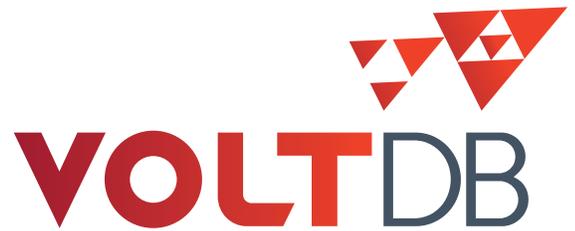


SMART DATA FAST.™



EMAGINE IMPLEMENTS REAL-TIME TELECOMMUNICATIONS PERSONALIZATION WITH FAST DATA

CASE STUDY

LEVERAGES VOLTDB TO DEPLOY REAL-TIME CUSTOMER VALUE MANAGEMENT SOLUTIONS WITH A MEASURABLE ROI

Emagine International transforms big data into useful insights to align the right message with the right people at the right time, on the right channel and in the right way. This innovative company provides a real-time, adaptive contextual marketing platform and managed marketing services for mobile service providers. Based in Sydney, Emagine works closely with mobile operators to significantly increase revenue opportunities by presenting tailored, relevant and timely offers to customers.

To differentiate its offering and help operators take advantage of real-time analytics and decisioning, Emagine selected VoltDB's in-memory scale-out SQL database as the core of its Emagine Real-time Event Decisioning (ERED) platform. This has allowed Emagine to architect a fast data solution that requires 3 milliseconds for the ingest-analyze-decide journey through the ERED platform, enabling Emagine to deliver customized offers to subscribers in fewer than 250 milliseconds. Mobile operators that use the ERED platform can achieve a measurable ROI in real-time personalization. Emagine completed two use cases that prove:

- Emagine has ingested 1.5 billion daily records for one mobile telecoms customer
- Real-time offers were proven to be 1.5 to 2.5 times more successful than near real-time offers
- In one use case, personalized real-time offers delivered a 253% increase in acceptance rates.

INTEGRATING FAST DATA AND LEGACY INFRASTRUCTURE

Emagine is focused on Customer Value Management (CVM)—the practice of understanding and maximizing the value of each individual customer through ongoing, tailored interactions. ERED enables service providers to capitalize on massive amounts of data in real time. The ERED platform is designed to capture event triggers from network devices as they happen. Telcos can then easily communicate the right offer to the right customer as data events occur. ERED enriches usage-based and trigger-based marketing campaigns with the ability to deliver a reward or a notification instantaneously when a threshold or target is reached.

Enabling service providers to execute campaigns and communications in real-time, it delivers personalized messages and offers while a customer's phone is still in his or her hand. This real-time platform ingests real-time transactions such as customer data records (CDRs), network events, URL data, Home Location Register/Visitor Location Register (HLR/VLR) states and end-of-call events to trigger campaigns, rewards and notifications.

Mobile networks provide network data about the subscriber experience of their service in real-time, such as whether the customer is experiencing network latency when downloading an app, dropping calls, or exceeding bandwidth limits while viewing a popular YouTube video. All of these events are detectable and actionable by mobile service providers as they happen. Nevertheless, legacy infrastructures and processes have left mobile operators unprepared to tap into real-time customer data from the network. A typical campaign management solution is integrated with a data warehouse, creating latency exacerbated by reliance on too many batch processes. Often,

source systems are legacy platforms that were never designed for real-time, and the best that can be achieved is a “near real-time” integration.

The built-in latency of legacy architectures means personalization decisions cannot occur in real-time, hence any personalized customer interactions occur too late and lose relevance. To achieve real-time personalization and remain competitive, service providers need to evolve their business and marketing infrastructures away from batch-based integration of systems to enable agile, real-time CVM.

According to Emagine CEO David Peters, “In a typical service provider there's a customer lifecycle, and there are many moments of truth across that lifecycle. These moments of truth range from acquisition and onboarding through to upsell, cross-sell and customer loss mitigation. Finally, if they do leave the operator wants to try to win those customers back, and the cycle begins again. Analyzing the journey from the point where the customer does something to the point when we interact with them really matters, because we want to interact with the customer in the moment when it really counts.

