

Reduce Fraud Risks with Real-time Decisioning in Digital Payments Transformation



PayPal Puts Data at the Heart of its Fraud Strategy with Aerospike

Challenges:

- Instant response to detect fraudulent transactions
- Each payment transaction requires hundreds of DB reads/writes
- 325 million customer profiles
- 32% data growth annually

Solutions:

- Aerospike Enterprise Hybrid Memory Architecture™ (HMA)
- Intel® Optane™ Persistent Memory
- Cross-data center replication

Results:

- 10x improvement in fraud calculation data
- 2X reduction in servers
- Supports 4x as much data per node
- 5x throughput improvement

Executive Summary

An explosion of data – and ever-increasing pressure to maximize the value of that data – is challenging modern financial services firms and digital payment providers to rethink the technology and economics of database performance.

Businesses need tools that can identify global fraud while maintaining a low-friction environment for trusted users. And, for real-time financial services and payment applications, there is a need for extreme scale computing that can scale from tens of terabytes to petabyte volumes. For these applications, speed is critical – a delay of even a few milliseconds can result in fraudulent transactions, and unacceptable risk exposures.

In response, digital payment providers are increasingly relying on more data, analytics, machine learning, and AI technologies needed to provide fast, secure digital payment and related services that today's consumers demand.

“Prior to Aerospike, we were using another in-memory database and running into challenges in terms of the cost of scaling. We needed to seamlessly leverage both the memory and disk in such a way that it can guarantee a consistent performance. We moved to Aerospike for its hybrid memory architecture to leverage next generation memory and SSDs to their fullest advantage.”

- Sai Devabhaktuni, Sr Director of Engineering, PayPal

The Path Forward: Data is at the Heart of Digital Transformation

Revenue, growth and profitability of enterprises in the financial services industry depend on data accuracy, transaction speed, data protection and privacy, and the ability to personalize and package data-based products and services.

To compete next generation modern payment applications need to deliver fast, personalized, and context-aware experiences at high speed for swift processing.

Unfortunately, irrespective of how big or small a company might be or how complex or simple their application, every company has a scale problem. Scaling for extreme growth – is both an art and science.

Limitations of Conventional Data Architectures

The ability to deliver actionable intelligence within milliseconds, at the point of transaction, is severely constrained by conventional data architectures. Prevailing data architectures today are built to store transactional and analytical data separately, in silos. Consequently, they fail to bring transactional data together with historical data for analysis in real time. Most analytical database systems are designed to access historical data at periodic batch intervals. They cannot meet low latency requirements, resulting in unacceptable response times, outdated information, or incomplete information. This can lead to customer abandonment, payment denial, fraud and missed cross-sell opportunities and eventually, all can hurt the customer experience.



Applying Real-time Decisioning and Transactional Analytics

Fraud detection and prevention.

Detecting false positives, payment fraud, AML check, online and POS purchase fraud, bot account creation in real time enabling faster settlements and safer transfer of money.

Real-time digital identity check.

Checking digital identity, authentication, two-factor authentication check, biometric identity check at POS, online money transfer, P2P payments, cross-border processing, cyber threat, AML check PCI DSS & PSD2 compliance.

Payment services providers need to make customer data accessible as APIs for 3rd party consumption.

Digital wallet and mobile commerce.

Digital identity authentication, two-factor check for commerce, faster response to account inquiry, catalog access for m-commerce, loyalty and rewards management.

POS targeting and offers.

Targeted, personalized offers and coupons at POS based on profile data.

Next Gen Technology Advancements

Advancements in real-time decisioning has been constrained by the high cost and limited capacity of DRAM.

First-generation NoSQL databases gained popularity by holding the entire dataset in active system memory. Unfortunately, the speed and latency advantages of in-memory databases have come at a price. The high DRAM capacity requirements to run large-scale in-memory databases can be cost prohibitive, often limiting their use.

Aerospike is a real-time NoSQL data platform, designed with a [Hybrid Memory Architecture™ \(HMA\)](#) that delivers a fundamentally different approach to traditional architectures. Aerospike's HMA persists data on fast SSD devices, leveraging primary key indexes (in DRAM, SSD, or Intel® Optane persistent memory). This architecture enables very high data throughput with extremely low latency and is used extensively across the finance and banking industry to power a variety of data intensive use cases.

