Bad Prompts, Bad Plans: Teaching AI to Understand PostgreSQL

PG Day

Thursday, 25 June and Friday, 26 June 2026

OST Eastern Switzerland University of Applied Sciences, Campus Rapperswil (Switzerland)

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Working at **HUG**
(Hôpital Universitaire de Genève)

Daily playing with 500 Postgres instances (mostly docker based) - we use Postgres from 2019.

I am working on the OSS tool **pgAssistant** when I find time for it (nights and week ends) and when i’m not fishing or hiking.

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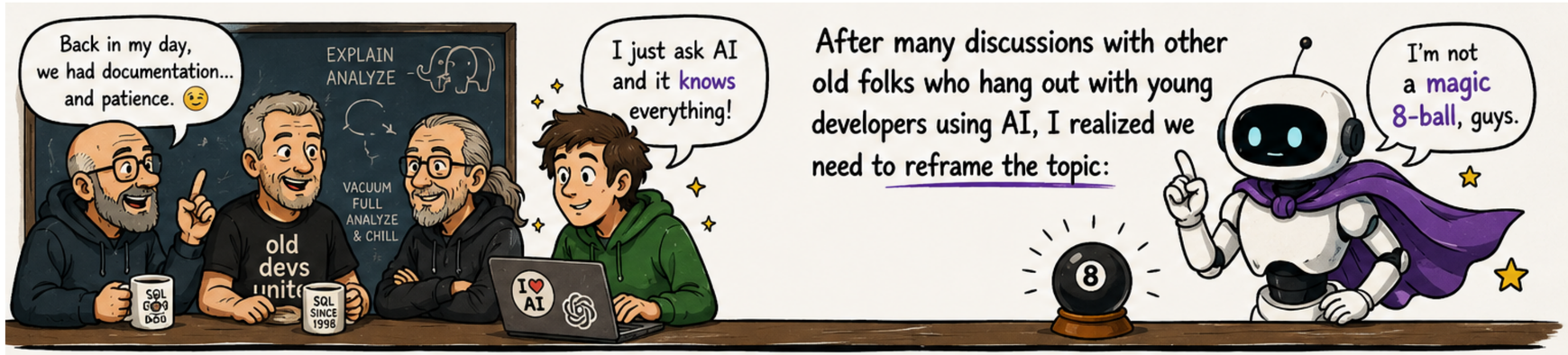
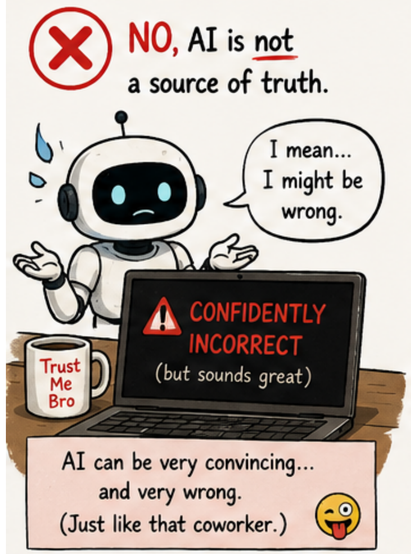
Why this talk ?





