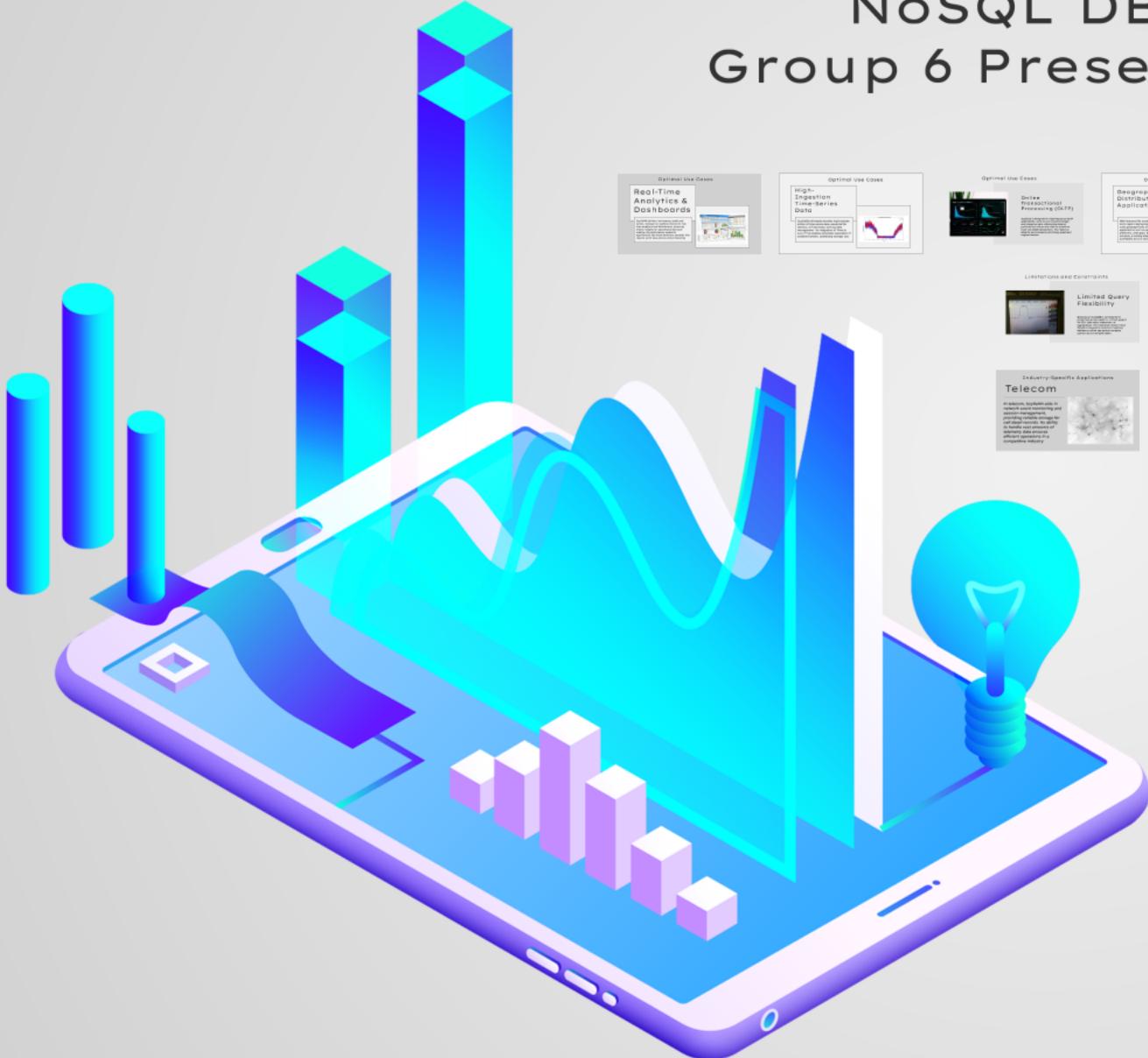


ScyllaDB NoSQL DBMS

Group 6 Presentation



A Comprehensive Analysis of:

- Use Cases
- Industry Applications
- Limitations, and
- Comparisons

Optimal Use Cases

Real-Time Analytics & Dashboards

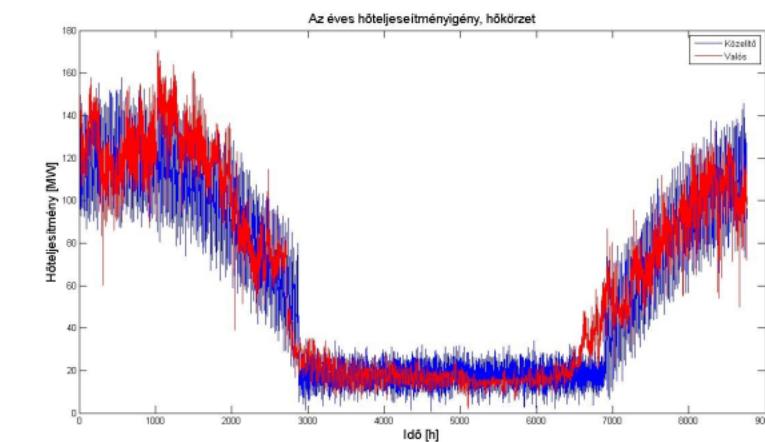
ScyllaDB delivers low-latency reads and writes, making it an optimal choice for real-time analytics and dashboards, ensuring timely insights for operational decision-making. Its performance supports applications like fraud detection systems that require quick data access and processing.



Optimal Use Cases

High-Ingestion Time-Series Data

ScyllaDB efficiently handles high-volume writes of time-series data, essential for metrics, IoT telemetry, and log data management. Its integration of Time to Live (TTL) enables automatic expiration of outdated entries, optimizing storage use.



Optimal Use Cases



Online Transactional Processing (OLTP)

ScyllaDB is designed for high-frequency OLTP applications, such as user session storage and shopping carts, offering low-latency performance without the need for extensive multi-row ACID transactions. This makes it ideal for environments prioritizing speed and responsiveness.

Optimal Use Cases

Geographically Distributed Applications

With features like tunable consistency and multi-region deployment support, ScyllaDB suits geographically distributed applications such as global SaaS platforms, chat apps, and streaming services, ensuring adaptability and availability across various regions.



Optimal Use Cases



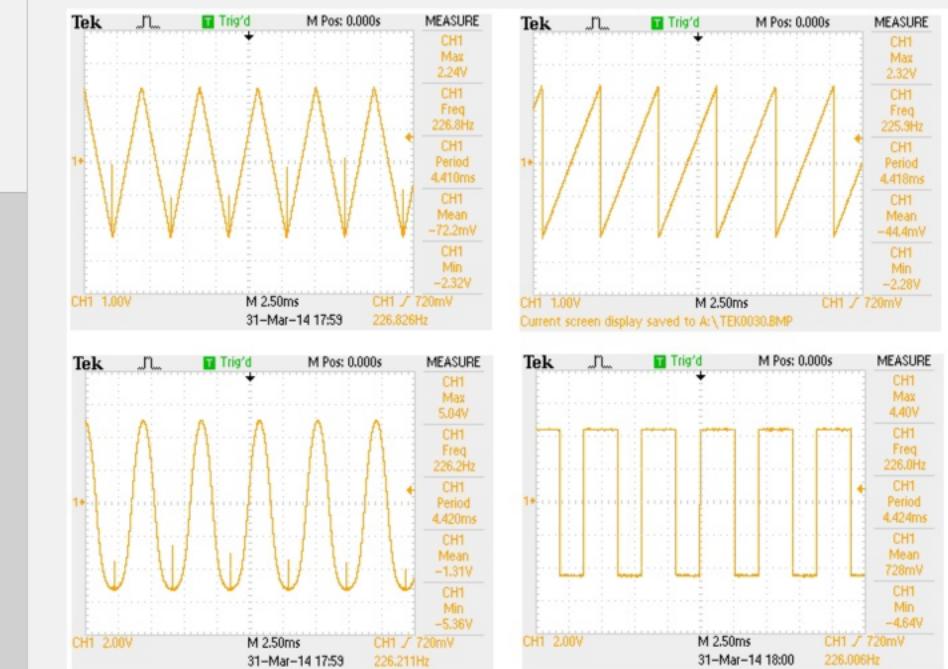
Cassandra Replacement

ScyllaDB serves as a practical drop-in replacement for Apache Cassandra, offering wire-level compatibility with improved performance and reduced hardware requirements. Organizations can transition with minimal disruptions while enjoying lower operational overhead.

