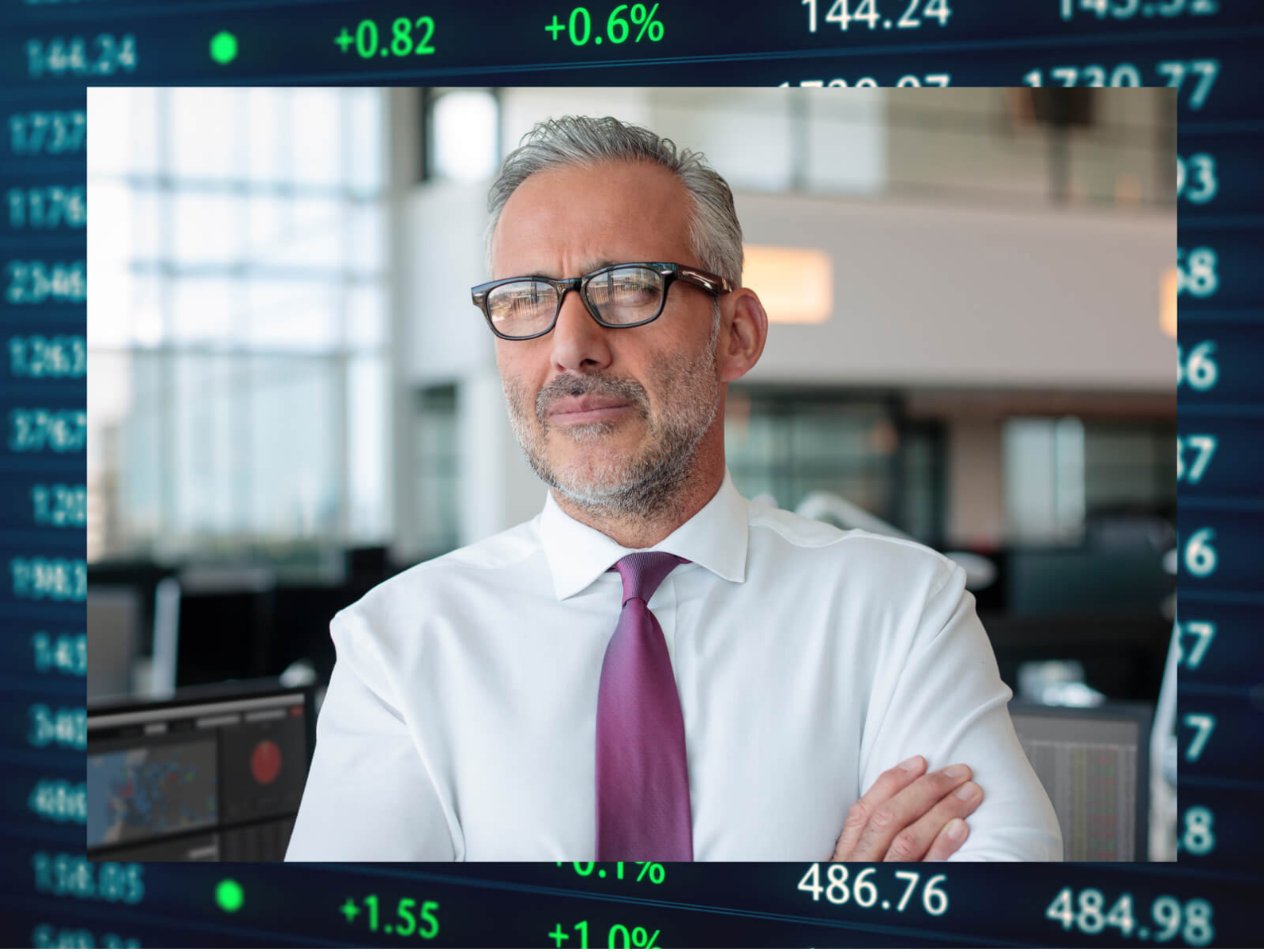


HPE Storage

Large-scale fraud management for financial applications

HPE Solutions with Aerospike—event-driven, real-time data analysis solution overview

HPE GreenLake

Introduction

Cyber fraud and digital attacks on personal data are among the leading challenges businesses face—costing the global economy over $5 trillion each year.[1] Meanwhile, modern digital payment applications are increasingly relying on data, analytics, machine learning (ML), and artificial intelligence (AI) technologies to provide fast, secure digital payment and related services that today's consumers demand.

