



# Accelerating the Pace of Digital Transformation

## Aerospike in Financial Services

The pace of digital transformation in the financial services industry is rapidly accelerating. Catalysts for change include technology innovations related to big data, distributed computing, the cloud, mobile applications and the proliferation of social media. Economic, business and political forces, many of which are byproducts of the 2008 financial collapse, are also playing a role. Banks and investment firms are confronting a tsunami of new regulations, intensified global competition and growing shareholder pressure for greater transparency and accountability.

The industry is making massive IT investments to adjust to these challenges and exploit new opportunities for growth and competitive advantage. IDC projects that total IT spending for the worldwide financial services market will reach \$522.3 billion by 2018.

IT spending by traditional banks and investment firms is being augmented by legions of financial technology (aka "FinTech") startups that include payments processors, alternative lending firms, and automated investment services. These investments are spawning new applications and solutions designed to acquire, retain, and grow a technology-savvy generation of customers who expect more than ever before.

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The task for established financial institutions is particularly daunting. They must maintain and modernize their core systems, while also introducing new customer-facing applications. These new applications, often referred to as systems of engagement, need to integrate and coexist with back-end systems of record.

IT departments are focusing their attention on developing realtime, mission-critical customer service and risk management applications that require instantaneous response times, massive scalability, and the ability to accommodate diverse types of data.

Most of these applications are being built on top of NoSQL databases, which offer significant advantages over traditional relational database technology. These include a schema-less data model, the ability to store and process structured and semi-structured data, and a distributed computing architecture.

Collectively, these technical characteristics make it faster and easier to develop and update applications, and to scale elastically as workloads, users, and data volumes grow, all without compromising speed and performance. NoSQL also brings notable cost advantages.

## Financial Services Use Cases



**Intraday System of Record/Operational Trade Store** – Banks and brokerage firms handle millions of transactions every day – executed from mobile devices, PCs, ATMs, and branch offices. Payments, deposits, withdrawals, transfers, and trades need to be fast, accurate, and secure.



**360-Degree Customer View** – Many financial institutions are focusing their attention on eliminating disconnected silos of customer information residing in legacy systems and systems acquired through merger activity. In addition to improved customer service, the integration of internal customer data with third party data and social media is critical in developing personalized banking, brokerage, and wealth management applications that leverage recommendation engines to present “right-time” offers.



**Systematic Trading & Trade Repository** – Fund managers and equity traders track tens of thousands of stocks, bonds and other financial instruments across multiple exchanges in real time to detect market signals that trigger buy and sell actions. The volumes of data involved are enormous, as these systems rely on years of historical data for time series analysis. Financial institutions are also mandated to store trade data for 7 years or more.



**Compliance** – Compliance mandates such as KYC (Know Your Customer), AML (Anti-Money Laundering), FATCA (Foreign Account Tax Compliance Act), and Dodd-Frank require the correlation of vast amounts of diverse data pertaining to customers, associates, and trades. Dodd-Frank Title VII, which requires the correlation of swap trades to the communication records (including phone messages, email and text) that preceded the transaction, illustrates the need for managing structured and semi-structured data types.



**Fraud Detection** – The consequences of fraud include monetary losses, damage to reputation and brand, and in some cases, regulatory and legal penalties. Rules-based systems need to detect irregular credit and debit card activity, trading activity, and identity theft by processing multiple queries and performing deep analysis on each incoming transaction within an SLA window. Low latency is extremely important, not only to detect potential fraudulent activity, but also to ensure that false positives don't occur that block legitimate transactions don't occur.



**Risk Modeling & Analysis** – Financial institutions need an integrated, real-time view of market, credit, and liquidity risk exposure across asset classes and customers. Risk management applications integrate, aggregate, and model diverse data sets from multiple systems to enable analysis and simulations. The output from these models help organizations comply with capital and liquidity mandates and optimize risk-adjusted returns.

## Why Leading Financial Services Institutions Use Aerospike

Many of the world's largest banks, brokerage houses, and payment processing firms are building their applications on Aerospike to meet today's requirements and future-proof their systems as global markets, government regulations, and technology continuously change.

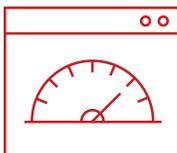


**Speed at Scale** – Applications deployed by retail and commercial banks, investment firms, and portfolio managers process massive and fluctuating volumes of data, transactions, and customers. For these applications, speed is of the essence. For example, a delay of even a few milliseconds can result in a fraudulent transaction or an unacceptable risk exposure position.

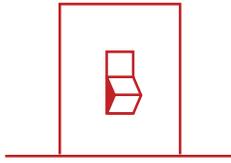
Aerospike is designed from the ground up to achieve unrivaled speed at scale through a broad set of capabilities and unique innovations.

Automatic database sharding is a key capability in the Aerospike architecture that dramatically improves performance by distributing the database and the workload across multiple servers. Sharding occurs on the fly, in real time, with no manual intervention, and removes application-level sharding built into the code.

Aerospike has pioneered a modernized architecture that takes advantage of memory in a way that has never been done before. Rather than using conventional file systems on top of the O/S block and file caches, Aerospike utilizes DRAM for the index and stores the data on SSDs treated as a raw block device. Aerospike's proprietary log structured file system is built to exploit the properties of Flash devices while eliminating issues associated with wear leveling, yielding superior and consistent performance and throughput. And unlike other NoSQL solutions, Aerospike is able to drive dozens of SSD devices per server before it becomes CPUbound. Its parallelism is powerful, both within a node and across nodes; the best performance is achieved by scaling up on one node and scaling out across nodes using DRAM and Flash. Access is optimized for the way in which Flash works – with small block reads and large block writes – and parallelized across multiple SSDs for better throughput.



**Predictable Performance** – Financial services firms operate in highly dynamic markets that are prone to extreme and unpredictable spikes in volume and activity, triggered by trade signals, market news, seasonality and other variables. Development teams need to be confident that the system always has the necessary capacity and elasticity to handle any load at any time. Unlike relational databases, which are designed to scale vertically on a single server, Aerospike's distributed NoSQL architecture features the ability to scale up and scale out across servers, clusters, and data centers. Automatic scaling occurs in a linear fashion, ensuring that read and write performance is consistent and predictable, even during surges in financial transactions.



**High Availability** – Aerospike’s distributed “shared-nothing” architecture and patented algorithms reliably store data with automatic failover and provide replication at the server level to handle failures. By integrating these mechanisms with transaction processing, the system is highly resistant to common failures and is, to a great extent, self-managing. Automated load rebalancing, rolling upgrades, fault-tolerance, background backups and restores, and Cross Datacenter Replication (XDR) are all built into the Aerospike solution. With no single point of failure, financial services firms are protected from unplanned outages and can be confident their sites are always available to customers and internal users.



**Lower Total Cost of Ownership** – A key advantage of Aerospike’s unique “built for SSD” architecture is that it requires far less hardware than conventional relational and NoSQL databases. For example, Aerospike enabled a major US bank and brokerage firm to re-engineer its intraday system of record with one-tenth the number of servers that were needed using an alternative database. Dramatic reductions in hardware expenses are supplemented with similar savings in staffing costs associated with Aerospike’s simplified architecture and built-in automation. DevOps teams are insulated from the common challenges of maintaining separate tiers for cache and persistent storage, and from separate databases for reads and writes. Automated database sharding and system self-management capabilities minimize the time and manual effort of daily system operations.

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**To learn more** about how Aerospike can help your firm increase customer profitability while mitigating risk and optimizing returns, visit us at [www.aerospike.com](http://www.aerospike.com).

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