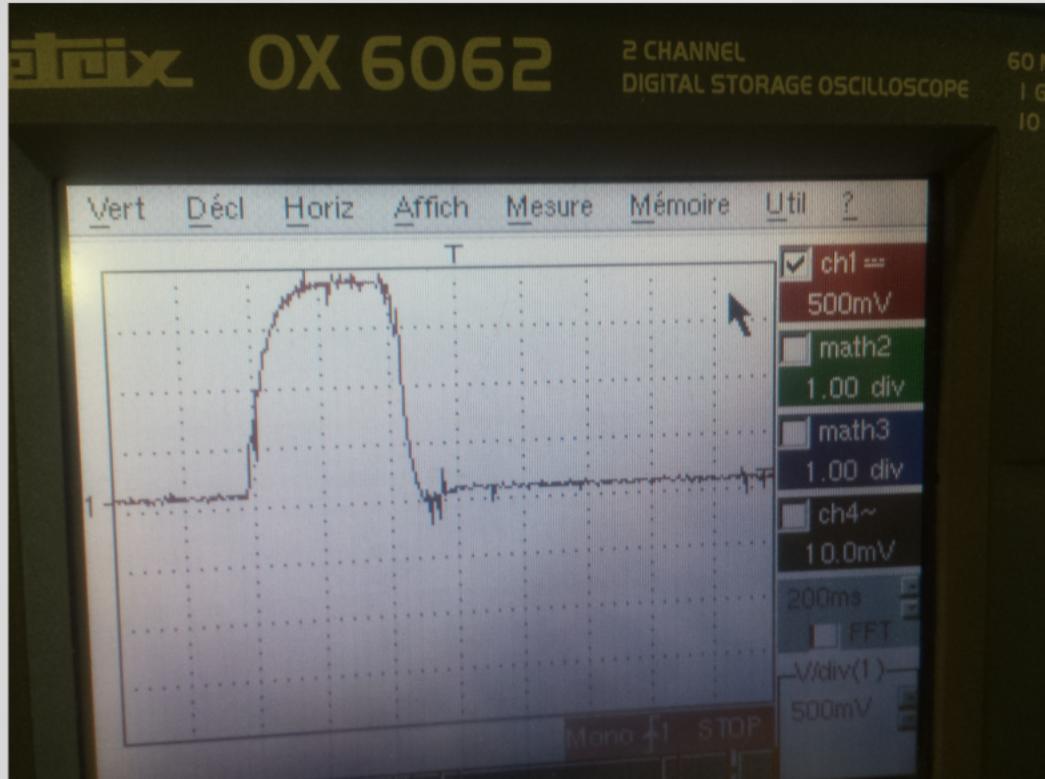
Limitations and Constraints

Lack of Full ACID Transactions

ScyllaDB provides eventual consistency and tunable consistency levels but lacks full ACID compliance. This means complex transactional logic, like multi-row updates with rollback capabilities, is not supported, which can be a drawback for applications needing strong consistency guarantees.