Enterprises must get ahead of this rapidly growing problem by seeking out technologies and solutions that take an innovative approach to fraud management.

The high volume of global payments—greater than 200 billion transactions with $128.5 trillion in value in 2021 growing at 5.6% and 9.5% respectively[2]—means fraud detection, and more importantly, fraud prevention, can only be effective if it occurs in real time. To accomplish this, financial fraud management applications relying on ML models must perform at submillisecond latency—challenging the limits of even the most advanced compute technologies in the market.

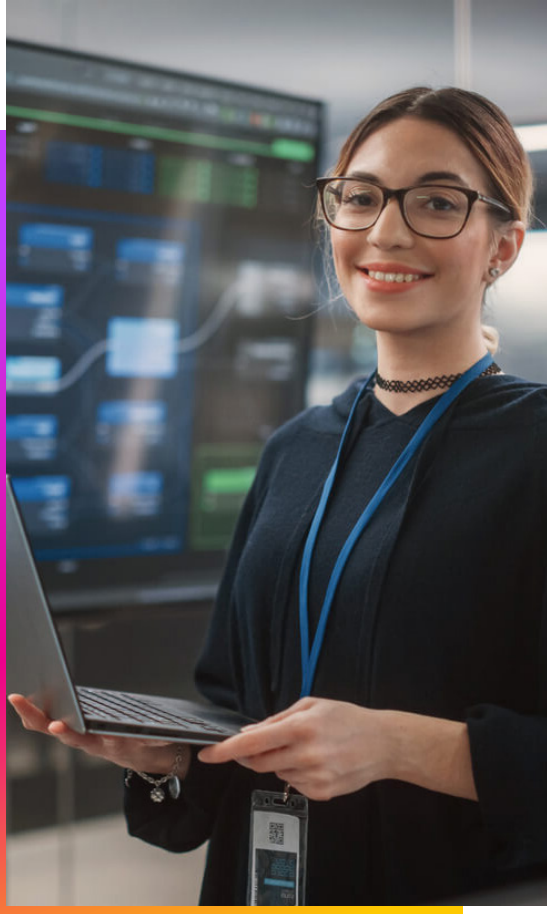
A smart, scalable, and extremely fast real-time analysis solution is needed. HPE and Aerospike have teamed up to provide just that—an industry-leading hardware, software, and services solution that leverages Aerospike's Hybrid Memory Architecture™ (HMA) and HPE nonvolatile memory hardware architectures to double or even triple the cost-performance of your fraud management application.

In this solution overview, we discuss our partnership with Aerospike. We also describe the ways our joint solution addresses the previously mentioned challenges and puts customers several steps ahead of their competition. Finally, we outline system configuration blueprints that can get you started.

[1] "57 Crucial eCommerce Fraud Statistics for 2022: Types, Cost & Protection Data" FinancesOnline, 2022

[2] "The Federal Reserve Payments Study: 2022 Triennial Initial Data Release," Board of Governors of the Federal Reserve System, updated June 2024

HPE Solutions with Aerospike—ready for real time



Aerospike is a real-time data platform that enables organizations to act instantly across billions of transactions with submillisecond performance. Leveraging hardware-software optimizations, industry expertise, and direct customer feedback, Hewlett Packard Enterprise and Aerospike have partnered to create our joint real-time fraud detection and prevention solution. Our leadership in high-performance computing and scale-up and scale-out technologies combined with Aerospike's cutting-edge approach to memory architecture now allows organizations to drastically impact the trade-off between cost and performance in high transaction businesses with extreme scale requirements.

Aerospike Enterprise is purpose-built with an HMA. This innovative memory and storage access enables hybrid options for very high data throughput with low latency and ongoing data security for applications that require five-nines uptime. HPE Solutions with Aerospike offers performance at scale for real-time applications at a lower total cost of ownership (TCO) and with exceptionally high availability and fault tolerance.

HPE Solutions with Aerospike are designed for workloads that require large data sets and real-time data access at the edge, in a system of record (SOR), across data centers, and in the cloud. Whether it be fraud management applications or AI-based instant decision systems, low latency and high scale are must-haves to operate your business processes at peak performance with the responsiveness and reliability that users expect. HPE Solutions with Aerospike bring together the powerful Aerospike Real-time Data Platform with the high performance of HPE Alletra Storage Server 4110, all validated in purpose-built configurations, well suited for demanding real-time data access.