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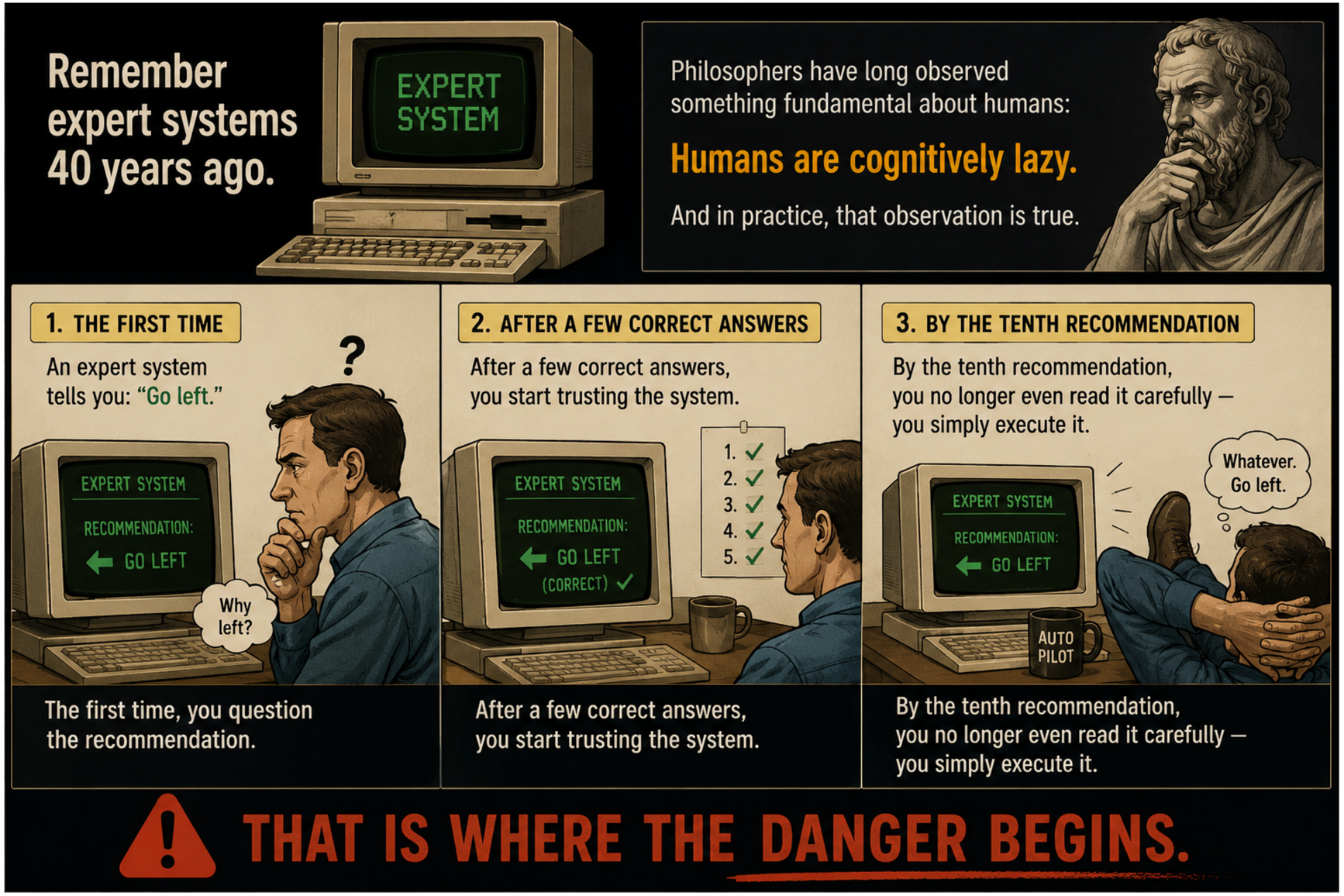
40 years ago, what we learned …