Limitations and Constraints



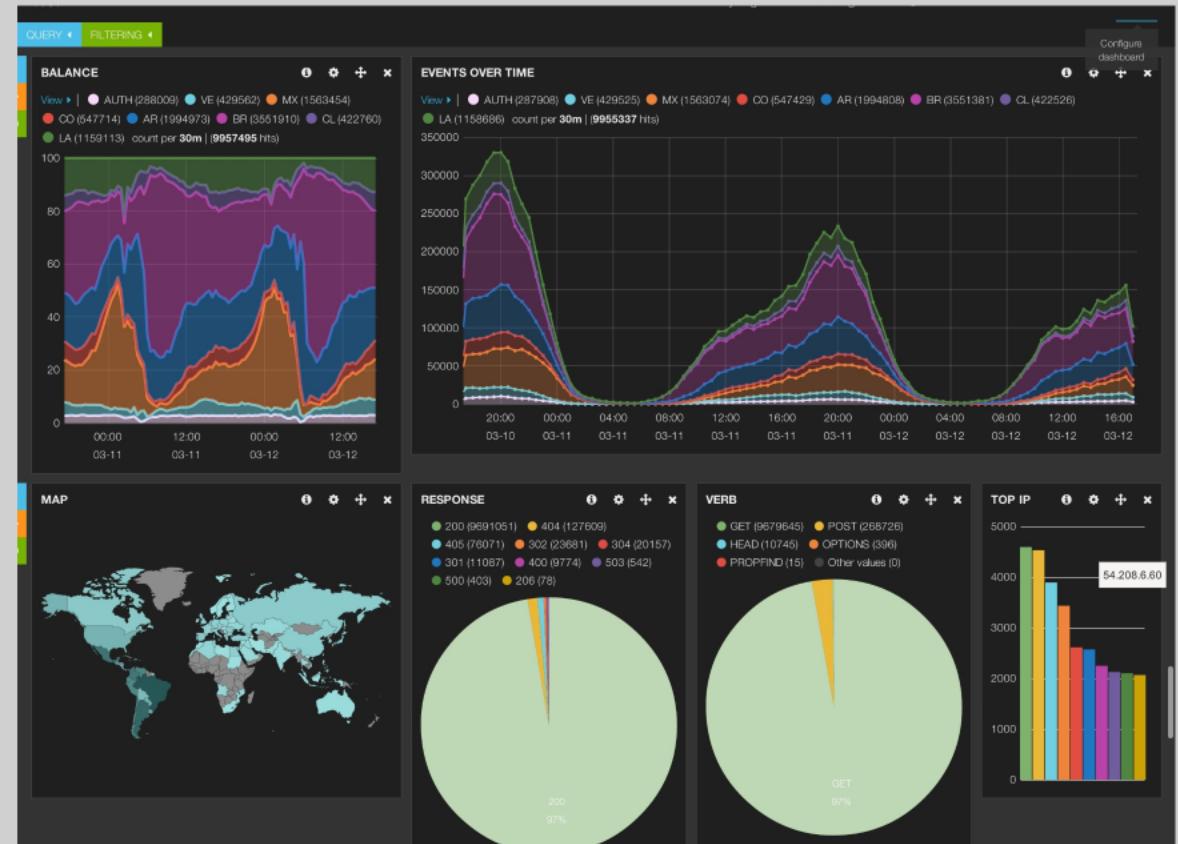
Limited Query Flexibility

Querying in ScyllaDB is constrained to predefined access patterns, without support for SQL-style joins, subqueries, or aggregations. This restriction makes it less flexible compared to traditional relational databases, which can perform complex queries across multiple tables.

Limitations and Constraints

Operational Complexity at Small Scale

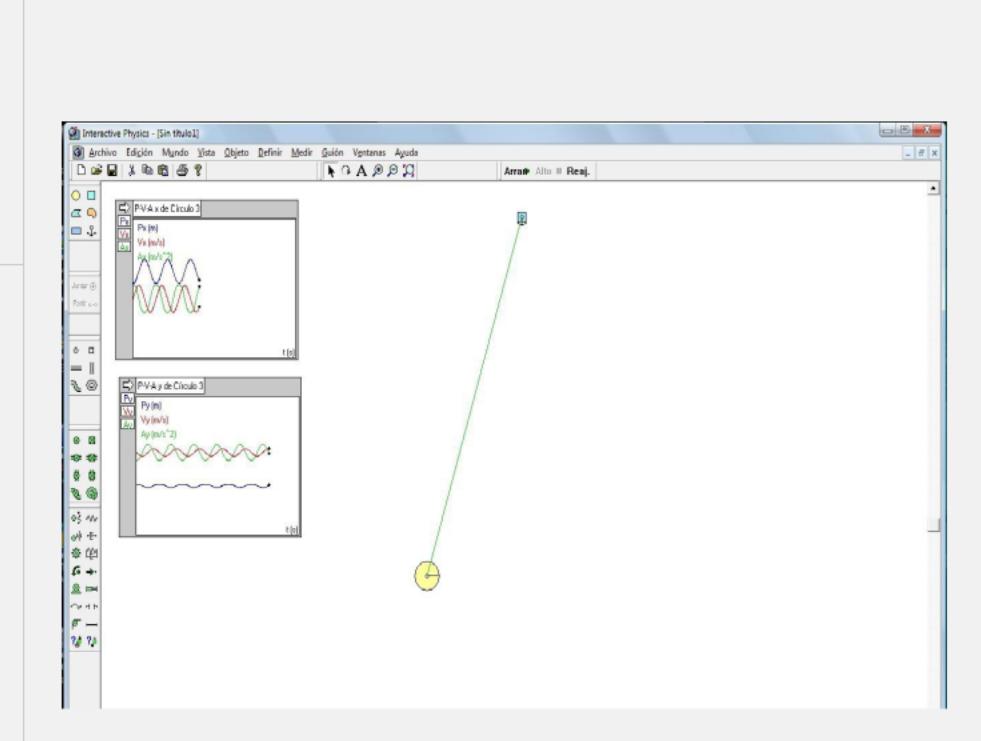
Although ScyllaDB excels at scale, its configuration and tuning requirements may lead to operational complexity for smaller applications. Settings like shards and compaction strategies can be overwhelming and unnecessary for simpler, non-distributed environments.



Limitations and Constraints

Requires Schema Discipline

ScyllaDB necessitates careful schema design tailored to specific query patterns to achieve optimal performance. Misusing partition keys or failing to model data correctly can lead to performance degradation, such as hotspots and bloated partitions.



