62	39	17	118	209	180	154
180	180	50	14	34	6	10	39	49	106	109	181
205	198	5	134	131	111	128	204	188	15	56	180
154	48	137	381	297	239	299	238	227	67	71	281
172	198	267	303	293	214	329	238	228	68	74	286
189	48	179	389	186	215	211	158	199	75	29	169
189	97	165	44	10	168	134	11	20	42	22	148
199	158	191	193	158	227	178	140	182	186	36	190
205	174	155	252	296	231	149	178	228	49	95	254
190	218	138	149	294	187	86	150	79	28	218	341
190	234	147	598	297	218	127	102	56	161	265	324
190	214	173	46	103	143	94	80	2	109	249	314
187	196	235	79	1	81	47	9	6	217	256	311
183	202	237	145	6	8	12	108	200	128	243	236
195	206	129	267	177	121	121	209	175	19	96	218

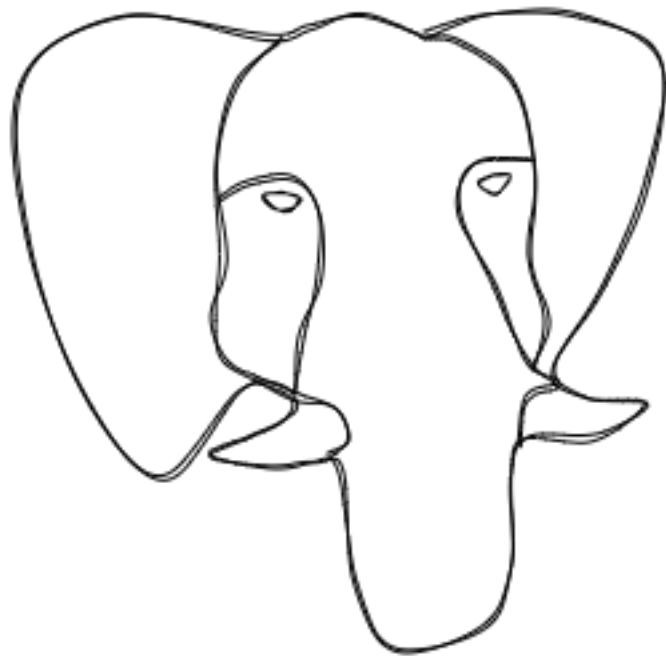
167	168	174	168	160	162	129	160	172	161	168	164
188	182	163	74	75	62	39	17	118	209	180	154
188	180	58	14	34	6	10	39	49	106	109	181
208	198	5	134	131	111	128	204	188	15	56	180
194	68	137	381	297	239	299	238	227	67	71	281
172	186	267	303	293	214	329	238	228	68	74	286
188	88	179	389	186	215	211	158	199	75	29	169
188	97	165	44	10	168	134	11	20	42	22	148
198	168	191	193	158	227	178	140	182	186	36	190
208	174	155	252	296	231	149	178	228	49	95	254
190	206	116	149	294	187	86	150	79	28	218	341
190	234	147	598	297	218	127	102	56	161	265	324
190	214	173	46	103	143	94	80	2	109	249	314
187	196	235	79	1	81	47	9	6	217	256	311
183	202	237	145	6	8	12	108	200	128	243	236
195	206	129	267	177	121	121	209	175	19	96	218



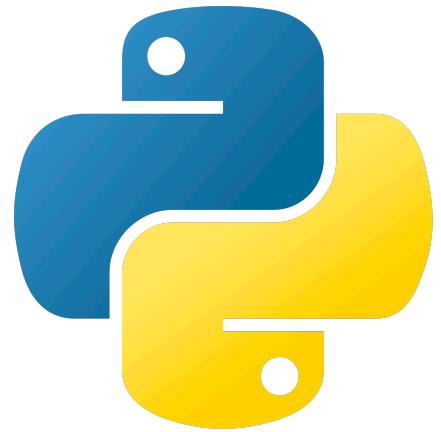
<https://dev.to/ftisiot/machine-learning-challenge-chihuahua-vs-muffin-with-postgresql-and-pgvector-4j1j>



