

## Flexible and Scalable Insights for National Exchange of Clinical Data

Cognosante supports the **eHealth Exchange Hub** initiative, the nation's largest public-private health information network. As their technology partner, we're helping the Hub provide healthcare organizations a single API (connection) and trust framework to exchange patients' medical data nationwide. This means leveraging additional data in electronic health records (EHR) for a data-driven patient experience and ultimately better health outcomes.

Our eHealth Exchange Hub Dashboards visualize traffic and unlock insights to optimize the Hub's efficacy, value, and performance. Our SaaS Dashboard, built as an extension of our **eSante Insights™ platform**, provides critical activity and trend information on the eHealth Exchange Hub supporting both administrators and participants. (See Figure 1)

In 2019, Cognosante joined **InterSystems' eHealth Exchange Hub infrastructure team**, to complement their solution with advanced, cloud hosted, serverless architected data cubes, advanced API driven integration, and dashboards. Originally intended to support an estimated two million messages per day, the rollout was exponentially successful and has grown to over 1 billion transactions per month as of July 2020.

This expansive growth in capacity was seamless due to Amazon Web Services' (AWS) scalability and flexibility, as well as the overall design of the solution. Since the Hub and its Dashboard infrastructure operate on Amazon Cloud, the resources scaled up to handle the incoming volumes quickly and without interruption. In fact, the Hub's transaction volume nearly doubled in 30 days – from 24 million to 50 million transactions per day – with no issues. As a result of the significant volume increases, an evolutionary redesign of the Hub Dashboard was necessary. While the redesign was in process, the AWS services were scaled up to ingest the larger volumes into the data lake. The Hub Dashboard was modified to remain operational and temporary reporting was put in place for continuity of client insights.

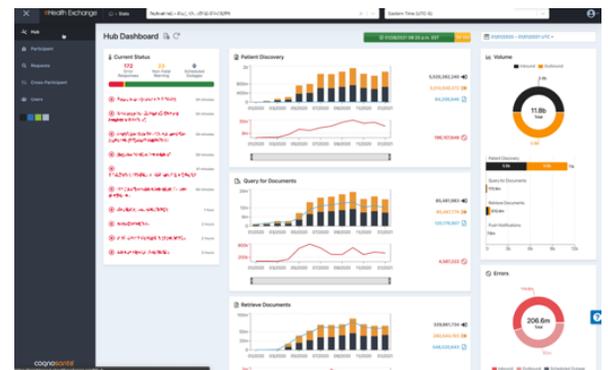


Figure 1 - eHealth Exchange Hub Performance

By August 2020, the redesigned Hub Dashboard v2.0 launched with a capacity in the billions of transactions per month. During its implementation, the cloud environment also scaled up to handle the rapid ingestion of current work and the importing of the data lake into the new application. The architecture worked flawlessly, and the new environment was operational ahead of schedule with all historical data and temporary backlogs ingested. Since the Hub Dashboard was upgraded over a weekend and fully operational at the start of business on Monday, there was no adverse impact to business continuity.

### ACHIEVING EXPONENTIAL SCALABILITY AND NEAR REAL-TIME INSIGHTS

Today, the eHealth Exchange Hub Dashboard receives as many as 100 million messages per day and 1.8 billion messages per month. Using Amazon Cloud services, the transaction processing to the Hub Dashboard and associated analytics is occurring within one minute; creating near real-time analysis of activity and trends on the eHealth Exchange Hub.

The architecture Cognosante designed, implemented, and integrated with the rest of the team (including **InterSystems** as the core technology provider and **Ready Computing** as the designer and implementer of the data feed to the Amazon Cloud) was built to respond to dynamic and demanding needs for scale. (see Figure 2)

