PostgreSQL Indexing

Effective data management in the Medtech industry

April 2024

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Introduction

How does PostgreSQL indexing support business development in Medtech?

Managing large volumes of patient data, diagnostics, and treatments requires quick, reliable access to information. PostgreSQL indexes allow Medtech systems to optimise data queries, shorten response times, and maintain high standards in both performance and regulatory compliance.

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Why efficient data management matters in Medtech

- Fast access to patient history, results, and treatment data is essential.

- Query delays can lead to medical errors and reduced quality of care.

- Indexing optimises performance of databases, supporting scalable and secure operations.

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Types of PostgreSQL indexes and their use cases

B-Tree Index — Patient search by ID/date of birth, lab result filtering.

Hash Index — Medical staff authorisation by unique identifier.

GiST Index — Searching clinical notes or medical image indexing.

GIN Index — Quick searches in JSON-formatted medical records.

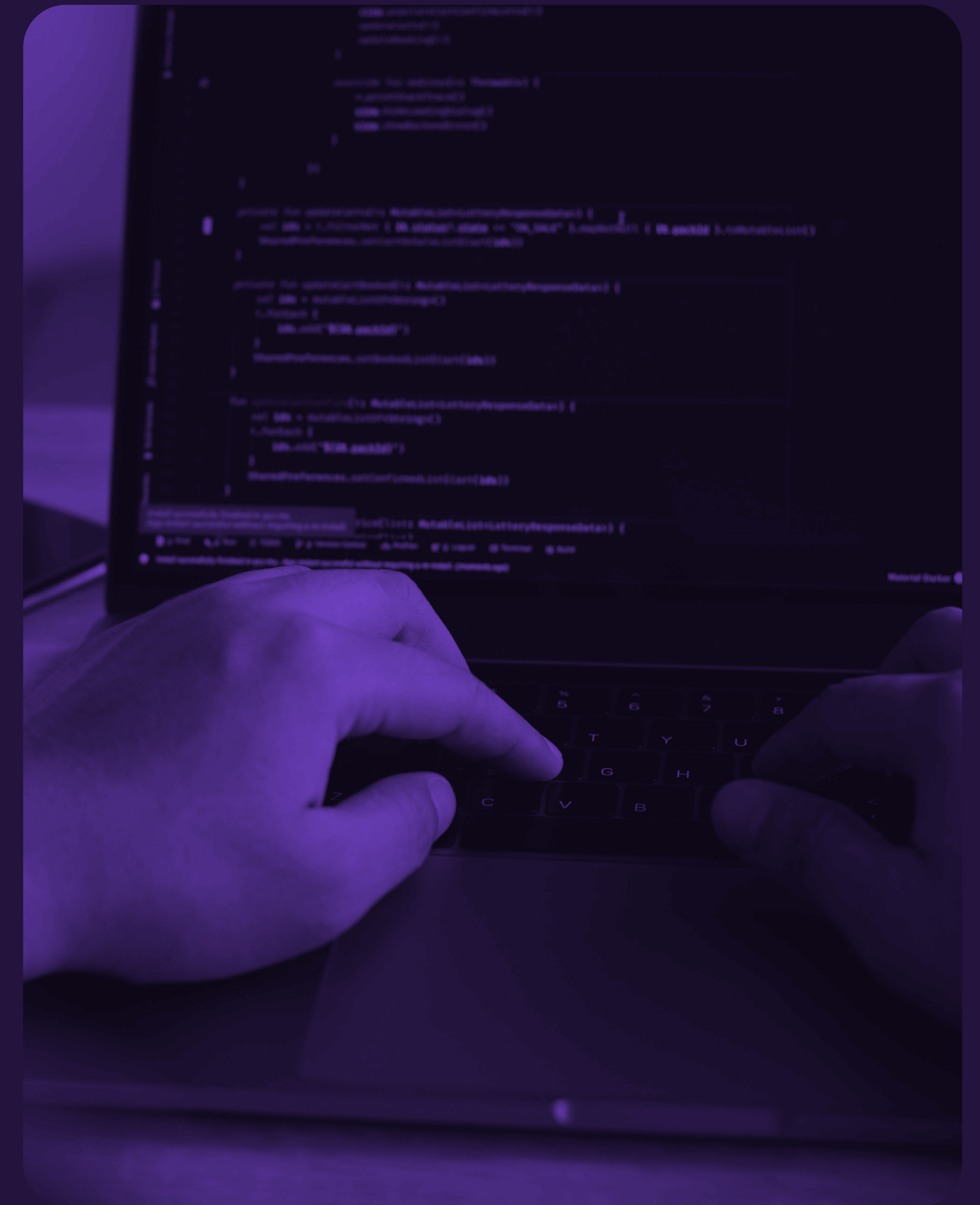**BRIN Index —** Real-time analysis of telemetry from monitoring devices.

