**Engineer** Data

# Improved GIS map performance 10x on PostgreSQL

Improved geographical map application performance by 10x through strategic database transition from MSSQL to PostgreSQL, including the data cutover, optimizing processing and data security.

2022 – 2024

## 10x

faster maps, after moving off MSSQL

**Situation.** The organization's geographical map application, which supported real-time spatial queries for many users, was experiencing severe performance bottlenecks. Latency in rendering map layers and querying location-based data impacted both user experience and backend service reliability. The system was backed by a legacy Microsoft SQL Server (MSSQL) database.

**Task.** Improve the performance, scalability, and security of the map application, with a specific goal of reducing query latency and increasing throughput for spatial operations.

**Action.** Led a strategic migration of the database from MSSQL to PostgreSQL with the PostGIS extension to enable native geospatial support.

- Designed a new schema optimized for spatial data, introducing GiST and SP-GiST indexes on geometry and geography columns for faster querying.
- Defined strict foreign key and check constraints to ensure relational integrity and enforce data validation rules on spatial coordinates.
- Migrated over 50 million spatial records using ETL pipelines with data transformation steps to conform to new SRID standards (EPSG:4326).
- Tuned PostgreSQL configuration parameters (e.g., work_mem, effective_cache_size) for optimal I/O performance under concurrent access.

- Implemented role-based access controls (RBAC) and row-level security to enforce data protection policies across multiple user groups.

**Result.** Achieved a 10x improvement in spatial query performance, reducing average response time from 2.5 seconds to under 250 milliseconds. Backend CPU load dropped by 65%, and system availability improved during peak usage. Security posture was also strengthened with granular access policies and data validation constraints, reducing potential for spatial data corruption.

### Bring this experience to your project

Use “Improved GIS map performance 10x on PostgreSQL” as a starting point for a similar challenge in your organisation. The services behind this work are available for your project. Finding the queries and the missing indexes behind a system that has got heavier every year, and fixing the ones that matter.

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### 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. Improved GIS map performance 10x on PostgreSQL — 10x faster maps, after moving off MSSQL

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## Want a faster, safer database behind your app?

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: Data Engineer. It draws on Backend Engineering, Databases, PostgreSQL, SQL, Data Engineering, Data Pipelines (ETL/ELT), Security, Performance Tuning, Migrations & Modernization and GIS / Geospatial. And while you are here, we are rather good at GIS & Geospatial Solutions, Database Performance Tuning and Database Migration & Modernization.

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## 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 →

# Want a faster, safer database behind your app?

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

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