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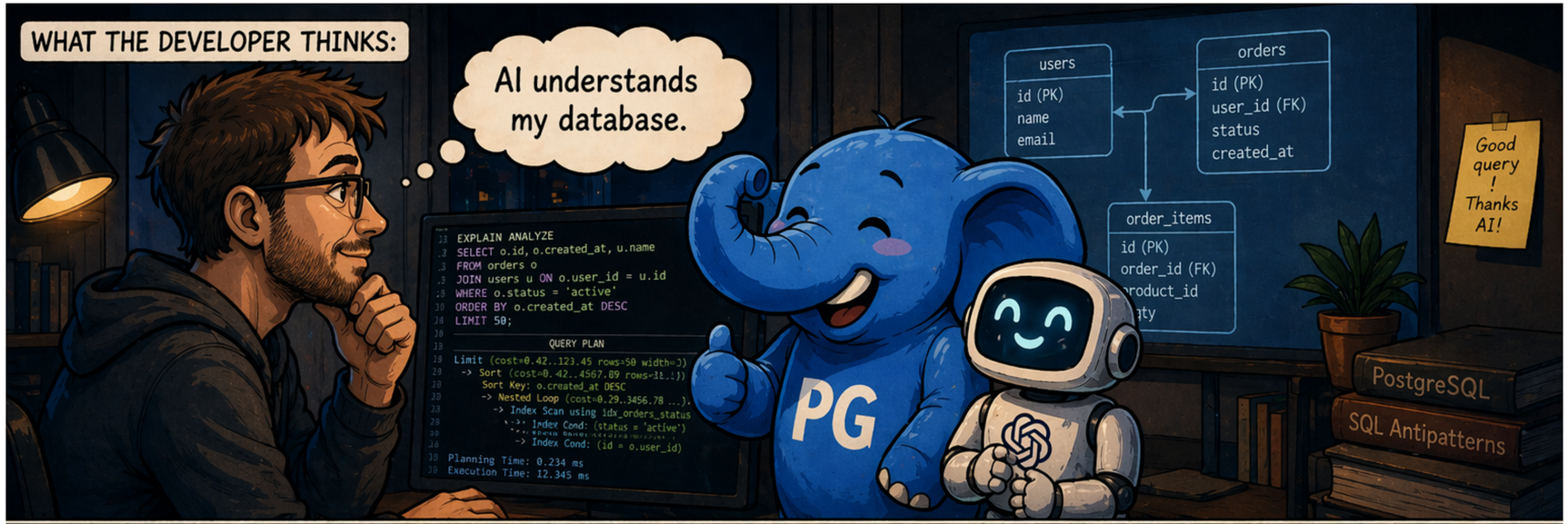
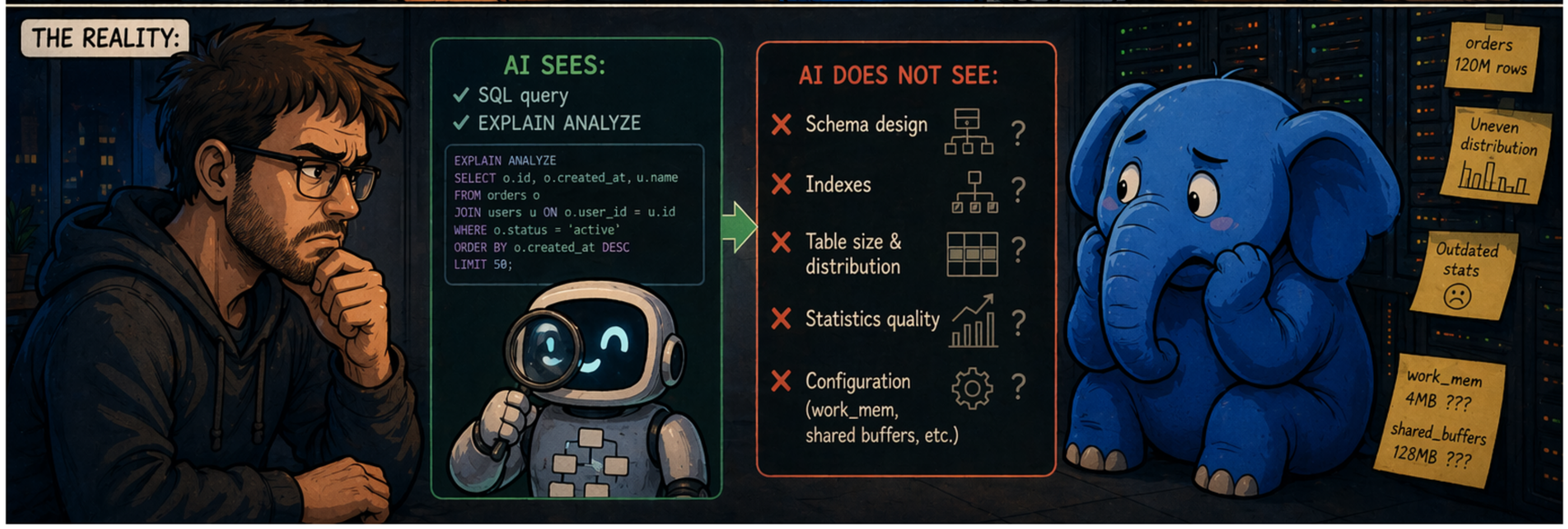
Dev mindset in 2026