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Challenges in implementing indexes

Data complexity — Medtech systems handle structured, semi-structured and unstructured data.

Compliance — Index strategies must align with HIPAA, GDPR.

Performance vs cost — Balancing speed improvements with infrastructure load.

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The main problem

How can Medtech companies efficiently store and analyse growing volumes of data while meeting regulatory requirements, integrating AI and medical analytics solutions and scaling operations in line with dynamic market needs?

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Business opportunities enabled by indexing

- Faster query execution for patient and lab records.
- Scalability of systems to accommodate data growth.
- Improved user experience and medical staff efficiency.
- Smarter use of system and hardware resources.
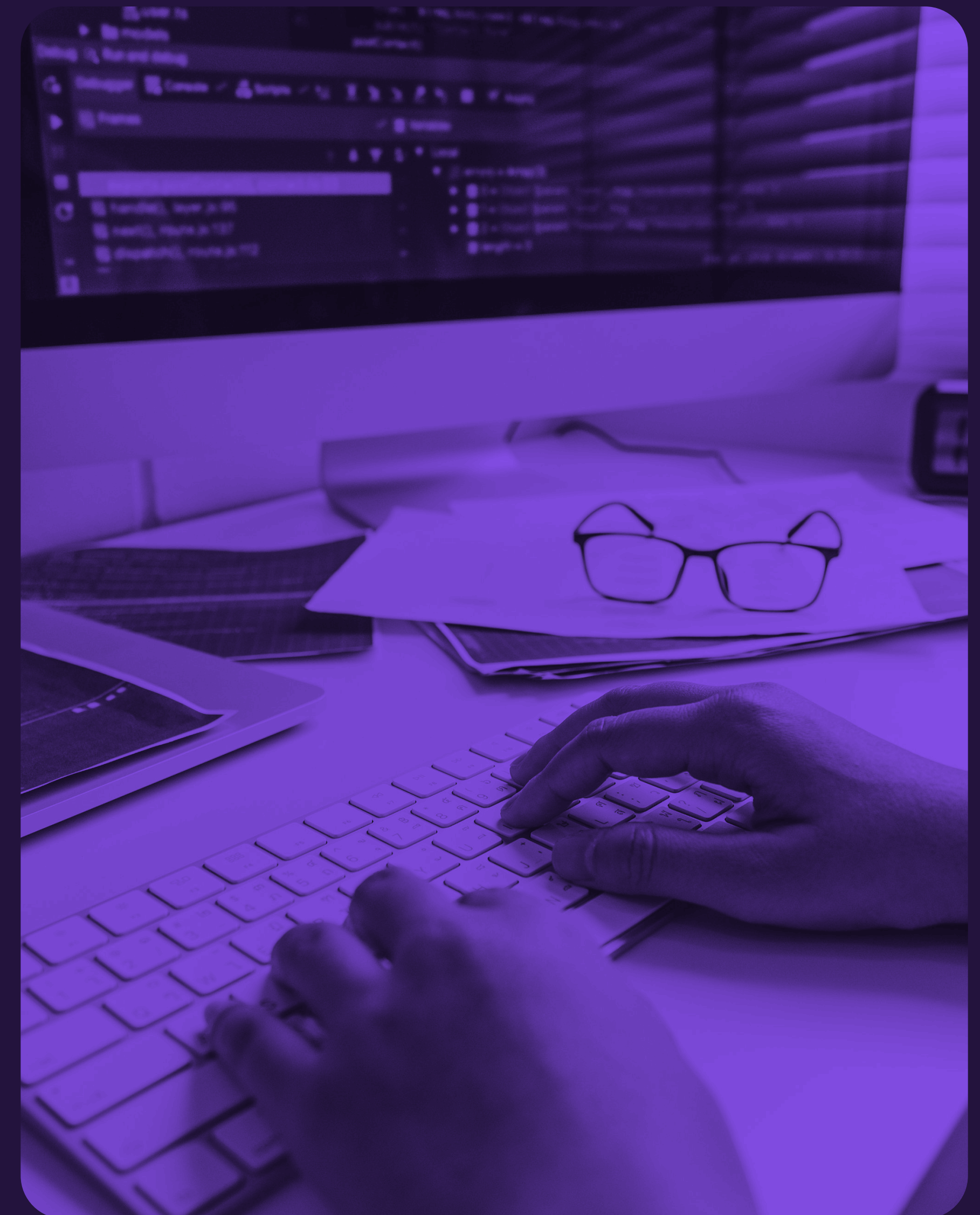
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Implementation process

Needs analysis: Identify high-frequency, critical queries.

Index selection: Match index type to data and query nature.

Index implementation: Create indexes on key columns.

Performance testing: Measure improvements post-indexing.