“Our vision was to build a platform that delivers the best interaction possible, aligned to each individual customer in real-time to drive customer engagement and maximize business results,” Peters stated. “Our definition of real-time is to take an event from the network and within 250 milliseconds have an offer, a communications message or an interaction in the hands of that customer. Then we're looking to drive customer engagement and maximize business results, which enables incremental revenue for the operator, decreases churn and increases customer activity levels.”

DEPLOYING A REAL-TIME ARCHITECTURE

A real-time architecture has the ability to process data as it arrives, rather than storing the data and retrieving it at some point in the future. “In the context of a service provider, we take ‘the present’ to mean the attention span of the subscriber while they have the device in their hands,” said Emagine CTO Srikanth Markonda. “We therefore define real-time for service providers as under 250 milliseconds for end-to-end journey time from network event to action with the customer—regardless of the volume or variety of the data being processed.”

Emagine needed to design a real-time engine that could complement its existing Adaptive Contextual Marketing platform, which uses the latest technologies and techniques in machine learning and big data analytics to reveal deep insights into customer behaviors. “Traditional campaign management platforms are architected to sit on top of the data inside a data warehouse, so they automatically inherit the latency from the enterprise data warehouse,” said Peters. “We implemented a Lambda architecture so we could benefit from the combination of real-time and batch and offer real-time analytics to turbo-charge existing multichannel campaign management environments.” Lambda is a multiple-layer data processing framework that features short-term data storage with fast query response times and long-term data storage with slower query response times.

After evaluating fast data technologies, Emagine selected VoltDB to provide real-time analysis of subscriber data based on event triggers such as the

end of a call, use of the mobile device in a particular location, or a user hitting a data usage threshold. VoltDB is a ground-up redesign of the traditional relational database architecture designed to run 100% in memory on scale-out commodity hardware. It provides record-breaking transaction performance with the familiarity of SQL and the data consistency and reliability of traditional relational systems—but with none of the data consistency tradeoffs of NoSQL offerings. VoltDB’s innovative architecture makes it easy to power fast data applications in a way not possible with existing technologies to analyze real-time streaming data, make decisions, and swiftly deliver targeted information and offers to mobile subscribers.

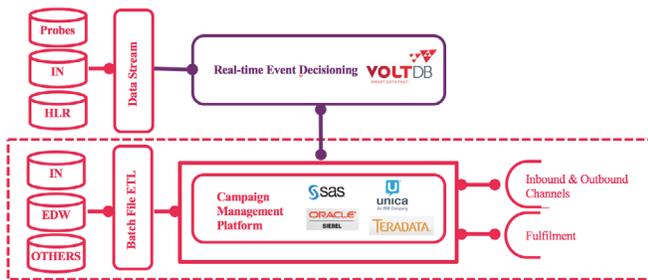
“We conducted a global search and selected VoltDB because we believe it’s the world’s fastest and smartest in-memory database,” said Peters. “It met our core requirement for sub-250 millisecond response time. In terms of transactions per second, it’s highly scalable and delivers the performance we need. We’re happy we selected VoltDB as the underlying architecture for our real-time layer.”

VoltDB is an in-memory SQL database that combines analytics on live data feeds with transaction processing in a single, horizontal scale-out platform. It runs on commodity hardware in a massively parallel shared-nothing architecture, and is built to tap the value of fast data in real time. Implementing a Lambda architecture with VoltDB as a fast front end allows the ERED platform to deliver real-time alerting and monitoring, reporting, analytics, configuration and auditing to deliver competitive advantages and measurable business results to mobile operators.

SUPERCHARGE THE CVM ENVIRONMENT WITH REAL-TIME CUSTOMER INTERACTION

Many of Emagine's current mobile telecommunications prospects already have a Multichannel Campaign Management (MCCM) in place. These traditional MCCM systems are batch-based architectures, and offer near real-time at best, which means daily batch-based customer interaction. These operators are achieving 10 minutes for a typical near real-time campaign. Additional challenges include data latency from Enterprise Data Warehouses (EDW) and other source systems, with no streaming analytics or real-time event triggers from the network.