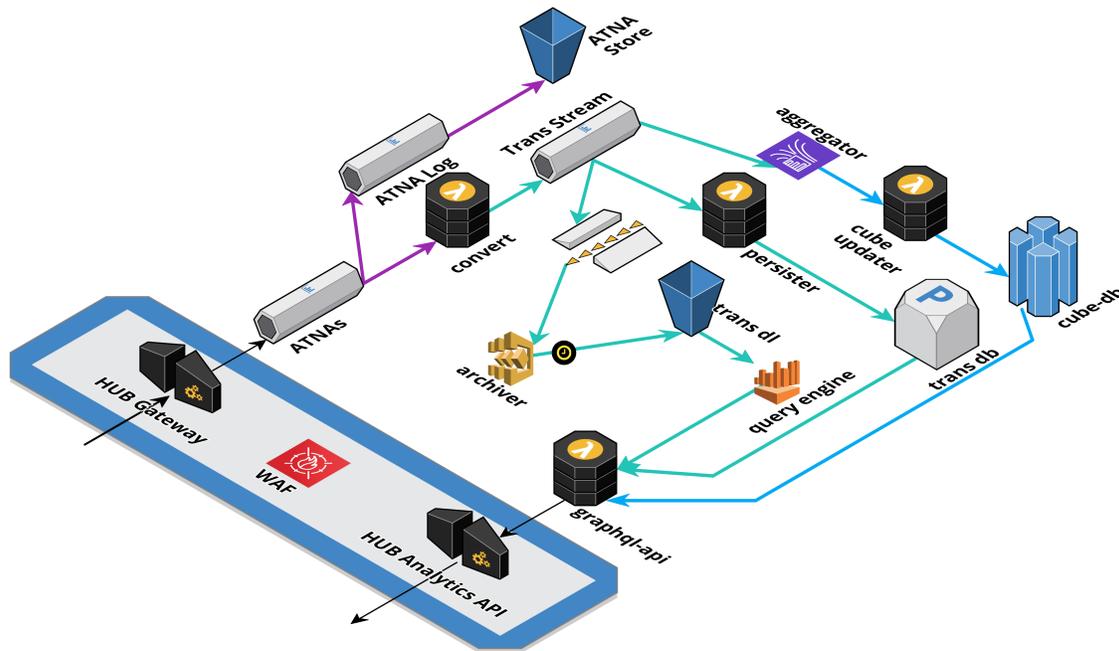


Figure 2 - eHealth Exchange Amazon Cloud Architecture

Core capabilities of this solution allow eHealth Exchange to accommodate their immense success and need for exponential scalability:

- **eHealth Exchange GraphQL API** – Empowered our partner organizations to scale the core solution and refactor the feed of logs to the Amazon hosted Dashboard component. The scalable API architecture accommodated the massive influx of data with minimal operational cost impact.
- **AWS Kinesis Data Streams** – Accommodating large and growing volumes of transactional data, our solution ingests millions of records per hour, leveraging AWS Kinesis Data Streams to implement an ingress data gateway. AWS Kinesis Data Streams proved to be a reliable solution which supports high volume data ingestions at an extremely low price. Architecting out data ingestion around Kinesis provided the required elasticity to deal with a constantly increasing volume of transactions without compromising system design.
- **AWS Kinesis Analytics** – Our solution delivers near real-time analytics of large transaction volumes. To achieve this, the system uses AWS Kinesis Analytics to create time-based aggregations and update our aggregation data tables in small increments. This allows the architecture to be responsive and adapt to peaks in transactional volume.
- **AWS S3** – By leveraging the AWS S3, our solution mitigates one of the biggest challenges faced when accommodating massive data storage requirements. The eHX Hub data lake is implemented on top of S3 storing in parquet files for all transactions, which allows for fast and efficient access to the data using the AWS Athena Query Service.
- **AWS RDS Aurora** – The architecture leverages AWS RDS Aurora to store incoming ATNA transactions and aggregation data. Being a highly scalable and distributed system, with a requirement to access recent data in a matter of seconds, we leveraged AWS Aurora to store incoming transactions up to 2 hours to support responsive searches on the most recent transactions. We leverage AWS Aurora to host complex aggregation tables, which allows storage of millions of records and provides extremely fast query access.
- **AWS Lambda** – The entire solution is a native cloud solution following a serverless architecture. AWS Lambda Functions perform all processing. From ingesting the incoming transactions to serving the analytics results, Lambda provides the needed scalability and reduces maintenance operations required on classic server-based solutions.

## LEARN MORE ABOUT OUR INTEROPERABILITY CAPABILITIES AND SOLUTIONS

Leveraging our eSante™ Solutions Platform, we strengthen healthcare delivery through interoperability and maximizing the efficacy of data across local, regional, state, and national health information exchanges (HIE); interoperability solutions; social determinants of health; and population health analytics. [Learn how we help our customers achieve their HIE strategies](#) through tailored and purposeful research and development, ongoing collaboration with our technology partners, and a commitment to continual innovation.