CASE STUDY

Leveraging real-time IoT data with a document database

About Zonetap

Zonetap (www.zonetap.com) is a company offering a geofencing application designed to protect construction workers in dangerous environments. According to OSHA, 17% of people die on a work site because they are not seen. Zonetap provides precise, location-driven data, messaging, alerting, fencing, and a GDPR-ready analytics platform. They have developed a wearable device that can be placed on employees and equipment in order to provide a real-time alert to the wearer that there is danger around the work site.

Zonetap's 2ND-SKN IoT device is an industry-leading safety solution for construction, mining, forestry, and more, creating an extra layer of safety for workers at these job sites. Employees wearing the device, as well as their managers, receive audible, visible, and haptic alerts in real time when the wearer is too close to a dangerous situation such as in the path of a moving vehicle or in a restricted zone.

Why Aerospike Won

- Aerospike's JSON Document API
- High throughput capabilities for data ingest
- Scalability for 1000 devices over MongoDB's ceiling of 24 devices
- Real-time reads and sub-millisecond latency for real-time alerting
- High availability and uptime

The Challenge

An IoT device like this requires near-perfect accuracy. The device uses Global Navigation Satellite System, or GNSS, pulses to transmit real-time location information to a web-based portal. On average, today's GNSS receivers work up to 12 to 18 feet (4 to 6 meters), which is not accurate enough for Zonetap's solution. The 2ND-SKN device is designed with 2 inches (1.2 centimeters) of accuracy. Working in these dangerous environments leaves very little room for error, and Zonetap knew they could not afford for the system to create false positives and result in constant alerts.

"We have to be able to provide an alert that's effective and efficient for operation of safety at these work sites."

- Mario Ornelas
Chief Executive Officer, Zonetap

The cloud-based platform that comprises the core of their solution is designed to handle fast transactions for low latency real-time alerting from the wearable device to the database. The 2ND-SKN IoT system uploads data four times per second, and up to 40 times per second, with 20-100 bytes per cycle. This amount of data can add up very quickly and those transactions need to be managed instantly.

Figure 1. How Zonetap's 2ND-SKN IoT device works

Zonetap began developing their solution using MongoDB, testing the 2ND-SKN prototype in real-life scenarios. However, as they added devices to their proof of concept environment, the system performance became very unpredictable. Unpredictability is bad news in life or death scenarios.

They experienced interference and continuous transaction delays. Once they hit 24 units, they realized they would hit bottlenecks in their real-time alerting system and MongoDB could no longer handle the scale of their transactions. In order to meet their goals, they would need more resources which meant higher costs. Their current solution would not be future-proof without making significant changes. The company aimed to scale to thousands of devices and needed a new solution as soon as possible, which brought them to Aerospike Database 6, leveraging its JSON Document API.

The Aerospike Solution

Zonetap selected Aerospike to help them achieve their scalability and performance goals with sub-millisecond latency and high throughput. They expect Aerospike to be able to ingest location data for 1000 devices today and deliver real-time reads for a seamless user experience with real-time mapping application capabilities.

> *"MongoDB could not handle those transactions... we unfortunately had to throw more resources that double the cost right away. And just wouldn't scale. We just did the math and this was not going to make sense without major changes. So Mongo was not the solution for us."*
>
> *- Mario Ornelas*
> *Chief Executive Officer, Zonetap*

Aerospike's document data services provide storage, processing, and querying of JSON document data in real time and from gigabyte to petabyte scale. Developers can create and store this data as an Aerospike Collection Data Type (CDT) object that can then be accessed, queried, and modified using a JSONPath syntax.
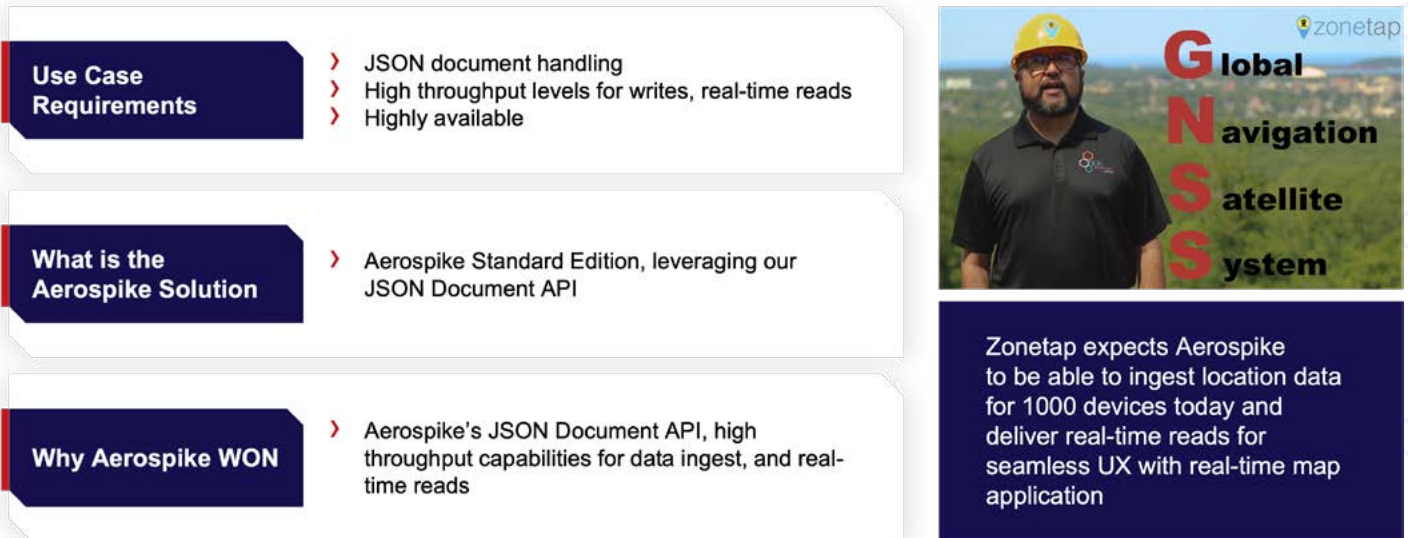
Figure 2. Zonetap and Aerospike

Results & Future Expectations

With their solution currently in production, Zonetap is poised to release the first commercial version of their product at the end of this year. They plan to add sensors to detect other work site components and potentially integrate with other smart devices to create a stronger safety ecosystem. The goal is to ingest the data from the ancillary devices through the 2ND-SKN back into the database, which would increase the amount of data and throughput, but lead to a safer work environment.

About Aerospike

Aerospike unleashes the power of real-time data to meet the demands of The Right Now Economy. Global innovators and builders choose the Aerospike real-time, multi-model, NoSQL data platform for its predictable sub-millisecond performance at unlimited scale with dramatically reduced infrastructure costs. With support for strong consistency and globally distributed, multi-cloud environments, Aerospike is an essential part of the modern data stack for Adobe, Airtel, Criteo, DBS Bank, Experian, PayPal, Snap, Sony Interactive Entertainment, and Wayfair. A global company, Aerospike is headquartered in Mountain View, California, with offices in London, Bangalore, and Tel Aviv.

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