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— T.J. Crawford
Founder & CEO
Innovative Transit Solutions

Next-generation transit ticketing

Delivering a fast, convenient experience for mass transit riders

Innovative Transit Solutions grew out of an initiative to modernize fares for the Las Vegas Monorail – a 3.9-mile transit system that provides an easy way to explore the city’s casinos, hotels, shops, and other sites. Transit Cloud – the company’s fare solution – provides several digital alternatives to traditional magnetic-stripe tickets, giving riders a more convenient way to purchase and validate fares. To support the revolutionary end-to-end solution, which stretches from backend payment processing to edge-of-network station gates, Innovative Transit needed a robust engagement database that provides superior performance. And because Las Vegas never sleeps, the solution had to ensure a great customer experience by delivering offline functionality in the event connectivity is interrupted.



The Challenge: Transform how riders buy and use transit tickets

The team at Innovative Transit set out to revolutionize the industry, starting with mag-stripe tickets that have long plagued riders and transit organizations alike. For example, it is impossible for transit organizations to deliver mag-stripe tickets online – they must be mailed to customers – which takes far too long. In addition, mag-stripe tickets are like cash; when riders lose them, the value stored on them is lost as well. Finally, for transit authorities, the hardware to encode mag-stripe tickets is extremely expensive to purchase and even more expensive to maintain.

At the same time, consumer confidence in eCommerce and the explosive growth of smartphones created an environment ripe for change. “We wanted to empower transit organizations to deliver tickets directly to riders’ mobile devices or allow riders to print out barcoded tickets from home,” says T.J. Crawford, founder of Innovative Transit, “Letting consumers use the ticket medium they are most comfortable with helps grow ridership.”

By using the latest technologies, the company can deliver the resiliency of mag-stripe tickets along with the benefits of an account-based solution. “If riders misplace tickets, they can just print out new ones or access their fares from their smartphones,” says Crawford.

As the company developed the software architecture for Transit Cloud, Crawford’s team recognized that relying solely on a cloud database wouldn’t work. “If you keep all account information in the cloud and the cloud service goes down for any reason, the gates won’t open. That will cause huge problems for riders and transit organizations,” says Crawford.



To support its digital fare solution, Innovative Transit needs a data platform that can:

- Deliver the fast performance required for a responsive customer experience
- Provide open technology that can facilitate innovation
- Offer offline functionality to support current faregates and future handheld deployments

“We needed a data platform that would let us put database instances at the edge of the network – in the stations and at the gates – and then operate in offline mode if cloud connectivity becomes unavailable. With those capabilities, we could better ensure that gates would still open and close, and riders could get to their destinations.”

The data platform also had to deliver strong, low-latency performance. “When a rider scans a ticket at a gate, the gate has to open quickly,” says Crawford. “We needed a data platform that would let us provide a seamless, responsive experience for riders.



The Solution: Capitalizing on strong performance and offline capabilities with Couchbase

The company selected Couchbase as the data platform for its end-to-end transit fare solution. “Couchbase delivers strong performance and supports the offline mode we need to keep riders moving,” says Crawford.

The Transit Cloud architecture includes a cloud-based Linux server that runs the company’s custom application. That application supports not only online purchases but also a full range of physical sales channels, including self-service kiosks and customer service booths located at each station. The Las Vegas Monorail can even embed ticketing information into event badges, enabling visitors from around the world to easily use their convention or trade show badge to ride the monorail as they move around the city.

In the seven Las Vegas Monorail stations, each entry gate has a small-form-factor PC that runs Couchbase. When riders scan their digital ticket or the barcode on their printout, Couchbase validates the ticket and opens the gate. Couchbase then replicates the redemption information back to the application running on the cloud-based server.

During the deployment process, Crawford asked Couchbase professional services to help overcome some initial obstacles. “The Couchbase team was a huge help in resolving early issues quickly,” says Crawford. “For example, the way the Las Vegas Monorail gates and stations were configured, we found that a problem with one gate could cause problems with others at the same station. The Couchbase team helped us implement a quick fix and then worked with us to develop a longer-term solution.”



