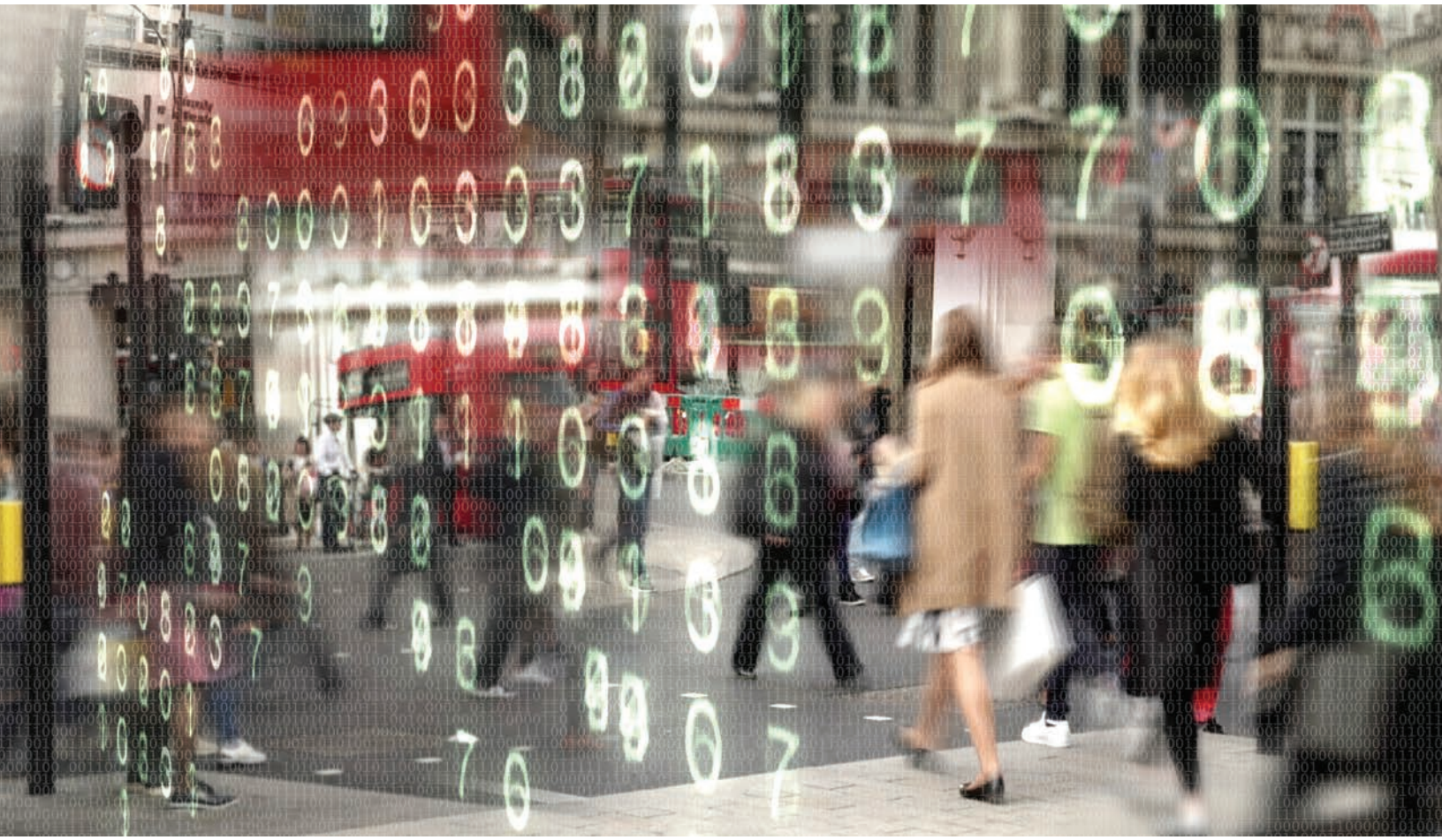
Surviving in the New, High-Speed World of Financial Services

Solution Guide



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A LEADING GLOBAL BANK IMPROVED DATA THROUGHPUT 500%, REDUCED LATENCY BY 1,000%, AND LOWERED OPERATING COSTS BY 75% COMPARED WITH ITS PREVIOUS IN-MEMORY DBMS, ALL WITHOUT A SINGLE INCIDENT SINCE ITS INITIAL IMPLEMENTATION.

The High-Speed World of Financial Services

Increasing trade volumes and periods of high market volatility can create significant challenges for financial services firms' data management infrastructure.