HPE Solutions with Aerospike optimize HPE Alletra Storage Server 4110 and Aerospike Real-time Data Platform performance, making it easy for enterprises to capitalize on database, storage, memory, and compute technologies when real-time data is required all the time.

HPE hardware and software already underpin the IT infrastructure of much of the global financial industry. With HPE servers touching the majority of credit card transactions globally, our partnership with Aerospike represents an opportunity to greatly enhance HPE's value to its existing customers in a critical and rapidly evolving space.

82% firms report being vulnerable to payments fraud[3]

37% of attacks in 2021 are Automated Clearing House[5]

71% of firms were victims of fraud in 2021[4]

181 zettabytes of data created annually by 2025[6]

[3, 4, 5] AFP Payments Fraud and Control Survey, J.P. Morgan

[6] "Amount of Data Created Daily (2024)," Exploding Topics, 2024

Why the data layer matters—how HPE and Aerospike solve the real-time problem

The conventional approach

The ability to deliver actionable intelligence at the point of transaction is severely constrained by conventional data architectures. The common approach is to store transactional data and historical- or mission-critical data on separate systems—each with its own distinct architecture and silo.

Naturally, however, data analysis applications that require rapid access to the data in these silos suffer from the inefficient design, which can have real consequences to the business. For instance, most analytical databases only access historical data within discrete batch intervals—leaving holes in their data retrieval processes that can produce unacceptable response times, outdated or incomplete information, missed fraud detection events, and even potential customer abandonment.

In these environments, performance bottlenecks compound as scale increases. This means growth in data volume either puts SLA performance at risk or increases the cost of maintaining SLAs.

For example, an organization that is running fraud detection and real-time decisioning algorithms across hundreds of nodes will run up against operational bottlenecks that only get worse as their scale increases. Even running at 99.98% of their SLA-mandated decision time (for example, 750 milliseconds) still means high degrees of false positives with millions of dollars of potential exposure to false positive fraud that companies must laboriously and expensively examine offline.

HPE Solutions with Aerospike, powered by HPE nonvolatile memory, can derisk that same scenario while significantly improving the SLA performance.

Resiliency and uptime of conventional solutions also leave room for substantial improvement. The impact of a slow restart of a downed system can be very costly at high scale, as can building in redundancy to avoid downtime.

The cost-performance of DRAM-only solutions and their comparatively limited capacity have constrained advancements in real-time decisioning. This is because DRAM cannot cost-effectively scale to power the many-terabyte AI/ML technologies that lie at the heart of enabling real-time analysis.

Count on high performance in a low footprint

To tackle performance for real-time workloads, Aerospike's HMA uses a hybrid and flash architecture to take full advantage of memory and flash storage—with DRAM storing only indexes and data stored in flash disks. The result is petabyte scale and high performance with solid-state drives (SSDs), along with a server footprint that's reduced by up to 80%. Each HPE Alletra Storage Server 4110 has up to 3 TB of DDR5 memory and over 300 TB of storage capacity via 20 front accessible Enterprise and Datacenter Standard Form Factor (EDSFF) or PCIe Gen5 NVMe SSDs, all in a standard rack depth 1U form factor. Taken together, HPE Solutions with Aerospike provide a compact scalable software and hardware architecture that is ready to handle your real-time data workloads.

Reduce access times with high throughput and low latency

In a real-time world, access time is the enemy. To keep access times low, independent of the number of nodes, the HPE Alletra Storage Server 4110 symmetric system architecture delivers exceptional throughput with up to 62.5 GB/s (500 Gbps of network bandwidth into the system, up to 64 GT/s for data in flight through the system, and up to 315 GB/s of PCIe Gen5 bandwidth to EDSFF NVMe SSDs. Coupled with Aerospike's Smart Client™ capability to reach data in a single hop (with every node in the system knowing what data every other node has). In this way, solution keeps latency at the lowest possible minimum. The Aerospike Real-time Data Platform also automatically conducts data load balancing continuously on all servers, even when scaling up or down, or with cluster reconfigurations. What's more, the solution's combination of small footprint and high performance allows it to ingest and act on data, wherever it resides from edge to cloud.