Rethink Speed at Scale

Fintech and digital payment applications process massive and fluctuating volumes of data, transactions, and customers. Even a few milliseconds delay can result in a fraudulent transaction or an unacceptable risk exposure position. Aerospike takes advantage of memory in a way that has never been done before. Aerospike is optimized to exploit the properties of multicore processors, fast memory and flash devices, yielding superior and consistent performance and throughput.

Unlike traditional NoSQL solutions, Aerospike is able to drive dozens of SSD devices per server before it becomes CPU-bound with powerful parallelism.

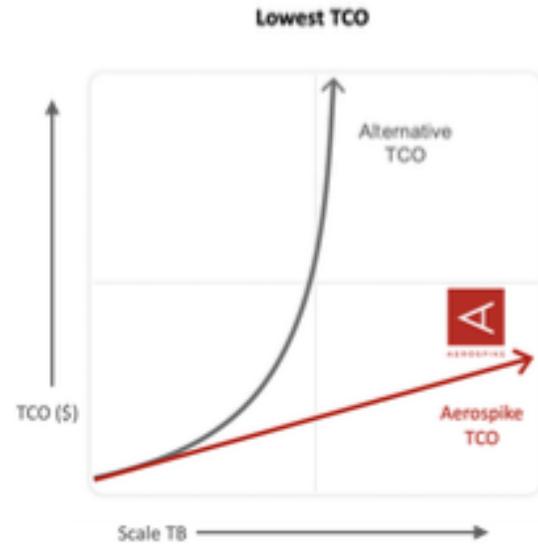


Figure 1

A Revolutionary Memory Tier

Intel® Optane™ DC Persistent Memory enables a unique new memory tier that is byte-addressable (similar to DRAM) while also being persistent (like storage). Providing similar performance to DRAM but at lower cost. Its high-density design, delivers a unique combination of affordable large capacity and non-volatility.

Aerospike's Hybrid Memory Architecture™ is engineered to make advanced use of Intel® Optane PMem for real-time computing. A multiyear collaboration between the two companies enables optimizations for higher performance than SSDs, lower cost per GB than DRAM, higher node densities, and data indexes which persist over system restarts.

Uniquely optimized for Intel Optane persistent memory, Aerospike Enterprise Edition offers performance at scale for real-time computing at an affordable cost and with high availability. It scales to petabyte dataset volumes and can deliver millions of operations per second with sub-millisecond latency.

Each node of an Aerospike cluster can potentially support up to 4X as much data as a DRAM-only solution, as illustrated in Figure 2. An Aerospike cluster can be scaled to 128 nodes to handle large datasets and heavy transaction volumes, without increasing latency.

Rapid Restarts

Aerospike is optimized for Intel persistent memory App Direct Mode, with higher memory capacities than DRAM, enabling larger indexes in addition to the broader set of performance advantages that App Direct Mode provides. At the same time, the index is persistent over power cycles. Aerospike is able to retain indexes on reboots, saving a lot of time. Instead of rebuilding the index, all you have to do is reattach to it. A node with over 1 billion records will restart in about 10 seconds (as opposed to 40+ minutes without this feature). This allows cluster upgrades and various other operations to go much faster.

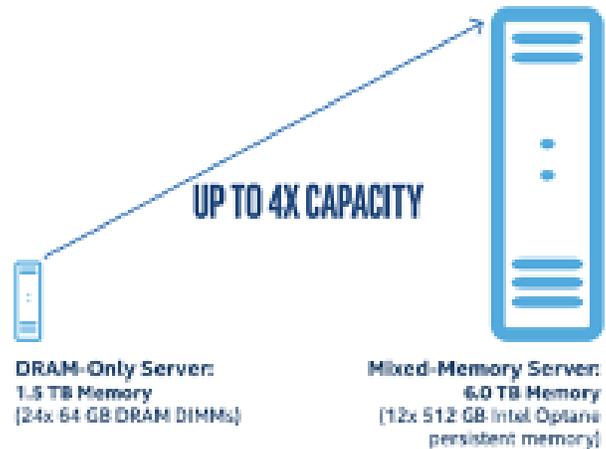


Figure 2

Real-time Decisioning Architecture with Aerospike on Intel® Optane™ Persistent Memory

Given the volume, velocity and variety of financial and sensitive customer data, many financial institutions are reinventing their data architecture – transitioning to a next generation data platform that is optimized for the speed, scale and complexity of the data that the industry demands. The Aerospike platform's Hybrid Memory Architecture™ (HMA) in Figure 3 delivers a fundamentally different approach which allows modern digital banking applications to take advantage of performance at linear scale, always-on data persist on fast SSD devices, leveraging primary key indexes in DRAM, SSD, or Intel® Optane™ Persistent Memory.