This is especially true in front- and middle-office applications in capital market firms. Sell-side firms in particular can experience extremely high transaction volumes, since they partition already high volumes of incoming orders into even more orders for execution. At the same time, they must support a high volume of concurrent analytic queries to provide information on order status, risk management, compliance, surveillance, and other key metrics, for internal and external clients. This requirement for multi-workload processing at very high scale — coupled with the need for the highest levels of performance and reliability, and a low total cost of ownership — has been difficult to achieve.

Compounding the challenge is the fact that transaction volumes not only grow incrementally and within expectations, but also often spike dramatically in response to unexpected world events. Recent examples include the 2008 financial crisis, 2010 Flash Crash, devaluation of China's currency in 2015, Brexit, trade wars, and many other political events.

The data platform underlying a firm's real-time and near real-time front- and middle-office applications is a critical component of its technology infrastructure. The applications must be extremely reliable and highly available — able to withstand both normal transaction volume growth and the extreme spikes that can occur during periods of market volatility, without incident.

A failure, or even just a slowdown, of the underlying data management infrastructure can have severe consequences for a firm. For example, with in-memory database technologies, it can take minutes or hours to rebuild the database and resume normal operations after a failure. In the meantime, the firm's ability to process additional trades and provide order status and other critical information is compromised, and financial losses mount.

Even a slight delay or outage can cause significant financial losses and impact a firm's reputation. One major bank recently reported a loss of $100,000 for each minute that its order management system was down.

Example: Order Management System

An order management system is a critical component of a bank's technology platform. It must record all orders originating from both clients and internal sources, ensure proper routing and execution of the orders, maintain the state integrity of each order (for example, if an order is only partially filled), record and properly allocate all trade executions, and preserve all data, while concurrently processing analytic workloads on the trade data. It is absolutely mission-critical; it cannot slow down, drop trades, or go dark, regardless of market volume or volatility.

To successfully handle growth and volatility without performance or availability issues, a data platform must balance transactional workloads with the concurrent analytic demands of downstream applications. Financial services organizations must be able to process millions of incoming messages per second while simultaneously supporting thousands of analytic queries per second from hundreds of systems that must report on the state of orders while performing other queries.

Traditional operational databases are too slow to accommodate the high throughput and data-access rates required. And in-memory databases alone are not sufficient for many applications for a number of reasons:

- **Scale limitations.** Because the data in an in-memory database is stored in main memory, the working data set is limited by the available amount of memory. As a result, as data volumes and/or analytic query workloads increase, at some point both the transaction processing and the analytic queries will slow or stall.
- **System downtime.** Because the data is stored in memory, if the database server fails, the data that is resident in memory on that server is lost. Some in-memory database systems offer persistence through mirror databases, replication, and other approaches. These techniques can affect ingest performance and cost, and increase maintenance complexity. For databases where the data is stored in files and transaction logs, the recovery effort involves rebuilding the database using the logs, checkpoint files, and other backup data. This is a time-consuming process, during which time the bank's ability to process orders is compromised, resulting in revenue losses and other penalties to the business.
- **High costs.** Scaling in-memory systems is expensive. And because servers have hard memory limits, scaling in-memory databases beyond these limits requires firms to purchase additional nodes to sustain normal operations and allow headroom for unexpected volatility, which increases costs.

A New Approach

Fortunately, there is a new approach that delivers performance equal to or better than that of an in-memory database, but with none of the compromises. InterSystems IRIS® data platform provides the durability and reliability of a traditional operational database, but with better resource efficiency and a lower total cost of ownership. Unlike both in-memory and traditional operational databases, it is optimized for extremely high performance for both transactions and concurrent analytical processing, without incident or performance degradation, even during periods of extreme market volatility.

This data platform delivers fast transactional and analytic performance without sacrificing scalability, reliability, or security. It handles relational, object, document, key-value, and multi-dimensional data in a common, persistent storage tier, without any replication of the data.

Unlike traditional in-memory databases, since the data is always stored on disk in a format optimized for random access, there is never a need to rebuild the database.

The data platform offers a unique set of features that makes it highly attractive for mission-critical transactional-analytic applications, including:

- High performance for transactional workloads, with built-in persistence,
- High performance for analytic workloads,
- Consistent high performance for concurrent transactional and analytic workloads at scale, and
- Lower total cost of ownership compared with in-memory technologies.

Conclusion

The high-speed world of financial services presents some of the most demanding requirements for technology infrastructures.

Fortunately, there is a technology that can meet these seemingly conflicting requirements: processing both transactions and analytic queries concurrently, at very high scale, with the highest levels of reliability even when markets spike, and with a low total cost of ownership.

For more information about InterSystems IRIS data platform, visit **InterSystems.com/Financial**.

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