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DBA mindset

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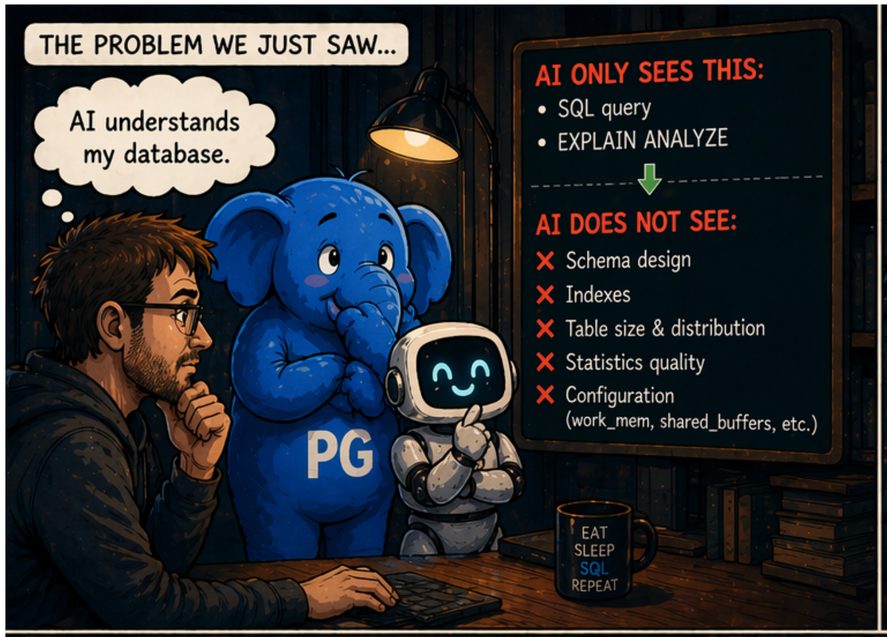
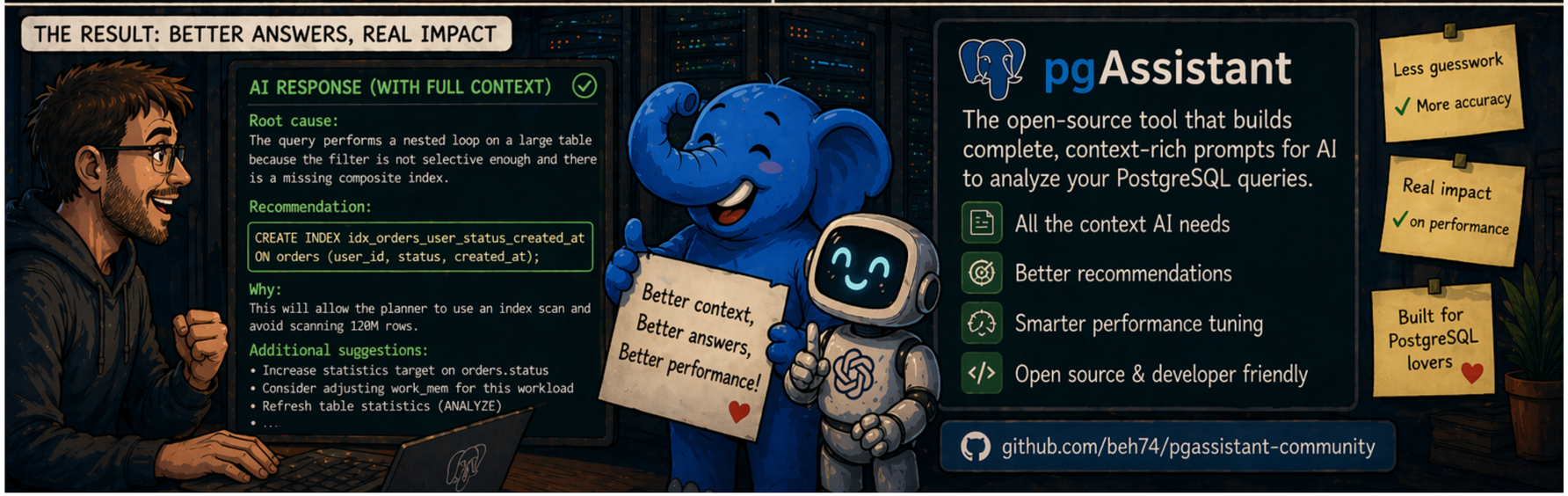
pgAssistant and AI





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The Right AI for the Right Query

NOT ALL AI ARE CREATED EQUAL

Choosing the right AI is like choosing the right car for the job.