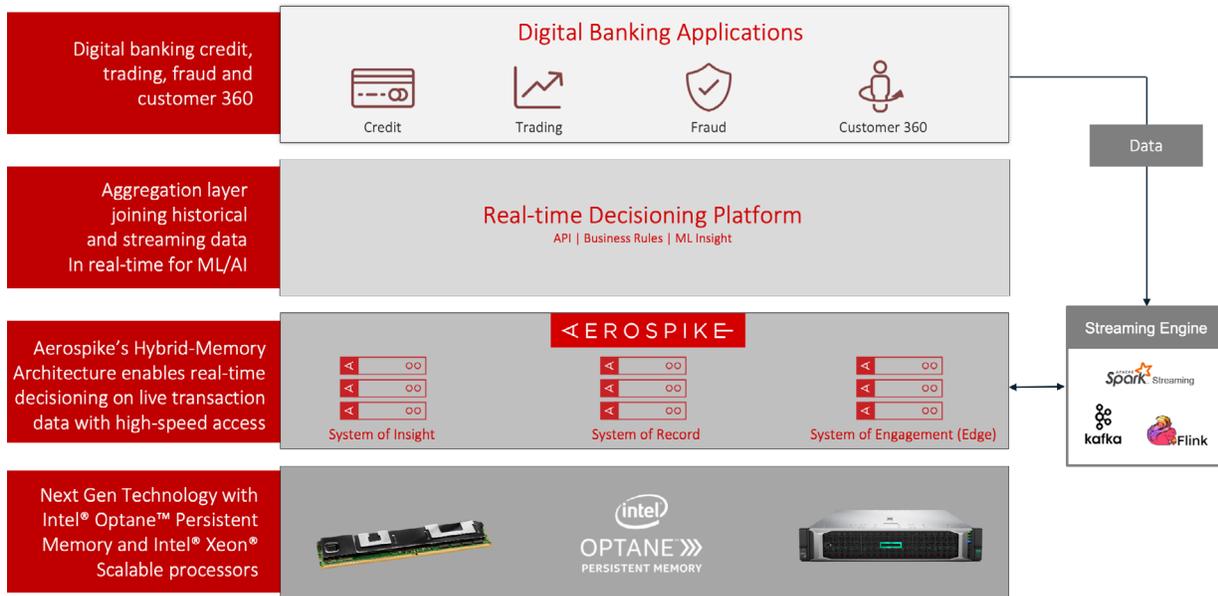


Figure 3

Aerospike on Intel® Optane™ Persistent Memory Benefits:

Risk monitoring

- Behavior-based risk analytics with historical and real-time data
- User activity tracking
- Authentication and login attempt monitoring
- Update millions of prices and balance positions daily

Market data management

- Identify trading signals in market
- Reshape intraday analysis
- High-speed data ingestion and Analytics

Built-in resilience

- Automatically scale your database
- Cross data-center replication and Active-Active locations
- No data loss with and strong consistency backed by five-nines (99.999%) SLA

Personalization

- Personalized user-session data
- Session notification Location-based offers

Boost operational efficiency

- Fast recovery in case of outages, with indexes retained in persistent memory in seconds, not hours
- Reduced maintenance time
- 4X reduction in TCO

Big cost savings

- Flash optimized with fast NVMe, and Intel® Optane™ persistent memory
- Access more memory and larger data volumes per server
- Process more operations/second than any other NoSQL database

Learn more about: Aerospike database: www.aerospike.com
Intel® Optane™ Persistent Memory: www.intel.com/OptanePersistentMemory

About Aerospike

Aerospike is the global leader in next-generation, real-time NoSQL data solutions for any scale. Aerospike enterprises overcome seemingly impossible data bottlenecks to compete and win with a fraction of the infrastructure complexity and cost of legacy NoSQL databases. Aerospike's patented Hybrid Memory Architecture™ delivers an unbreakable competitive advantage by unlocking the full potential of modern hardware, delivering previously unimaginable value from vast amounts of data at the edge, to the core and in the cloud. Aerospike empowers customers to instantly fight fraud; dramatically increase shopping cart size; deploy global digital payment networks; and deliver instant, one-to-one personalization for millions of customers. Aerospike customers include Airtel, Banca d'Italia, Nielsen, PayPal, Snap, Verizon Media and Wayfair.

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