The Result: Providing a smooth rider experience and gaining a platform for innovation

Moving from initial pilot to large-scale deployment in a few months

The company conducted an initial pilot of Transit Cloud with 10,000 users during the Consumer Electronics Show (CES) in Las Vegas in early 2017. “CES attendees could scan the barcode on their event badges to attend CES, ride the monorail, and use a bike-sharing service, all from a single NFC badge,” explains Ingrid Reisman, Chief Marketing Officer of the Las Vegas Monorail Company (LVMC).



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— Ingrid Reisman,
Chief Marketing Officer
of the Las Vegas
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The successful pilot enabled the company to undertake a larger-scale deployment for ConExpo-Con/Agg, North America's largest construction trade show just a few months later. "We were able to scale up from a test of 10,000 users at CES to a live solution at ConExpo with approximately 136,000 people fairly easily," says Reisman. "for our system and provides the solution we've been looking for to better meet our unique customers' needs."

Spurring increased use of mass transit

ConExpo was the first large-scale deployment and demonstrated the potential for this modern fare solution to help drive more people toward mass transit. "By integrating the transit fare with the ConExpo badge, we helped boost ridership by nearly 30 percent, and increased revenue by an even more impressive 50%, compared with the previous year's show," says Reisman. "That increase suggests that providing a convenient digital ticket could help municipalities get more people out of their cars and onto mass transit," adds Crawford.

Achieving efficient, scalable performance

The Innovative Transit team has found that Couchbase can easily handle a heavy load of concurrent transactions. "Couchbase outperforms the credit card processing," says Crawford. "In our initial testing, we were able to sell approximately 40,000 fares per second without any database hiccups."

"During ConExpo when we were seeing transactions flying by in real time, the Couchbase environments at the gates never approached capacity," says Crawford. "Even using the relatively low-power, small-form-factor PCs, the processors and memory barely exceeded 50 percent. That efficiency will let us expand deployments while keeping our capital costs in check."

Delivering a fast experience for riders

Couchbase works with the other solution components to provide lightning-fast performance that keeps transit riders moving. "From the moment someone purchases a ticket to the moment it's ready to be redeemed at a station gate is typically less than one second," says Crawford. "That's revolutionary speed for the transit industry. A rider can use a smartphone to buy a ticket while standing in front of a gate and by the time he or she puts the smartphone on the scanner, the gate is ready to validate it."

The company helped accelerate the gate opening process by running Couchbase on Windows 10 instead of in a Linux virtual environment. "We experienced huge performance improvements by running natively on Windows 10," says Crawford. "The gate response time - from presenting the ticket to the gate opening - was cut nearly in half. We went from 650 milliseconds to about 350 milliseconds. All of this speed adds up to a very fast experience for riders."



About Innovative Transit Solutions

Innovative Transit Solutions is helping transit agencies increase ridership with a powerful suite of consumer-focused payment and fare management products. Transit Cloud was built from the ground up to let agencies focus on serving their riders and communities through an open, omnichannel fare solution. Riders can purchase tickets with ease through mobile devices, fare vending machines, an organization's own customer service, or partner sales channels. By providing the most frictionless rider experience, delivering real-time rider insights, and reducing systems management nightmares, agencies are seeing ridership growth and improved operations.



2440 West El Camino Real | Ste 600
Mountain View, California 94040

1-650-417-7500

www.couchbase.com



Looking Ahead: Moving beyond gates

In the future, Innovative Transit will be using Couchbase Mobile to support a wider array of fare redemption scenarios. "Some transit systems use fare enforcement personnel instead of gates," says Crawford. "For those systems, we can deploy Couchbase Mobile on mobile handsets so those personnel can quickly and easily validate tickets."

Whether accommodating mobile fare redemption or other use cases, Innovative Transit now has a strong foundation for innovation. According to Crawford, "Couchbase takes care of the data platform so we can focus on innovating our product and delivering a service that makes life easier for our customers."

Learn more

Visit couchbase.com to learn more about the world's most powerful NoSQL data platform.

About Couchbase

Couchbase's mission is to be the data platform that revolutionizes digital innovation. To make this possible, Couchbase created the world's first Engagement Database. Built on the most powerful NoSQL technology, the Couchbase Data Platform offering includes Couchbase Server and Couchbase Mobile and is Open Source. The platform provides unmatched agility and manageability - as well as unparalleled performance at any scale - to deliver ever-richer and ever more personalized customer experiences.