Emagine's ERED platform has been developed to be complementary to existing MCCM platforms. It offers an opportunity for these operators to supercharge their existing MCCM platforms and leapfrog to sub-second customer interaction.



Emagine's approach unlocks the full power of CVM with sub-second customer interactions.

MEASURING THE ROI OF REAL-TIME ANALYTICS

Emagine conducted a proof-of-concept with a Tier 1 mobile service provider to quantify whether real-time interaction makes a difference in driving revenue growth and reducing churn. The fundamental question Emagine sought clarity on was, "Will

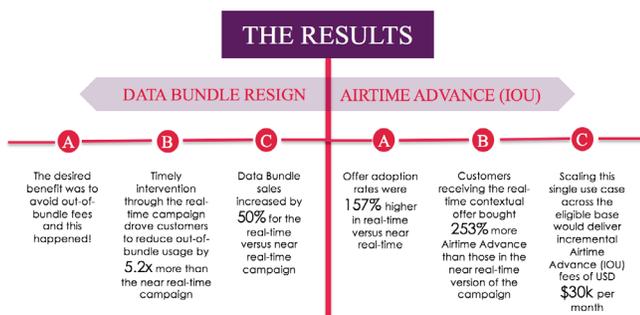
real-time campaigns based on streaming analytics deliver a greater business benefit than near real-time campaigns?" Is interaction with the customer within five or 10 minutes good enough, or does real-time, sub-second interaction actually generate an incremental benefit? Two use cases were analyzed with the service provider:

- Data Bundle Resign:** Messages would be tailored to intercept customers and make subscribers a contextual, real-time offer of a customized data bundle when they were about to exceed service usage levels. This would allow the mobile operator to avoid charging high out-of-bundle rates when subscribers surpassed the service thresholds of their existing plan, which was driving customer dissatisfaction and leading to customers cancelling their existing data bundles and moving to other operators.
- Airtime Advance (IOU):** Identify "valuable" customers who are about to run out of credit on pre-paid services and offer them a real-time contextual Airtime Advance—an IOU credit. This would motivate customers to continue to use the network, and create incremental revenues by requiring a small service fee when the subscribers recharged their plan.

The results were impressive, and confirmed quantitatively the advantages of real-time analytics over existing near-real-time solutions. For the two use cases, Emagine ingested 1.5 billion call and event detail records per day. For the Data Bundle Resign use case, the service provider was able to instantly present customized offers that reduced out-of-bundle usage by over 500%. Real-time data bundle sales increased by 50% compared to the existing near-real-time campaign results.

The Airtime Advance use case yielded similar measurable results. Real-time offer adoption rates were 157% higher than those of near real-time offers. Subscribers receiving tailored real-time offers bought 253% more Airtime Advance services than those who received near real-time offers. As the operator implements this use case across its entire eligible base, it is projected to generate incremental Airtime Advance fees of USD \$30,000 per month. These two test cases prove that real-time campaigns deliver greater business benefit to telco marketing efforts than possible with near real-time campaigns.

best practice objective is to work in partnership with clients to deliver up to 5% net gain in incremental revenues. A typical CVM roadmap from Emagine will now deliver incremental revenues that easily justify investment in further scale and sophistication over a multi-year period.”



“Our results show that the power of real-time can be 1.5 to 2.5 times greater than is possible with near real-time campaigns,” said Peters. “For a service provider with \$1 billion U.S. dollars in revenue, switching to real-time analytics would achieve an increase in CVM results of up to \$45 million U.S. dollars annually.”

Markonda concluded. “We’ve been able to optimize performance while ensuring high availability and delivering measurable results. Our real-time architecture provides us with a competitive advantage in the marketplace, and using VoltDB as the ingestion engine delivers the real-time decisioning and analytics we need to help mobile operators succeed. Support has been excellent from VoltDB, and VoltDB has been easy to configure and manage.” Peters added, “CVM requires a multi-year partnership, and our