



i2i Systems

# AN OVERVIEW OF VOLTDB

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# OVERVIEW

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What is VoltDB?

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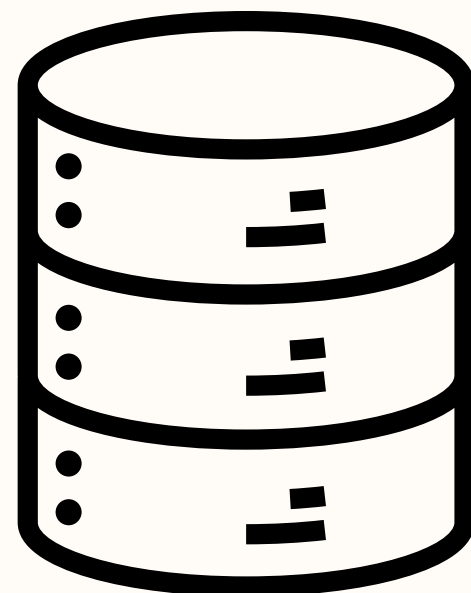
Key Features and Optimizations

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# WHAT IS VOLTDB?

VoltDB is a high-performance, in-memory relational database management system (RDBMS) designed for high-throughput, low-latency transactional workloads.

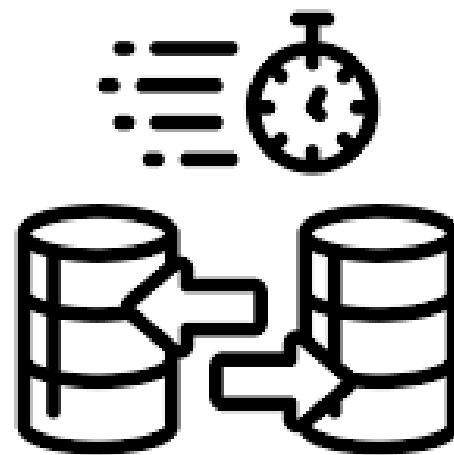


It combines the familiarity of SQL with modern in-memory and distributed computing technologies. By storing data in RAM and leveraging a distributed architecture, VoltDB ensures fast data processing and scalability.

# KEY FEATURES AND OPTIMIZATIONS

# IN-MEMORY STORAGE

All data in VoltDB is stored in RAM rather than on disk. This allows for extremely fast read and write operations because accessing data in memory is much quicker than accessing data on disk





# DISTRIBUTED ARCHITECTURE

VoltDB partitions data across multiple nodes in a cluster, providing horizontal scalability and high performance

- Partitions are distributed across nodes.
- Data is partitioned based on a partitioning key
- Transactions are routed to the relevant node based on the partitioning key

# SINGLE-THREADED EXECUTION

Single-threaded execution ensures that each partition has its own single thread and processes transactions sequentially using this single thread

- Simplifies transaction management by avoiding the performance cost caused by managing multiple threads
- The single-threaded approach maximizes CPU efficiency by avoiding context switching, which is common in multithreaded systems
- Each node can process its partitions independently, enabling parallel transaction processing across the cluster

# BUILT-IN HIGH AVAILABILITY

High availability ensures that the database remains accessible and operational even in the event of failures.

- Data is automatically replicated across multiple nodes
- If a node fails, its tasks are automatically transferred to another node
- The cluster continuously monitors the health of each node



# COMPARISON BETWEEN VOLTDB AND TRADITIONAL RELATIONAL DATABASES

- **Storage:** VoltDB uses RAM for data storage, enabling extremely fast read/write operations, whereas traditional RDBMS use disk storage
- **Architecture:** VoltDB employs a distributed, partitioned architecture for high scalability and fault tolerance, while traditional RDBMS typically use a single-node architecture, which is simpler but less scalable
- **Concurrency Control:** VoltDB utilizes single-threaded execution within partitions, simplifying concurrency control and reducing overhead, whereas traditional RDBMS use multi-threaded execution with locks and latches, allowing for complex concurrency management

- **High Availability:** VoltDB has built-in high availability with automatic replication and failover, whereas traditional RDBMS often require additional setup for high availability
- **SQL Optimization:** VoltDB features advanced cost-based optimization and parallel execution for efficient query handling, whereas traditional RDBMS utilize mature and reliable query optimization techniques developed over decades.
- **Performance:** VoltDB is optimized for high throughput and low latency, ideal for real-time processing, while traditional RDBMS provide balanced performance for a wide range of transactional and query needs

**Use Cases:** VoltDB is best suited for real-time analytics, financial services, and telecommunications, while traditional RDBMS are ideal for general-purpose applications and legacy systems with broad compatibility



# REFERENCES

01 <https://docs.voltodb.com>

02 <https://chatgpt.com>

03 <https://www.odbms.org>





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<https://www.linkedin.com/in/burak-atalay-/>



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