DON'T EXPECT A SCOOTER TO WIN A FORMULA 1 RACE!

I run an 8B model on my laptop. Why can't it be as good as ChatGPT/Gemini/Claude?

Because size matters.

(and training, data, infrastructure, etc.)

CODE MORE

RUNS ON COFFEE

8B ON YOUR LAPTOP

The scooter

- ✗ Fits in your backpack
- ✗ Cheap to run
- ✗ Great for simple tasks
- ✗ But... has limits

ASK: Explain PostgreSQL execution plans in detail.

ANSWER: Sure! Basically, it works like... ummm... joins are like... tables together?

20B MODEL (CLOUD)

The sporty car

- ☑ Much smarter
- ☑ Better reasoning
- ☑ Handles complex tasks well
- ☑ Great all-rounder

FAST-AI

ASK: Explain PostgreSQL execution plans in detail.

ANSWER: Here's a detailed explanation of the plan nodes, costs, cardinality estimates, indexes, and what could be improved...

120B+ MODEL (CLOUD)

The Formula 1

- ☑ Deep reasoning
- ☑ Highly accurate
- ☑ Understands nuance
- ☑ Handles edge cases like a pro

ASK: Explain PostgreSQL execution plans in detail.

ANSWER: Here's a comprehensive analysis of the execution plan, including node-by-node breakdown, potential issues, advanced tuning strategies, and trade-offs...

AI IS NOT MAGIC. IT'S ENGINEERING.

DATA + MODEL + CONTEXT = QUALITY

THE RIGHT AI FOR THE RIGHT JOB

- ☑ Choose the right model size for your needs and budget.
- ☑ Use specialized AI for specialized tasks.
- ☑ Bigger isn't always better, but tiny is often not enough.
- ☑ Context, data, and prompt quality still matter (a lot!).

RIGHT AI RIGHT JOB

SOME AI ARE JUST NOT BUILT FOR THE JOB

It's not just about size.
It's also about specialty.

THE POET AI

Roses are red, violets are blue, your query is lovely, but I have no clue.

Great with poetry.
Not great with query plans.

THE MARKETING AI

This index will 10x your performance! Guaranteed!*

Great with hype.
Not great with facts.

*Results may vary. A lot.

THE CODE COPILOT (NOT DB EXPERT)

Let's rewrite your query in JavaScript!

Great with code.
Not great with Postgres.

THE CONFIDENTLY WRONG AI

I am 100% certain this is the best index.

100%

Very confident.
Very often wrong.

Pick wisely, ask smartly, and always verify.

AI is your assistant, not your oracle.

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The Secret Sauce Behind pgAssistant

1 TO GIVE THE LLM THE DDL OF THE TABLES INVOLVED IN THE QUERY, pgAssistant USES TABLES THAT ARE GIVEN BY THE QUERY PLAN, NOT BY THE QUERY ITSELF

The query uses a VIEW, but the plan shows it actually touches 4 tables!

WRAPLE: THEH SQL QUER'? (uses a view)

```
SELECT c.name, SUM(s.amount) AS total_spent
  FROM sales_by_customer sbc
  JOIN customers c ON c.id = sbc.customer_id
  WHERE sbc.total_spent > 1000
  ORDER BY total_spent DESC
  LIMIT 10;
...
```

EXPLAIN (ANALYZE, BUFFERS)

```
...
 HashAggregate  (cost=....)
   Group Key: c.id, c.name
 ->  Hash Join
       Hash Cond: (oi.order_id = o.id)
     ->  Hash Join
           Hash Cord: (o.customer_id = c.id)
       ->    Seq Scan on customers c
       ->    Hash
             ->  Seq Scan on orders o
       ->  Hash
             ->  Seq Scan on order_items oi
     ->  Hash
       ->  Seq Scan on products p
...
```

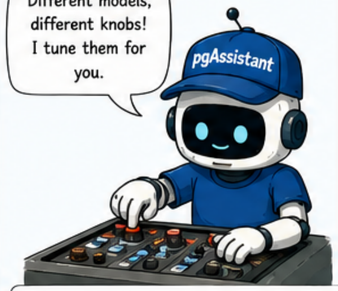
TABLES USED (extracted from the PLAN)

customer	c	-- customer master data
orders	o	-- customer orders
order_items	oi	-- items in each order
products	p	-- product catalog

By using the plan, pgAssistant collects the DDL for these 4 tables to give the LLM the full context.