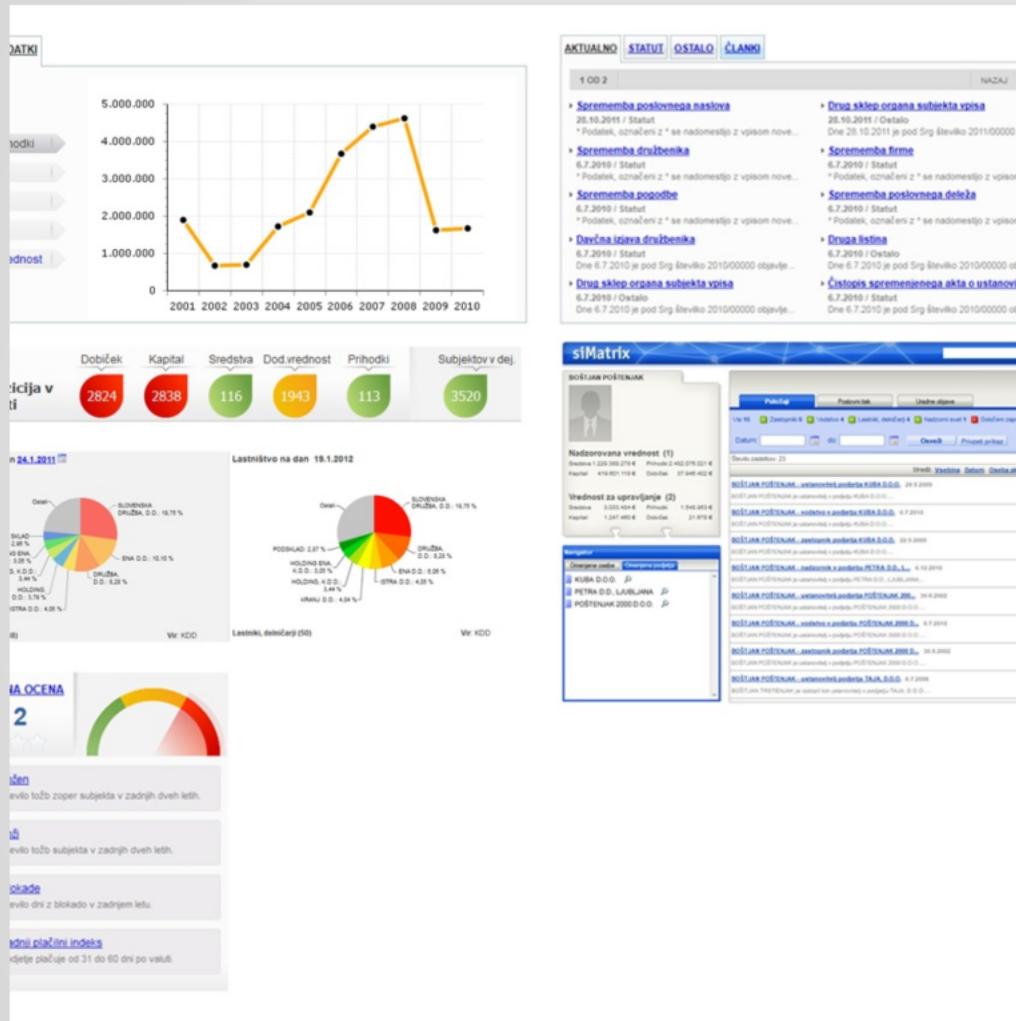
Limitations and Constraints



Ecosystem Limitations

Compared to more mature database ecosystems like PostgreSQL and MongoDB, ScyllaDB's ecosystem has fewer native integrations for BI tools or analytics engines. The absence of native full-text search further limits its versatility in certain analytical applications.

Industry-Specific Applications



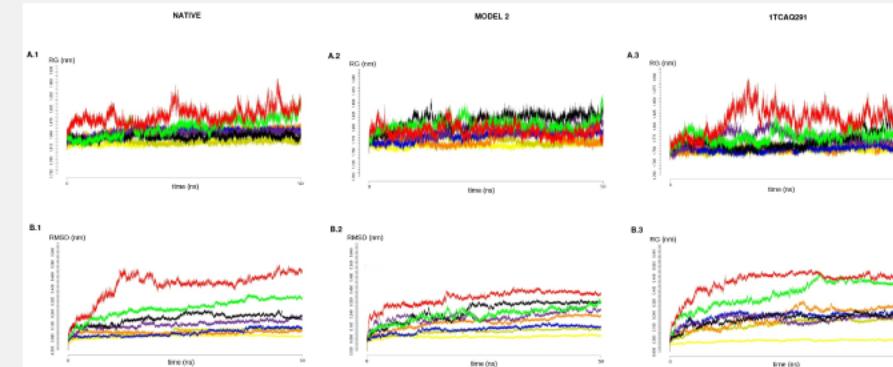
Finance

In finance, ScyllaDB is utilized for real-time fraud detection and transaction logging due to its low-latency capabilities. It supports high-frequency data ingestion and analytics, essential for monitoring and portfolio management.