**Maintenance:** Monitor and reorganise indexes regularly.

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Implementation effects and ROI

- Reduced system response time.

- Higher volume of queries handled without infrastructure upgrades.

- Increased data integrity through unique indexes.

- Improved satisfaction among medical system users.

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Key success metrics

- Query response time before and after indexing.

- First-attempt query success rate.

- Operations per second (read/write throughput).

- Changes in CPU and memory usage.

- Staff feedback on speed and system stability.

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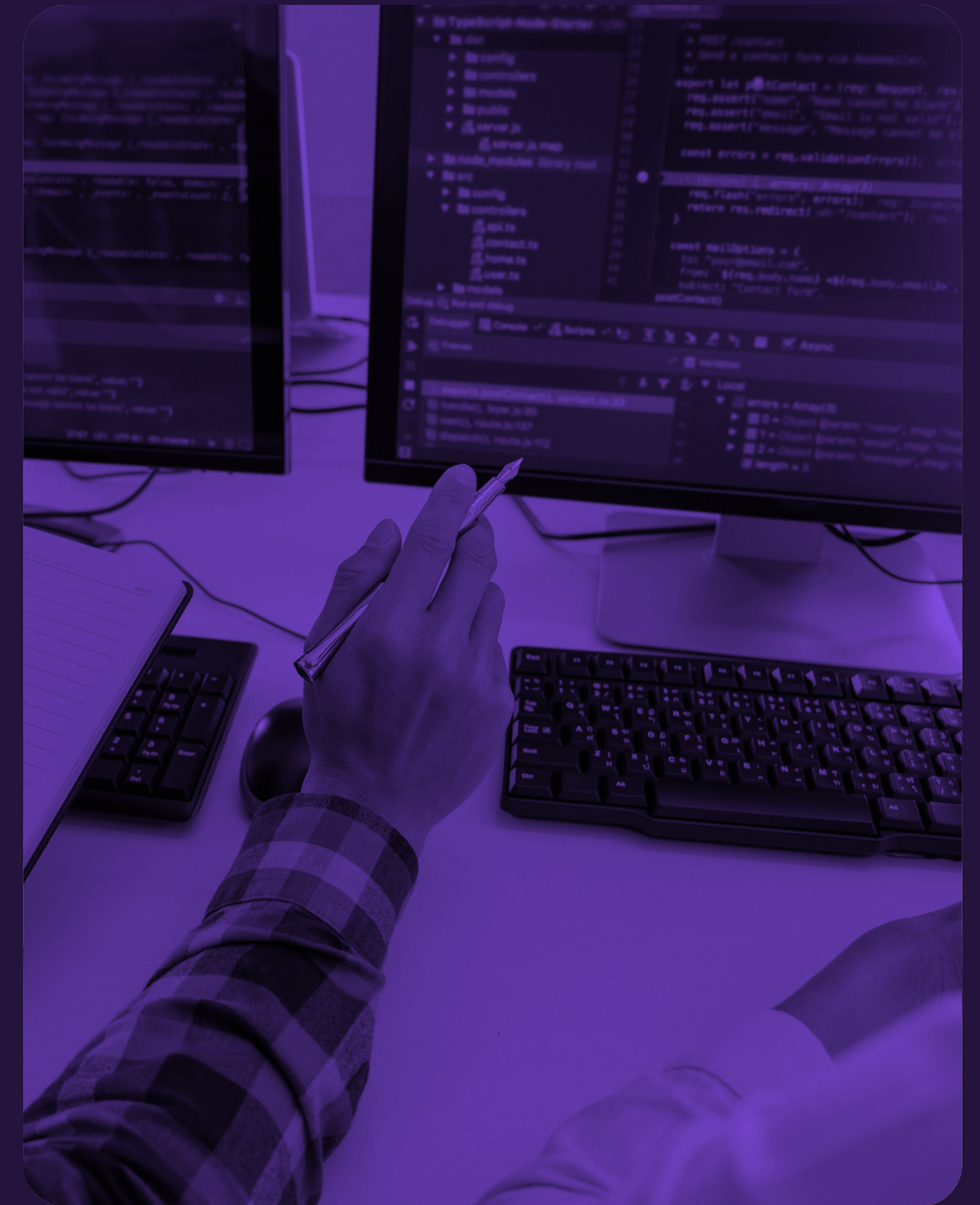
Summary

PostgreSQL indexing offers Medtech organisations a reliable and scalable solution for data management. It boosts speed, enhances operational performance, and ensures compliance with healthcare data regulations.

Adopting the right indexing strategy enables:

- **Faster data processing**

- **Lower system operating costs**

- **Improved data quality and reliability**

- **Better patient care through optimised information access**

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The Neoncube Team

Jacek Nosal

jacek@neoncu.be

+48 693 293 324

Michał Smoliński

michal@neoncu.be

April 2024

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