

IoT Data and Firmware
Management Transformation
Through AWS and FOTA



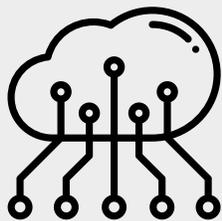
7FACTOR



We Build Good Things

At a glance

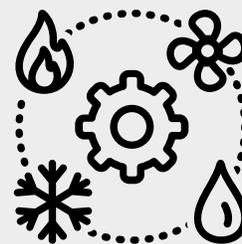
Leveraging our deep understanding of AWS modernization, we moved the client's application to be hosted on Amazon Web Services (AWS). We then transitioned their database to AWS for enhanced data processing in two parts: moving all their relational data into AWS RDS instances and all their IoT data into AWS Timestream DB. We also introduced a Firmware Over The Air (FOTA) system to streamline firmware updates and bolster security. This adjustment also ensured operational efficiency and security, facilitating reliable and high-quality monitoring of thousands of IoT devices across client sites.



AWS Cloud



FOTA



HVAC/R Industry

Key Insights

10k+ IoT

data points collected with modernized data management

30% faster

data processing with two-pronged database system

40% increase

in firmware updates by implementing FOTA system

0 minutes

downtime during and after AWS migration



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7Factor Engineer

Tom Sarver

Background / Problem

Background

The end goal was clear for the HVAC/R sensor manufacturer: be able to scale globally and enhance performance, speed, and intelligence across the board, guaranteeing their monitoring devices were always reliable and secure no matter where a user was in the world. We needed to revamp how they manage IoT sensor data and update firmware, ensuring they could efficiently process billions of data points from their IoT devices effectively.

We conducted the project in two critical phases: a comprehensive migration to AWS and the implementation of a FOTA system. The transformation resulted in streamlined operations and significantly enhanced the management of thousands of deployed IoT devices across many client facilities and equipment.

Problem

The sensor manufacturer's operations involved the deployment of IoT sensors across various client properties, including public service vehicles and buildings, to monitor conditions such as temperature and humidity. These sensors collected vast amounts of data, which were then stored and managed across different cloud services, leading to inefficiencies and security vulnerabilities. The client wanted to make their database more secure and scalable and completely automate their infrastructure, which was impossible in their current cloud environment.

Their infrastructure presented several inefficiencies and security concerns:

Dispersed Data Management

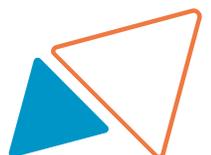
The dispersed data management system, with IoT data stored separately from other operational databases, slowed down data processing and increased operational complexity.

Insecure Manual Processes

Manual processes for updating sensor firmware were insecure and inefficient, posing risks to data integrity and device functionality.

Scalability Constraints

The existing infrastructure had limited scalability to manage the increasing data volume and was not optimized for the scale of data collected, leading to potential losses in data accuracy.



Phase 1: AWS Migration

In transitioning our client's extensive data and applications to AWS, we embarked on a significant overhaul aimed at unifying and securing a broad spectrum of IoT and operational data within AWS's advanced ecosystem.

By leveraging AWS Kinesis, we managed to efficiently process a continuous influx of millions of IoT data points to AWS's Timestream database, designed specifically for time-series data, to optimize organization and access. At the same time, we moved operational data to Amazon Relational Database Service (RDS) to leverage its robust and scalable database management capabilities. To meet the specific needs of IoT data management, we employed a dual-database strategy: utilizing Timestream for efficiently handling lightweight, non-relational IoT data, and Amazon RDS for managing more structured operational data organized by sensor categories. This approach ensured both precision in data management and enhanced system scalability.

The rationale behind this move to AWS was driven by a commitment to achieving enhanced infrastructure automation. Leveraging AWS's comprehensive suite of services, 7Factor was able to enhance operational efficiency and fortify security measures, facilitating a more streamlined and resilient system architecture. A pivotal component of this automation strategy was the implementation of Terraform, which allowed for precise, code-managed infrastructure deployment and scaling.

Throughout the migration process, maintaining the integrity and full functionality of the client's system was paramount. By consolidating their infrastructure on AWS, we achieved a more secure and cohesive data management environment and unlocked the potential for extensive infrastructure automation. This transformation marked a significant advancement in the client's operational capabilities, setting a new standard for efficiency and scalability in their technology infrastructure.

Phase 2: FOTA Implementation

We tackled the challenge of modernizing the firmware update process for the client's sensors by steering clear of updating their legacy application, Wireless Automation Management (WAM), which was built on outdated code. Recognizing that working with WAM's old infrastructure would be inefficient, we developed a new solution. The solution was the creation of an admin portal, a new web application designed to streamline the firmware update process without the limitations of the legacy system. This application was moved over to be hosted on AWS using AWS EC2 instances.



▶ Problem / Results

Phase 2: FOTA Implementation

The goal was to simplify firmware updates, which were previously updated manually, a process both cumbersome and time-consuming. To automate and ease this process, we collaborated with ConnectedDev, who developed the firmware, integrating this new system into the admin portal. This portal enabled select employees to upload firmware, which could then be seamlessly downloaded by customers through WAM, the main user application. This approach not only automated the firmware update process but also ensured that users could easily access and implement updates, marking a significant step forward in device management and operational efficiency.

Results

“Their [client’s] pre-existing cloud landscape was hindering the performance of their product and its ability to adapt to their market,” explains 7Factor Engineer Tom Sarver. *“In the realm of IOT, it’s critical to have to store vast quantities of data and to be able to query and retrieve that data fast when it’s needed. Migrating to AWS opened up the client’s options on a global scale. Not only can the client provide their service to their customers with faster load times and more efficient storage, but also it gives the product the adaptability to grow (or shrink) where and when that is needed.”*

This strategic move consolidated data on AWS, simplifying operations, enhancing data security, and minimizing manual errors in firmware updates. The new infrastructure, designed with a cleaner, microservice approach, utilizes AWS's Virtual Private Clouds (VPCs) and Identity and Access Management (IAM) policies, ensuring the system is primed for handling increasing volumes and complexity of data. This ensures operations can scale securely and efficiently. The FOTA system introduced a reliable, secure, and automated process for updating the client's thousands of IoT devices, each reporting data at different intervals, thereby keeping devices across the client network up-to-date and secure.

By adopting AWS's robust cloud solutions and focusing on strategic IoT device management, our consulting team significantly improved the client's operational efficiency, security, and scalability.



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Let us show you how