Industry-Specific Applications

Retail/E-commerce

ScyllaDB enhances retail applications by supporting product recommendations, shopping cart state, and real-time inventory tracking. Its ability to manage high-throughput data streams ensures an improved user experience and operational efficiency.



Industry-Specific Applications

Telecom

In telecom, ScyllaDB aids in network event monitoring and session management, providing reliable storage for call detail records. Its ability to handle vast amounts of telemetry data ensures efficient operations in a competitive industry.



Industry-Specific Applications

IoT

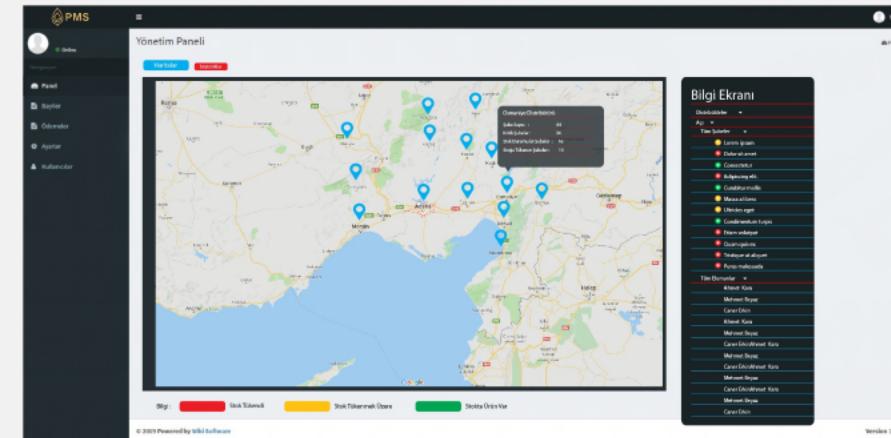
ScyllaDB is ideal for IoT applications as it allows for efficient sensor data ingestion and telemetry processing. Its scalability ensures that it can support edge devices and high-velocity data streams, vital for real-time insights.



Industry-Specific Applications

Gaming

In the gaming industry, ScyllaDB serves pivotal functions such as leaderboard management and session state storage. Its low-latency transaction processing is essential for providing seamless gaming experiences to users.



Industry-Specific Applications

Ad Tech

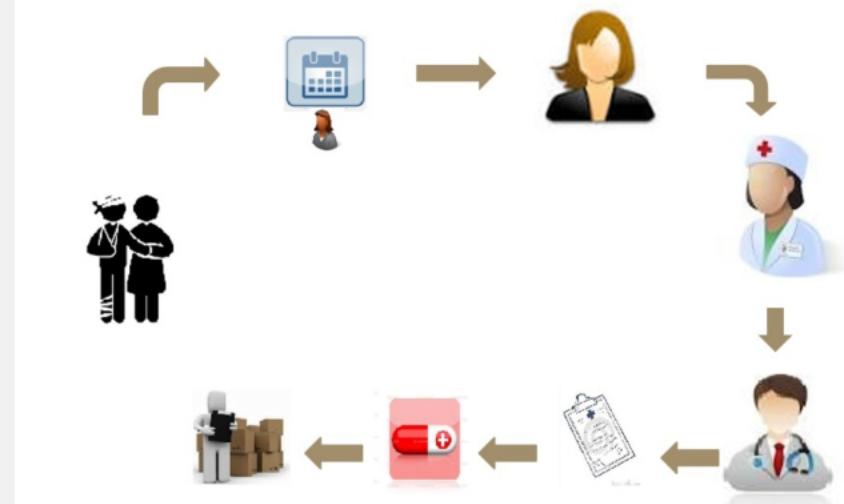
In advertising technology, ScyllaDB powers real-time bidding platforms, enabling fast and efficient impression tracking and user segmentation. This capability supports dynamic ad placements and improved targeting strategies for marketers.