@ftisiot | @aiven\_io



# AI in PG



plpython3u



## PostgresML

Generative AI and Simple ML with [PostgreSQL](#)

tests passing chat 67 online

## Table of contents

- [Introduction](#)
- [Installation](#)
- [Getting started](#)
- [Natural Language Processing](#)
  - [Text Classification](#)
  - [Zero-Shot Classification](#)
  - [Token Classification](#)
  - [Translation](#)
  - [Summarization](#)
  - [Question Answering](#)
  - [Text Generation](#)
  - [Text-to-Text Generation](#)
  - [Fill-Mask](#)
- [Vector Database](#)

```
SELECT pgml.transform(  
    task  => 'text-classification',  
    inputs => ARRAY[  
        'I love how amazingly simple ML has become!',  
        'I hate doing mundane and thankless tasks. 😞'  
    ]  
) AS positivity;
```

positivity

---

```
[  
    {"label": "POSITIVE", "score": 0.9995759129524232},  
    {"label": "NEGATIVE", "score": 0.9903519749641418}  
]
```

# AI in database... or not?

## Move Compute where Data is

No Data Movement

No Stale Data

Security

Reuse of existing skills

Increased variety of workloads

## Move Data where Compute is

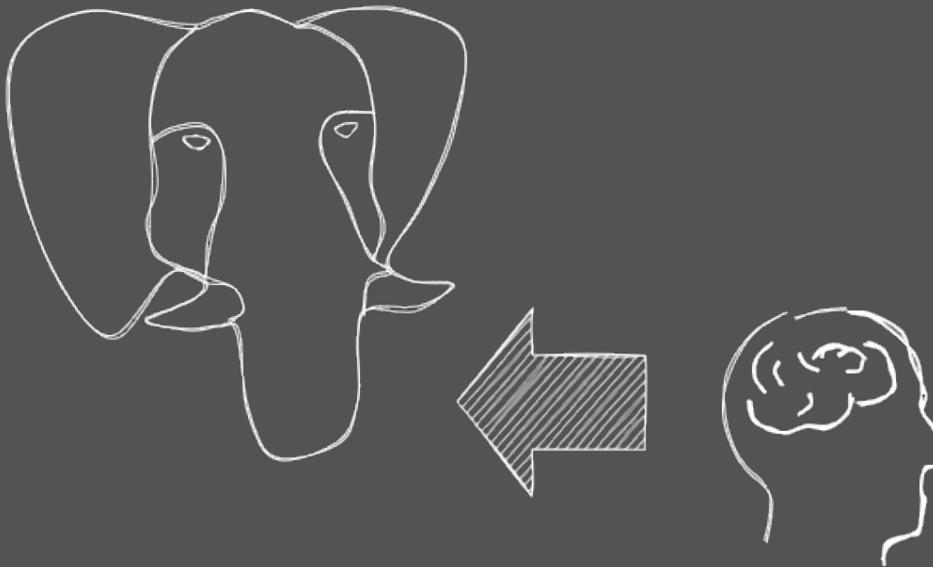
More choice of tooling

Different compute needs

Data scientist are usually NOT in DB

Separation of concerns

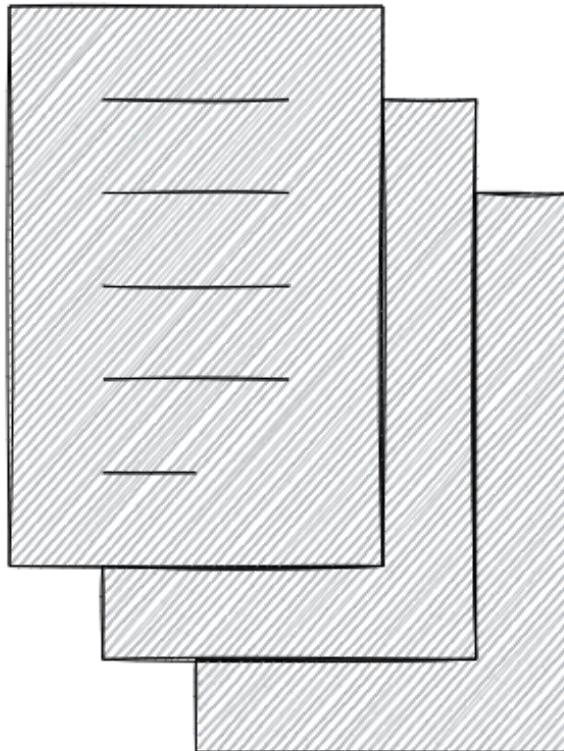
# PG as Target



# AI as productivity assistant



# Developer



From text to Query

Optimise Queries

Optimise Code (ORM)