2 USING A LARGE LANGUAGE MODEL (LLM) EFFECTIVELY REQUIRES MODEL-SPECIFIC CONFIGURATION.

Parameters such as temperature, context window, and system instructions can significantly impact the quality and reliability of the output, and these settings often need to be tuned differently depending on the model being used.



Different models, different knobs! I tune them for you.

pgAssistant auto-configures these models for you:

Llama 3 · Llama 2 · Mixtral · Mistral · Qwen3

Gemma · DeepSeek · Phi · GPT-OSS-20B

Key parameters we adjust (per model):

TEMPERATURE
Controls randomness.
Too high = creative (but risky)
Too low = boring (but safe)

CONTEXT WINDOW
How much the model can "see".
Every model has its limits.

SYSTEM INSTRUCTIONS
Define the role, style and rules.
A small change, a big impact!

Different models, different sweet spots. pgAssistant handles it for you.

3 ADDITIONALLY, PROMPT LENGTH PLAYS A CRITICAL ROLE:

overly short prompts may lack necessary context, while excessively long prompts can dilute important signals or exceed the model's optimal processing capacity. Striking the right balance in prompt size is essential to achieve accurate and consistent results.

Not too short.
Not too long.
Just right!

TOO SHORT

Huh? Not enough info...

✗ Missing context = risky or incorrect answers

JUST RIGHT

Perfect amount of context. Let's go!

✓ All the right info, clear signal, better answers

TOO LONG

Too much noise... I'm lost!

✗ Diluted signal or exceeds optimal capacity

The goal: enough context to be useful, not so much that it hurts.

QUALITY > QUANTITY

pgAssistant gives the LLM the right context, uses the right settings, and keeps prompts just right.
You get better answers, faster.

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Demo

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What i learned coding pgAssistant ?

Using a expert system (determinist) is a first good approach;

Using AI (not determinist) is a **complementary** approach;

But when an expert system gives you a false recommandation, it’s a bug. When LLM gives you a false recommendation, it’s a feature.

And in both cases, you still need to challenge the system responses!

pgAssistant, since the beginning is using this 2 approaches and follows this philosophy.

What are the real advantages of AI with PostgreSQL? Two areas stand out:

1/ Checking compliance with RFCs,

2/ Checking naming conventions.

In both cases, it's difficult, if not impossible, to adopt an "expert system" approach.

What about query optimisation ? it depends : scooter or formula 1 and … the context length … If the context length is large, today, a formula 1 can allucinate. Tomorrow ? i don’t know.

Keeping historical datasets (Global advisor and query ranking) is not useful, it is mandatory. —> pgassistant-collector and Grafana.

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What about the future ?

Autonomous PostgreSQL system ??

The future is more likely to be hybrid ???

A practical architecture for autonomous PostgreSQL might include:

- an LLM to understand a developer's or DBA's request expressed in natural language;
- PostgreSQL monitoring tools to collect objective metrics such as slow queries, locks, wait events, cache hit ratios, replication lag, index usage, etc ;
- rule-based checks to enforce known best practices around schema design, indexing, configuration, backup policies, security, and high availability;
- statistical or machine-learning models to detect anomalies, forecast capacity needs, or identify unusual workload patterns;
- a knowledge base plus a machine-learning containing internal runbooks, past incidents, architecture decisions, and environment-specific constraints;
- a human PostgreSQL expert to validate risky recommendations, especially for production changes.

This is often more robust than relying on a single large model that is expected to diagnose and optimize everything on its own like … an Oracle AI ?

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A Closing Thought

I once had a conversation about AI with a renowned professor at HUG. He told me :

AI will make good doctors excellent — and bad doctors even worse.

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