Industry-Specific Applications

Healthcare

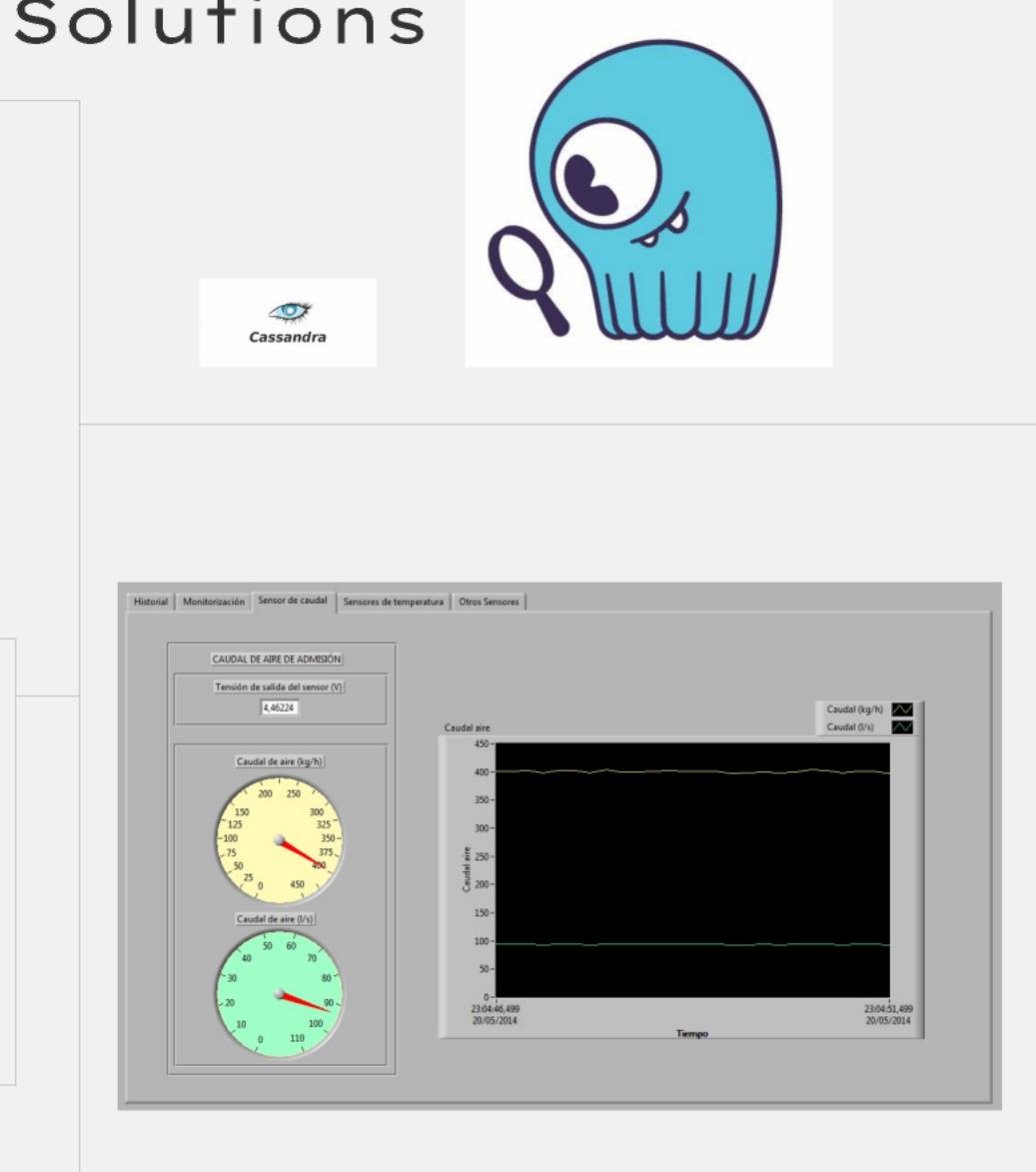
ScyllaDB supports healthcare applications such as patient monitoring systems, ensuring compliance with standards like HIPAA. Its real-time data processing capabilities are essential for aggregating streaming device data, enhancing patient care.