Suggestions and Learning

# DBA



## Observability

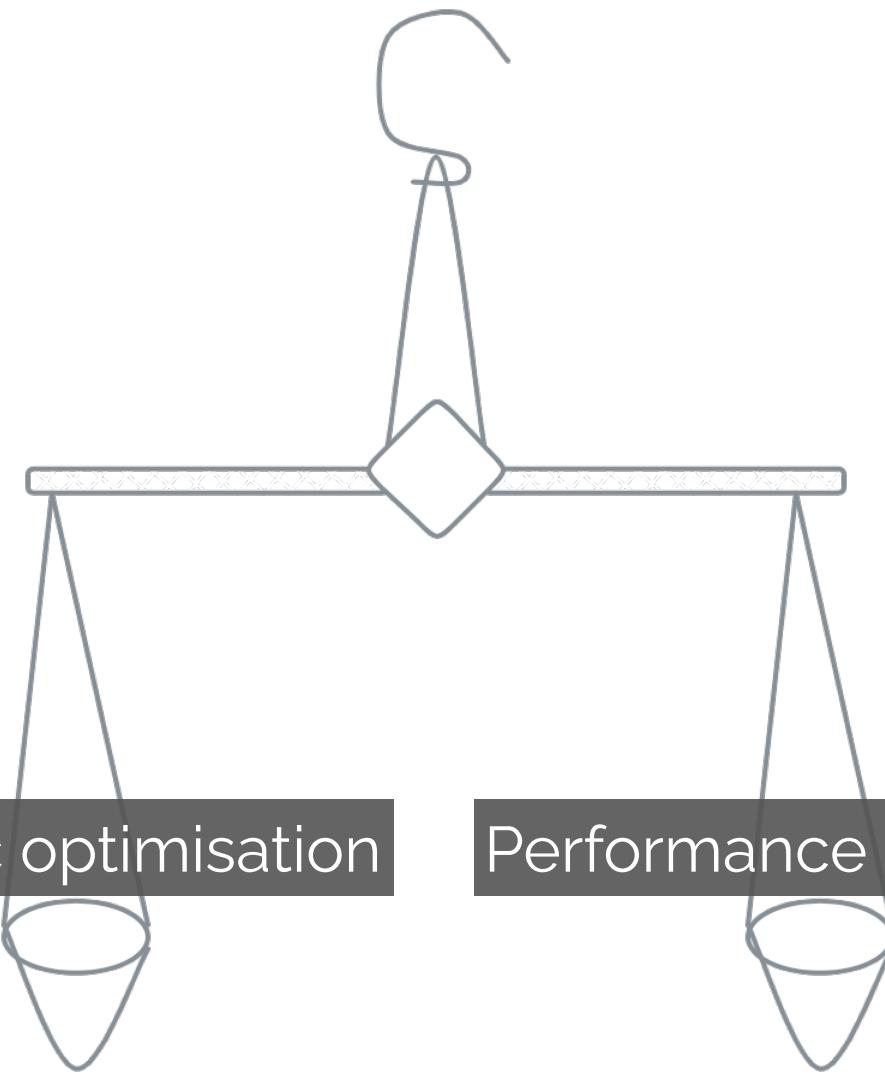
Performance Insights

Improvement suggestions

Parameters

Queries &  
Supporting structures





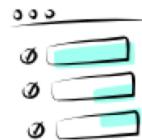
Automatic optimisation

Performance stability

# Aiven + EverSQL



Hi, what would you like to do today?



Optimize a single SQL query



Analyze why my database is  
slow

Please tell us which database you're using:



ORACLE



Other  
databases

SQL Query Optimizer

SQL Syntax Checker

SQL Formatter

Slow Query Log Visualizer

Text to SQL

SQL to Text

SQL to Hibernate Code

SQL to TypeORM Code

SQL to Prisma Code

SQL to Sequelize Code

SQL to Django Code

SQL to SQLAlchemy Code

SQL to GORM Code

SQL to Entity Framework Code

SQL to Doctrine Code

SQL to Laravel Code

MySQL Histogram Visualizer

# Free Developer Tools

SQL Query Optimization Tool C X +

eversql.com/sql-query-optimizer/

EverSQL

+ Invite members support@eversql.com ( 588 credits )

Hi, what would you like to do today?

Optimize a single SQL query

Analyze why my database is slow

OR

Take me to the optimization dashboard

Feedback icon



Hi

The load on your database is 21.6% higher this week, compared to the previous week.

