AEROSPIKE

High availability data platform for IoT-based, continuous blood glucose monitoring

CASE STUDY

Multinational medical device company now can process and deliver health measurements quickly, accurately, and globally

Background

A multinational medical device company produces a continuous blood glucose-monitoring solution featuring wearable sensors that read glucose levels and integrate the data directly to a reader and a mobile tracking app on a smartphone. The information is immediately delivered wirelessly to a cloud system so that family and healthcare professionals can receive immediate updates when a glucose reading is taken and monitor diseases like diabetes in real-time. The company manages the whole ecosystem of sensors, readers and mobile apps that connect with the data platform.

Challenge

This multinational medical device company utilizes a sophisticated asynchronous message cueing architecture that uploads, stores and delivers these critical messages and notifications. Once readings are received, the system determines which type of text, email or push notification to send. However, if the data isn't processed quickly and accurately, all notification activity stops. This is a big problem since family and physicians are not notified of vital health measurements.

Why this multinational medical device company chose Aerospike

Global Message Queuing in the Cloud

- Hundreds of millions of messages per day
- 40,000 objects at any moment
- 10 terabytes of unique data

Competitors beaten (Cassandra, ScyllaDB)

- "Killed them" on performance alone
- "Killed them on High Availability (HA)"
- Enterprise support superior
- Cost savings by "at least a factor of 2"

Additional Aerospike Benefits

- Ability to run in multiple clouds; not just AWS
- Handled "whatever we were able to throw at it"
- Easy to implement and use
- Security features including disk encryption and authentication

Database performance and availability are critical success factors for the message delivery system. The previous database solution used by the company experienced problems when nodes went down, causing health messages to be delayed until the nodes could be restored from a backup. Since the old solution was not designed as a high availability database, developers had to invest significant time adding code around the database to ensure that data would be replicated. In addition, the teams had to internally parse and cleanse data before accurate notifications could be sent. With so much data to be managed at any given time, the company needed a reliable data architecture that could deliver speed, scale, security and constant availability.

The Aerospike solution

Processing data in a minute timeframe

> ***"At the end of the day, I'd rather have my guys writing features to support our devices than a bunch of infrastructure code to make somebody's database high availability."***
>
> *General Manager Cloud Solutions, Multinational Medical Device Company*

Aerospike functions as the data storage engine and tracking mechanism for all measurements taken and notifications delivered from the proprietary cueing system. Every message is stored in the database whether or not it is processed and is kept for a certain amount of time to allow a look-back analysis if needed. The intelligent architecture evaluates every scenario and decides which text, email or push notification to send in real-time. The system must also identify readings or messages that have erred, re-send them and re-track. The entire process has a very short life span, so the information must be measured, processed and completed successfully in a tiny time frame. Information goes in and out quickly, and Aerospike's robust throughput allows the system to handle any amount of data that's thrown at it.

The message processing system is the most crucial piece of the company's architecture, so it must always be running reliably and optimally to ensure critical readings are delivered without fail. However, even with terabytes of data being processed in the background, the Aerospike-powered system works so fast that it doesn't delay the mobile apps from sending data via NFC and Bluetooth to the cloud in real-time. With Aerospike, the company manages hundreds of millions of messages per day, 40,000 objects at any moment and ten terabytes of unique data.

Ensuring consistent high availability and security

> ***"It was a simple product to bring up, a simple product to integrate into our code. It just did exactly what it was supposed to do."***
>
> *General Manager, Cloud Solutions, Multinational Medical Device Company*

It was Aerospike's high availability architecture that really sold this multinational medical device company on the overall solution. According to the General Manager of Cloud Solutions, "there's no such thing as a quiet environment in their business. In the old days when volume wasn't very high, they could count on late-night maintenance to fix any problems. But today, they can't afford to have any part of the system down at all. Even one node going down could take 20 minutes to recover, downtime that is totally unacceptable".

Having a native HA system was critical for the company, and they didn't want to spend the time adding their own code just to be sure that data was being replicated, as they were forced to do with their old database. As the CEO commented, "I'd rather have my guys writing features to support our devices than a bunch of infrastructure code to make somebody's database HA."

Testing high availability was an important part of their evaluation process. To test, they put two nodes under a high load, cut the power and brought the replacement back up to the pool to see how the messaging system responded. The bottom line was that they could lose a couple of servers and everything would just hum right along.

Security of the message cueing system was also a vital component, given the sensitive nature of health measurements and communications. Aerospike's disk encryption (both in-motion and at rest) and authentication memory cache ensures that multiple logins to accounts are invalidated once each session is over. Using the cache layer for authentication helped to alleviate the burden on the core transactional database to track logins and secure session access.

Getting up and running quickly and easily

The company needed a drop-in replacement for their old system to minimize downtime and ensure a smooth transition to a more robust architecture. Aerospike fit the bill perfectly, making it easy for the company's DevOps team to learn the new command-line tools, get the system up and running quickly, and manage daily activity from the intuitive user dashboards.

The company identifies as a first-class driver for Go development. Aerospike made it easy for them to plug driver code right into their architecture and talk to the Aerospike service. Competing solutions like Cassandra were not as user-friendly. As the General Manager declared, "It just works. It's been seamless for us to plug into our architecture." The flexible platform also allowed the company to run its messaging operations in multiple cloud environments, including AWS and its own cloud data centers.

Conclusion: moving forward with a cost-effective solution

Aerospike offered a lower total cost of ownership by at least 2x. The company's previous system had to write to an expensive disk in Amazon, so getting the equivalent performance required them to incorporate high-speed EBS disks. With Aerospike, they could use the local SSD storage disks and perform shadow writing to the EBS.

With Aerospike, the company's message queuing process can be monitored with complete confidence and reliability, running the entire ecosystem of mobile apps and keeping readers connected with the company's cloud platform. So now, when a patient takes a glucose reading, a doctor or loved one can instantly see how they're managing their disease, and medical professionals can run reports, manage dashboards and set rules to give them a holistic view of each patient. With the glucose monitoring market growing as fast as it is – particularly during the Covid pandemic when patients rely on remote healthcare solutions – Aerospike will continue to provide robust data management for this multinational medical device company to remain at the top of their game.

AEROSPIKE

The Aerospike Real-time Data Platform enables organizations to act instantly across billions of transactions while reducing server footprint by up to 80 percent. The Aerospike multi-cloud platform powers real-time applications with predictable sub-millisecond performance up to petabyte scale with five-nines uptime and globally distributed, strongly consistent data. Applications built on the Aerospike Real-time Data Platform fight fraud, provide recommendations that dramatically increase shopping cart size, enable global digital payments, and deliver hyper-personalized user experiences to tens of millions of customers. Customers such as Airtel, Experian, Nielsen, PayPal, Snap, Wayfair and Yahoo rely on Aerospike as their data foundation for the future. Headquartered in Mountain View, California, the company also has offices in London, Bangalore and Tel Aviv.

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