Engineer Data

Accelerated PostgreSQL performance by 10x

Accelerated PostgreSQL performance by 10x via strategic indexing, partitioning, and query optimization, enhancing database efficiency for user, tenant, geospatial, and time-series electrical data.

2022 – 2024

10x

faster PostgreSQL, by indexing and partitioning

Situation. The PostgreSQL database served a mid-sized application managing user accounts, tenant information, geographical data (e.g., locations, regions), and daily electrical consumption metrics. While the system operated under low traffic, performance issues emerged as data volumes grew. Queries involving geospatial data and time-series electrical logs became sluggish, leading to inconsistent response times. The lack of optimized indexing, fragmented queries, and unpartitioned tables exacerbated the problem, creating bottlenecks for critical operations like user authentication, tenant management, and data reporting.

Task. The goal was to enhance database performance by 10x without overhauling the existing architecture. The focus was on optimizing query execution, reducing latency, and ensuring scalability for future data growth. Key priorities included improving response times for geospatial and time-based queries, minimizing resource contention, and maintaining data integrity while implementing changes.

Action. 1. **Indexing:** Analyzed frequently queried columns (e.g., user IDs, tenant IDs, geospatial coordinates) and created targeted indexes. For geospatial data, GiST indexes were added to speed up spatial queries. Composite indexes were introduced for multi-column filters, such as tenant ID + date ranges for electrical data. 2. **Partitioning:** Implemented time-based range partitioning for the electrical data table, splitting it by day/month. This reduced the dataset

size for queries and improved scan efficiency. For geographical data, hash partitioning was used to distribute load evenly across nodes. 3. **Query Optimization:** Rewrote complex queries to avoid full table scans, leveraging CTEs (Common Table Expressions) and materialized views for frequently accessed datasets. The `EXPLAIN ANALYZE` tool identified inefficient joins and subqueries, which were restructured for better execution plans. Additionally, query caching and connection pooling were configured to reduce overhead.

Result. Post-optimization, query response times improved by 10x, with critical operations (e.g., user authentication, geospatial lookups) executing in milliseconds. The database's resource utilization dropped by 40%, allowing the system to handle increased data volumes without performance degradation. Users reported smoother interactions, and the system became more scalable for future growth. The changes also reduced the need for hardware upgrades, saving costs while ensuring long-term reliability. This project demonstrated how strategic indexing, partitioning, and query refinement can transform even low-load systems into efficient, future-ready databases.

Bring this experience to your project

Use "Accelerated PostgreSQL performance by 10x" as a starting point for a similar challenge in your organisation. The services behind this work are available for your project. Somebody responsible for the thing the whole company rests on: it is up, it is backed up, and it is not quietly rotting.

Explore our services Get in touch →

Look behind the result

Read the situation, decisions and result in this example. We can discuss which parts transfer to your constraints and which need another approach. Accelerated PostgreSQL performance by 10x — 10x faster PostgreSQL, by indexing and partitioning

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Is PostgreSQL becoming your bottleneck?

Talk through your project with the engineer responsible for delivery. We agree the scope, price basis and handover in writing before work begins.

Role context: Database Engineer. It draws on Databases, PostgreSQL, SQL, Data Engineering, Performance Tuning and GIS / Geospatial. And while you are here, we are rather good at Database Administration (DBA) and Database Performance Tuning.

Get in touch Explore our services

One piece of **a longer record** — and it is all on this site.

Every entry is written the same way: the situation, the task, what we did and what changed.

See the whole record

Define the improvement you need

Bring a representative dataset, the questions it must answer and the current bottleneck. We can agree how to measure quality, throughput and recovery.

See what it costs Get in touch →

Is PostgreSQL becoming your bottleneck?

Ask about the decisions behind “Accelerated PostgreSQL performance by 10x”. You will speak with the people who can explain the work and assess your own project.

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welcome@engineer.company +45 50 10 61 84 Copenhagen, Denmark

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Carefully Crafted With Love by D.

CVR 45969703 · Tagensvej 105C, 3. th, 2200 København N

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