Choose a database ▾

#### These insights will guide you to your next optimization opportunities:

Get insights via Slack

3 new slow queries found this week, increasing the database load by 1.4%

1 queries slowed down this week, increasing the database load by 0.1% .

22 queries were executed more frequently this week, increasing the database load by 22.2% .

Improve performance and reduce storage cost by \$2924.2/year, by deleting 8 redundant indexes.

Show more insights ▾



Optimize a single query

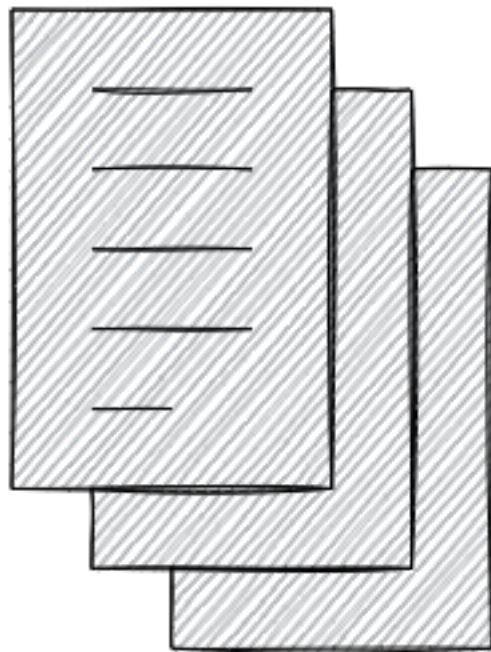


Analyze a slow query log

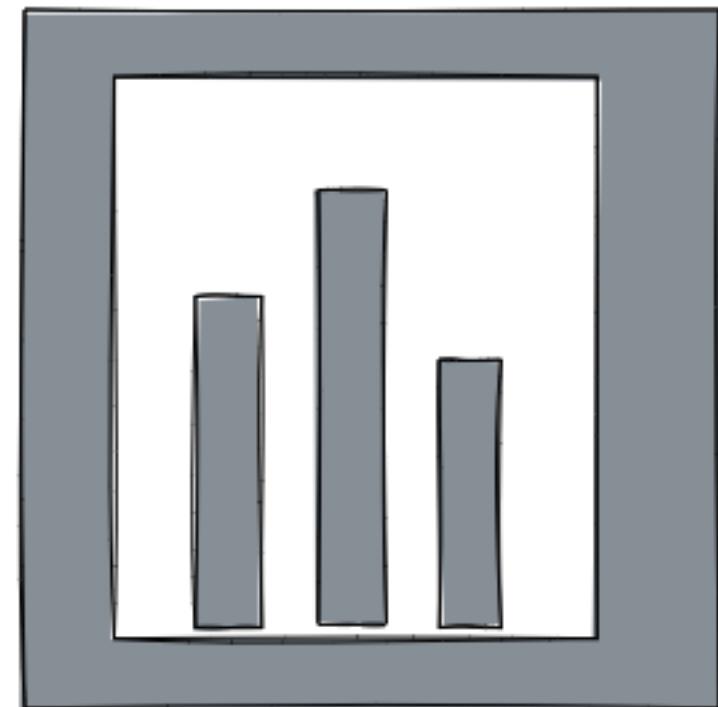


Monitor a new database

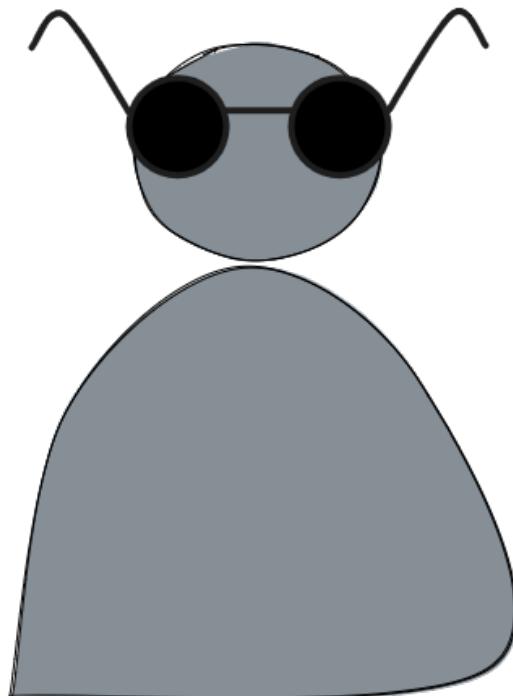
# Query history



# Database Metadata



# Confidentiality



```
select *\nfrom ORDERS\nwhere\nCUSTOMER='GIOVANNI'
```

[sample-458](#)  
**pg-6963205**

My Organization / sample-458 / pg-6963205 / Overview

**pg-6963205**

PostgreSQL 15.4 EOL: 2027-11-11 OK Running Nodes 1

[← Back to project](#)

...