Comparitive Analysis With Competing Solutions

ScyllaDB vs. Cassandra

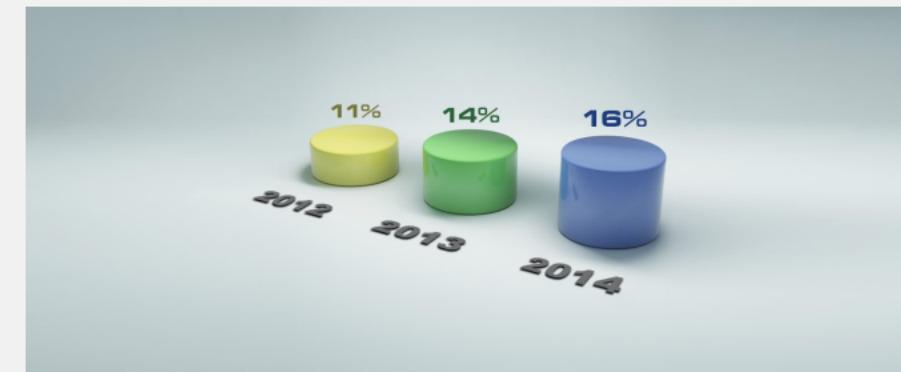
ScyllaDB outperforms Cassandra in speed and resource efficiency due to its shard-per-core architecture, which optimizes resource usage. Additionally, ScyllaDB offers wire-level compatibility with Cassandra, allowing for a smoother transition for existing applications.



Comparitive Analysis With Competing Solutions

ScyllaDB vs. MongoDB

While MongoDB excels in flexible querying and schema design, ScyllaDB provides better scalability for write-intensive workloads with low latency. This makes ScyllaDB more suitable for applications requiring high throughput, such as real-time analytics.



Comparitive Analysis With Competing Solutions

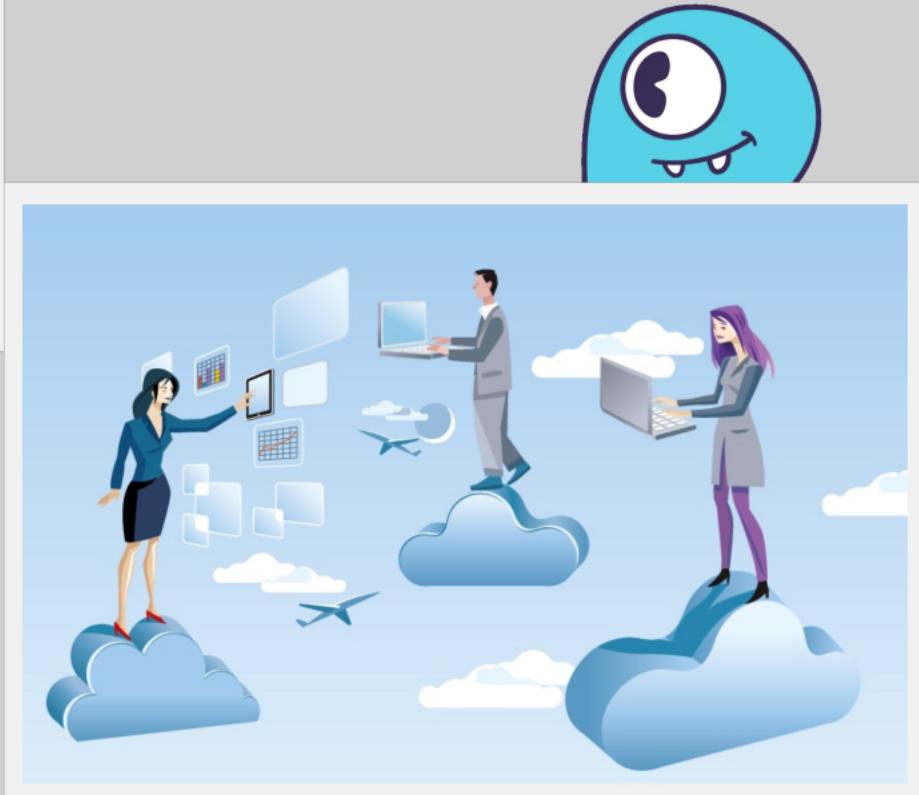
ScyllaDB vs. PostgreSQL

ScyllaDB sacrifices complex query and transactional capabilities for enhanced speed and distributed scalability. It is ideal for high-availability scenarios but should not replace PostgreSQL for use cases requiring strict ACID compliance and sophisticated queries.



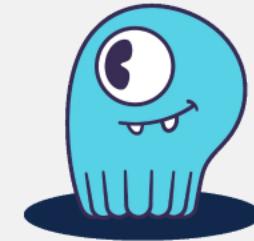
Conclusion and Recommendations

ScyllaDB is optimal for real-time, high-throughput applications where performance and scalability take precedence over transactional support. Select ScyllaDB when speed and resource efficiency are critical, and reserve relational databases for applications needing complex queries and strict data management.



References

ScyllaDB Documentation. <https://docs.scylladb.com/>



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