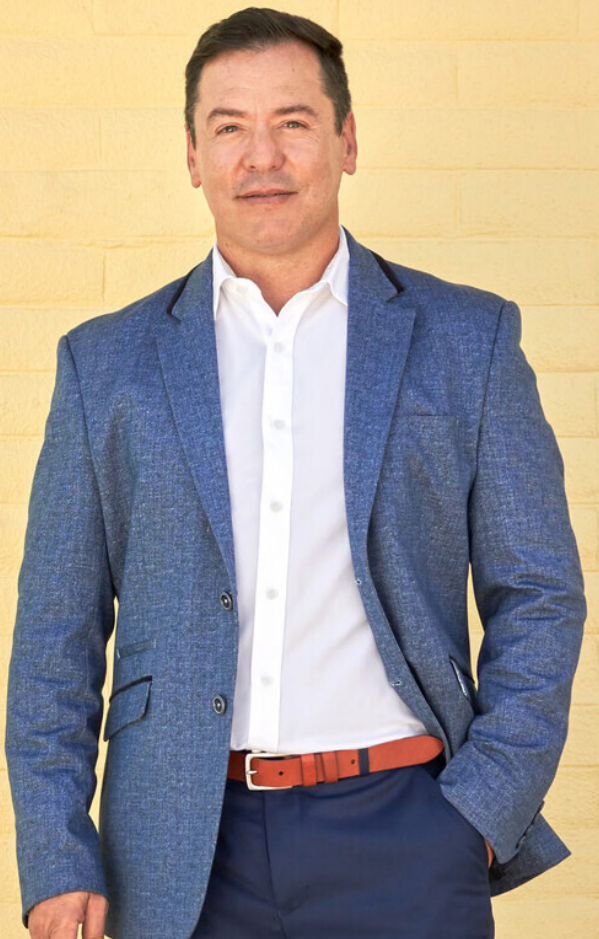
Powered by innovative technology from HPE, Aerospike can scale to billions of objects, petabytes of data and millions of transactions per second on each node. This allows financial institutions to experience submillisecond fraud detection at the moment of transaction with higher decision confidence and a drastic decrease in total cost of ownership.

Data and database indexes can also be retained in nonvolatile memory when the system is powered down. This is not a trivial capability for financial institutions when node restarts occur in seconds now, rather than hours or tens of minutes thus significantly reducing the cost per transaction. These new efficiencies translate to reduced downtime, more frequent software updates and security patches, and greater redundancy and data replication.

With TCO being reduced by half or more versus alternative solution architectures, the value proposition for mission-critical real-time decisioning with HPE Solutions with Aerospike is stronger than ever.

Solution blueprints—getting started with event-driven, real-time analysis for fraud management

HPE and Aerospike's joint architectural optimizations around nonvolatile memory and HMA make it easy for you to capitalize on our leading memory, database, storage, and compute technologies and out-innovate your competition by doing much more with much less.



HPE ProLiant DL380 Gen10 Plus NVMe solutions with Aerospike

Modeled after existing solutions with FSI customers, these three solution blueprints offer starter, performance, and at scale reference implementations for customers looking to begin architecting a system configuration that fits their needs.

Starter

Supports 12.6 TB of data

2 x Intel® Xeon® Gold 6346 (16 cores, 3.1 GHz)

16 HPE 16GB (1x16GB) Single Rank x4 DDR4-3200 CAS-22-22-22 Registered Smart Memory Kit

16 HPE 1.6TB NVMe Gen4 Mainstream Perf MU SFF BC U.3 Static Multi Vendor SSD

1 HPE NS204i-p x2 Lanes NVMe PCIe3 x8 OS Boot Device

2 Intel® E810-CQDA2 Ethernet 100Gb 2-port QSFP28 Adapter for HPE

Performance

Supports 25 TB of data

2 x Intel Xeon Gold 6346 (16 cores, 3.1 GHz)

16 HPE 32GB (1x32GB) Single Rank x4 DDR4-3200 CAS-22-22-22 Registered Smart Memory Kit

16 HPE 3.2TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD

1 HPE NS204i-p x2 Lanes NVMe PCIe3 x8 OS Boot Device

2 Intel E810-CQDA2 Ethernet 100Gb 2-port QSFP28 Adapter for HPE

At scale

Supports 51.2 TB of data

2 x Intel Xeon Gold 6346 (16 cores, 3.1 GHz)