Overview

Integrations

Network

Metrics

Logs

Query statistics

Current queries

Users

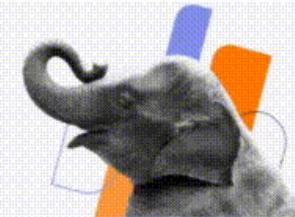
Databases

Pools

Backups

## Get started with Aiven for PostgreSQL®

Set up, secure, and integrate your Aiven service with a step-by-step guide.

[Get started](#)

## Connection information

[Quick connect](#)

<b>Service URI</b>	postgres://CLICK_TO REVEAL PASSWORD@pg-6963205-sample-458.aivencloud.com:21472/defaultdb?sslmode=require
--------------------	--



<b>Database Name</b>	defaultdb
----------------------	-----------

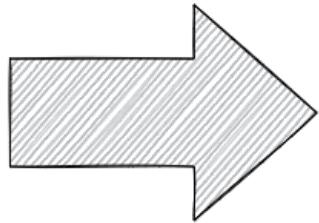
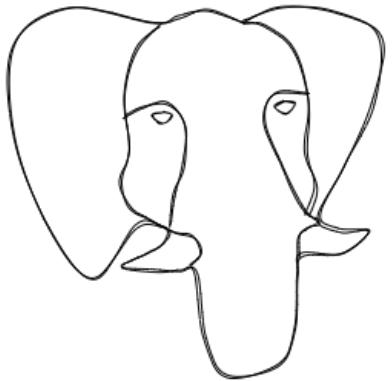


<b>Host</b>	pg-6963205-sample-458.aivencloud.com
-------------	--------------------------------------

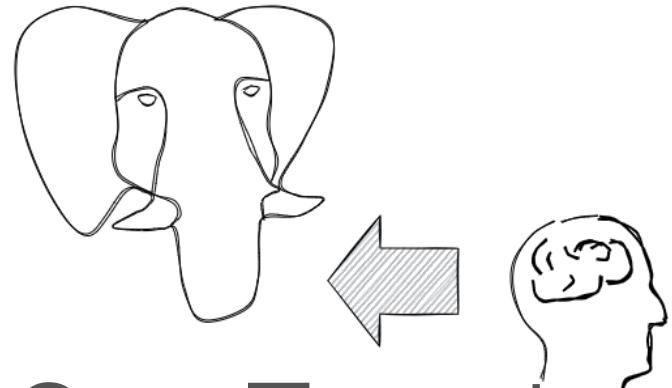


<b>Port</b>	21472
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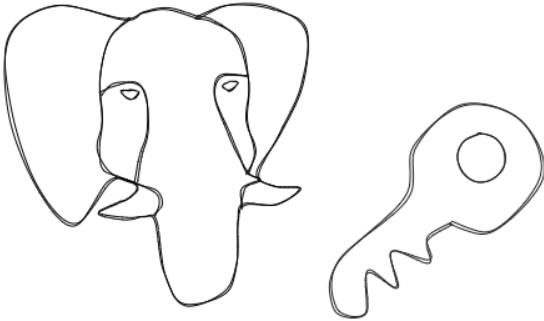




PG as Source



PG as Target



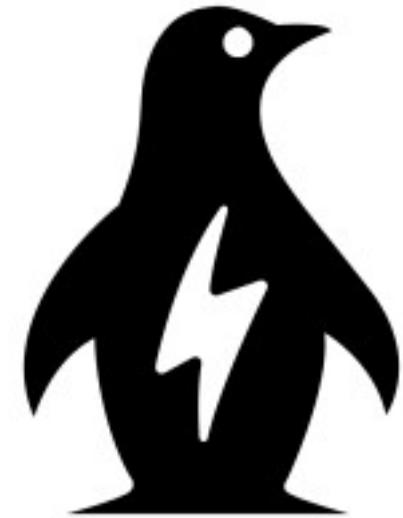
PG as key component

<https://go.aiven.io/pgconfeu-aiven>



300\$

<https://go.aiven.io/pgconfeu-eversql>



PGConf2023