AN INFLUXDATA CASE STUDY

BAI Communications Leverages InfluxDB and Existing Infrastructure to Deliver Critical Safety Alerts for Transportation Operators

bai communications

Real-Time Updates Improve Network Observability and Passenger Safety

Company in brief

BAI Communications is a world leader in shared communications infrastructure, pioneering the future of advanced connectivity, and delivering the ubiquitous coverage that can transform lives, power business ambitions, and shape the future of our cities. The company focuses on three key verticals: broadcast, neutral host and 5G, and transit. It seeks to enrich lives by connecting communities and advancing economies.

Case overview

BAI Communications provides the infrastructure for T-Connect, the wireless network used by the Toronto Transit Commission (TTC). For rail operators, platform overcrowding is a safety issue. BAI wanted to leverage its current infrastructure (Wi-Fi routers) to identify platform overcrowding so rail operators could take mitigating action. BAI designed an innovative and cost-effective solution that uses WiFi data and InfluxDB to produce real-time observability of passenger volume for the entire Toronto subway system.

The business challenge

BAI wanted a way to identify and address station crowding issues to create safer rider experiences for public transportation users. BAI operates T-Connect, the wireless network used by the TTC. This network covers 75 rail stations and consists of over 72km of fiber, more than 1,000 access points, three datacenters across the city, and hundreds of servers and other pieces of networking hardware. The network sees approximately 200,000 sessions on about 100,000 unique devices per day.

With a network of that size, BAI is constantly concerned about performance and user experience, which is how the company first came across InfluxDB. BAI engineers wanted to optimize and reduce the amount of time it took to connect to the network. Plenty of solutions existed that provided data about network performance after connecting, but they did not find anything to provide information about the connection process itself.

So, the BAI team created Project Touchstone, a Raspberry Pi running a Python script that captured and timed every element of the onboarding process. To store the generated data, BAI used InfluxDB. Jeremy Foran, BAI's Head of Data Analytics, described the appeal of using InfluxDB: "Being able to see the graphs as soon as we're committing information to the database without having to build visualizations or endpoints was really powerful, and we really liked it." InfluxDB quickly became BAI's go-to time series database because of that flexibility and its ease of integration.

The technical challenge

When BAI started to address the platform overcrowding issue, they did not have the budget to add more infrastructure. Therefore, they began to investigate ways to leverage their existing architecture.

BAI needed a way to measure the number of riders in a station in real time. BAI conducted some research, using Wi-Fi analytics, that showed a strong correlation between the number of active Wi-Fi connections in a station and the number of total riders in that station.

The solution

BAI already had access points (APs) and wireless controllers installed in each rail station. So, they built a virtual machine that used a Python script to scrape data from the wireless controllers every five seconds.

This script also adds tags to the data so that the BAI team can configure the APs into different groupings based on the task they are trying to accomplish or the business logic they need to run. From the virtual machine, the data gets sent to InfluxDB. BAI InfluxDB to visualize that data. Next, business logic gets applied to the data, which is subsequently published to an API.
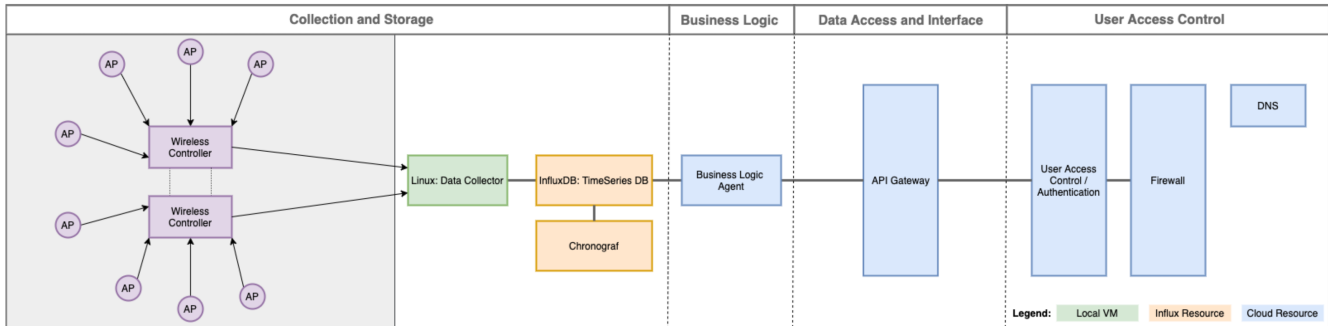
Using InfluxDB allows BAI to apply different sets of business logic to the same data, which means they can slice and dice the data so that teams within the TTC can create custom alerts. That means different teams can establish the threshold or severity for when they receive an alert for a specific type of event.

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"We leveraged existing wireless infrastructure to deliver this value add, and InfluxDB enabled us to quickly and effectively develop our [rail] platform overcrowding solution."
Jeremy Foran, Head of Data Analytics, BAI Communications

Results

As riders enter the station, get on a train, and leave, the WiFi network data shows peaks and valleys because riders connect and disconnect on a predictable basis that syncs with the train schedule. However, when a disruption to service occurs, riders remain connected to the access points (APs) in a given station and the data shows a steady increase without a corresponding decline.

BAI created a custom system map dashboard that updates in real time with station status. This not only helps rail operators identify where overcrowding occurs and how severe it is, but the map also allows them to see the ripple effect across the rail network from delays at a single station.

Safety staff use these maps to focus their attention on the areas that need it. For example, instead of cycling through hundreds of disparate security camera feeds, they can use the map to indicate stations with overcrowding and go directly to the camera feeds for that station. This type of proactive monitoring and responsiveness to developing issues makes safety staff more effective at resolving issues.

With a simple Python script to collect the data, a handful of servers, and InfluxDB as the 'cornerstone' of the solution, BAI built a lightweight solution that uses few resources, yet generates significant value for rail operators and safety staff.

What's next

InfluxDB continues to provide value to BAI because it allows them to update data collection to production services with zero downtime. BAI's Jeremy Foran explained, "we update the script to append new tags, publish a new API with the existing versions, and then return those tags to the consumer without having to take the database down or redesign tables or associations or anything like that. So, this means the entire solution took us hours to publish new versions or make amendments to the information that was included in the data logic, hours instead of days, and that's really the kind of agility that Influx provided us."

The BAI team also continues to investigate ways to leverage new features as they get added to InfluxDB. At present, they are evaluating how to apply internal analysis and forecasting capabilities in InfluxDB to their application.

About InfluxData

InfluxData is the creator of InfluxDB, the leading time series platform. We empower developers and organizations, such as Cisco, IBM, Lego, Siemens, and Tesla, to build transformative IoT, analytics and monitoring applications. Our technology is purpose-built to handle the massive volumes of time-stamped data produced by sensors, applications and computer infrastructure. Easy to start and scale, InfluxDB gives developers time to focus on the features and functionalities that give their apps a competitive edge. InfluxData is headquartered in San Francisco, with a workforce distributed throughout the U.S. and across Europe. For more information, visit influxdata.com and follow us @InfluxDB.

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