16 HPE 64GB (1x64GB) Dual Rank x4 DDR4-3200 CAS-22-22-22 Registered Smart Memory Kit

16 HPE 6.4TB NVMe Gen4 High Performance Mixed Use SFF BC U.3 PM1735a SSD

1 HPE NS204i-p x2 Lanes NVMe PCIe3 x8 OS Boot Device

2 Intel E810-CQDA2 Ethernet 100Gb 2-port QSFP28 Adapter for HPE

HPE Alletra Storage Server 4110 EDSFF NVMe solutions with Aerospike Enterprise Server

The HPE Alletra configuration blueprints are designed for density and scale with 2x the compute density of traditional 1U server, expanded power capabilities, and plug and play direct liquid cooling options.

Starter

Supports 9.6 TB of data

2 x Intel Xeon Gold 6426Y (16 cores, 2.6 GHz)

16 HPE 16GB (1x16GB) Single Rank x8 DDR5-4800 CAS-40-39-39 EC8 Registered Smart Memory Kit

20 HPE 1.92TB NVMe Gen5 Mainstream Performance Read Intensive E3S EC1 EDSFF CD7 SSD

1 HPE Alletra 4110 NVMe M.2 Enablement Kit

2 Intel E810-CQDA2 Ethernet 100Gb 2-port QSFP28 Adapter for HPE

Performance

Supports 38.4 TB of data

2 x Intel Xeon Gold 6426Y (16 cores, 2.6 GHz)

16 HPE 32GB (1x32GB) Dual Rank x8 DDR5-4800 CAS-40-39-39 EC8 Registered Smart Memory Kit

20 HPE 3.84TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF PM1743 SSD

1 HPE Alletra 4110 NVMe M.2 Enablement Kit

2 Intel E810-CQDA2 Ethernet 100Gb 2-port QSFP28 Adapter for HPE

At scale

Supports 78.6 TB of data

2 x Intel Xeon Gold 6426Y (16 cores, 2.6 GHz)

16 HPE 64GB (1x64GB) Dual Rank x4 DDR5-4800 CAS-40-39-39 EC8 Registered Smart Memory Kit

20 HPE 7.68TB NVMe Gen5 High Performance Read Intensive E3S EC1 EDSFF PM1743 SSD

1 HPE Alletra 4110 NVMe M.2 Enablement Kit

2 Intel E810-CQDA2 Ethernet 100Gb 2-port QSFP28 Adapter for HPE

When it comes to AI and ML applications, large early adopter companies are building and training their own AI models. For some companies, especially in financial services and banking, the model and its outcomes contribute to their differentiation in the market. This solution was designed specifically to support those do-it-yourself organizations.

The solution can:

- Plug into and leverage your existing infrastructure and provide seamless integration with your existing tools (from open source to IBM mainframes)
- Directly integrate into your Apache Kafka Pub/Sub systems, as well as your Apache Spark Clusters with Aerospike Connectors for Kafka and Spark (This allows for transactional and historical data stored in Aerospike to be accessed in real-time by the Kafka and Spark Clusters, which thereby allows streaming events to be scored in real-time against the production AI model)
- Comply with your organizations' IT security policies

HPE blueprints are based on reliable, cost performant HPE Alletra Storage Server 4110 20 EDSFF, HPE ProLiant DL380 Gen10 Plus, and HPE Superdome Flex family of products. This portfolio of servers offers flexible choices and versatile design, along with improved energy efficiencies. Its simplified but comprehensive management suite and industry-leading support deliver a more reliable, fast, and secure infrastructure solution, help increase IT staff productivity, and accelerate service delivery. Hitting high-performance numbers is not enough for real-time applications. Predictability of performance and access times is critical. The Aerospike HMA is optimized for predictability by accessing indexes from volatile memory instead of storage, helping eliminate latency spikes and ensure low, constant latency. When this database architecture is combined with the HPE Alletra Storage Server 4110, utilizing two 4th Generation Intel® Xeon® Scalable processors, the result is consistency and predictability. Everyone from the first user to the ten millionth experience the same latency and performance.

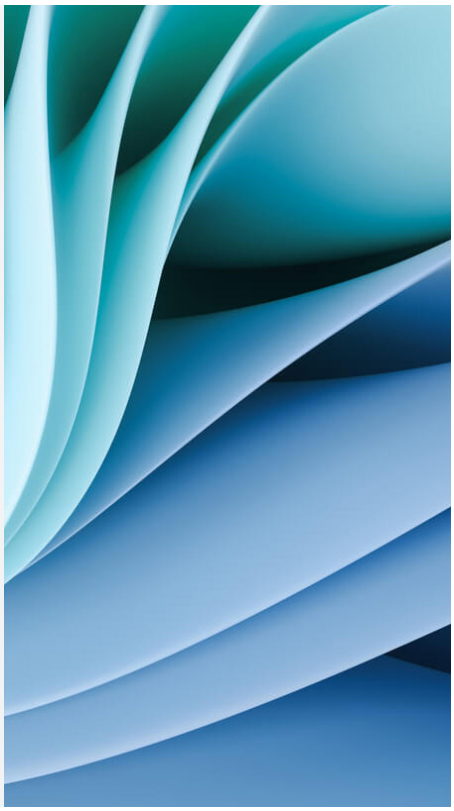
With a combined, pretested solution architecture, HPE and Aerospike enable customers to achieve greater scale, higher system availability, and lower TCO models than ever before.

No matter where you are in your data management or AI journey, we meet you where you are and get you to where you need to be.

World-class services

Between 23,000 HPE service professionals and Aerospike's renowned implementation and deployment services, we match the performance of the technology in this solution with outstanding dedication to a successful deployment and overall partnership experience.

From proof-of-concept to extreme scale, Aerospike's deployment methodology provides best practices and advisory services for all deployment sizes for your architecture, development, and site reliability engineering teams. Hands-on workshops are used to identify key considerations and work through the practical implications of our expert recommendations. A successful Aerospike deployment has several facets spanning capacity plans for workloads, data models for applications, runbooks for operational teams, and monitoring metrics for measuring performance. At the end of our engagement, you receive an enterprise deployment guide that documents our recommendations tailored to your use cases.



A smart choice for cost-effective, real-time fraud prevention

Doing more with less is always a mantra in the technology world, but it is going to be particularly important as we emerge from the COVID-19 crisis. Companies' profits have been impacted as consumer activity slows to a near halt, and it will continue to be impacted as the economy turns the corner. Now is a great time to invest in systems that will reduce operating costs in the near term and position your organization to capture and retain new and valuable business in the long term.

HPE and Aerospike deliver a smart choice for real-time fraud prevention—with high performance against large transaction volumes, industry-leading availability and uptime, and simplicity of operations.

Powered by HPE nonvolatile memory in industry-standard servers, Aerospike enables companies to keep pace with their explosion of data growth in real-time fraud management while maintaining SLA performance—at a substantially lower TCO.

This partnership presents the opportunity to improve the quality and volume of data consumed in fraud detection and prevention models, thereby avoiding millions of dollars in costs associated with false positives. In the wake of a changing world, consumer behavior is once again evolving, and the financial services industry will need to respond. HPE and Aerospike invite you to take this opportunity to fund your next innovation through smart cost reduction.

Case studies

Leading global provider of online payment services

- Improves SLAs 15x
- Reduces false positives 30x
- Improves fraud calculation data 10x

Global risk management services provider

- Runs 130M transactions daily across 40,000 websites
- Delivers hundreds of attributes in < 100 milliseconds
- Grew 450 TB of business to 1.3 PB
- Saved $3.3M over three years

Major fintech payment solutions provider

- Reduced DB cluster node count 66%
- Delivers 10 to 20 milliseconds payment processing window
- Achieves 99.99% uptime
- Scaled transactions/second by 40x

Pan-European instant payment service

- Delivers true end-to-end user payments (through their bank) in seconds
- Processes 43 million transactions per day
- Costs less than €0.002 per payment transaction
- Enables scalability for thousands of European banks

Contact an HPE or Aerospike representative

To discover how HPE and Aerospike can transform your fraud management position and provide solutions to further real-time data and analytics use cases, contact an HPE or Aerospike representative today.

About Aerospike

Aerospike is trusted by leading enterprises around the world to help them confidently deploy mission critical, strategic operational applications that make digital transformation possible. Headquartered in Mountain View, California, the company also has offices in London, Bangalore, and Tel Aviv. aerospike.com

Learn more at

buy.HPE.com/us/en/HPE-Solutions-with-Aerospike/p/1014739843

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