



### Use Case: Internet of Things

Refers to the revolution of a growing number of internet-connected devices that can network and communicate with each other.

### Industry

Healthcare

### Challenges

- Management of large volumes of real-time structured and unstructured information
- Flexible data model capable of ingesting new, custom data sources
- Enterprise search and analytics without the rigidity of relational systems

### Solution

- Hybrid on-premise and SaaS model handles dynamic data and rolling upgrades
- Flexible data model accommodates varying and custom patient data
- Search and query capability on unstructured data

### Results

- Real-time decision support for clinicians with a holistic view of patient history
- Lowest Total Cost of Ownership
- Agility in responding to customer needs

## INTERNET OF THINGS

# AMARA HEALTH USES DATASTAX TO PRO-ACTIVELY PROTECT PATIENT'S HEALTH

Amara Health provides real-time predictive analytics to support clinicians in the early detection of critical disease states. Early detection enables rapid response, deriving better patient outcomes and lower healthcare costs. With the acceleration towards value-based payment models, Amara delivers the decision support software needed to achieve decreased lengths-of-stay, lower utilization costs, and enhanced revenues.

### The Challenge

Amara provides real-time decision support for clinicians to help in the early identification of hospital patients at risk of serious, rapidly progressive diseases, like sepsis. These are patients that are potentially going to crash over the next hours or days, so an intervention is extremely urgent. Clinician's receive a text message alert from Amara's system on their smartphone or tablet directs their attention to the at-risk patient. The message includes key clinical variables to provide context for the alert.

Amara's software connects with multiple hospital data sources and analyzes data streams that are very real-time in nature. In addition to dynamic data, information received by Amara's software varies in format including structured – such as medical codes and other numeric values; unstructured clinician narrative – such as doctor's notes, operative reports, and discharge summaries; and real-time physiologic signals from patient monitoring devices.

The team at Amara Health faced a significant challenge in managing large volumes of dynamic structured and unstructured data. Due to the dynamic nature of data being ingested, it was imperative that the system be agile and able to ingest new data sources unknown at the time of designing the system. Amara required a database with a flexible data model, capable of change in real-time. In addition, although much of the information received was in Health Level 7 (HL7) format, a key requirement was being able to handle custom formats hospitals may have.

Another critical component in Amara's search for the ideal database technology infrastructure was enterprise-grade search over text and ability to query information. Relational databases didn't meet these needs because of its hard-wired nature and lack of flexibility in dealing with unstructured data.

### The Solution

After evaluating database alternatives, the Amara team understood that relational database infrastructures could not ingest real-time healthcare data coming from new and varying sources in a variety of formats, let alone provide search and querying in real time. Amara Health chose DataStax Enterprise as its database of choice so it would have Apache Cassandra™, which is optimal for real-time data, plus enterprise capabilities from DataStax they would need in production: search, query, round-the-clock support, enterprise security, and other benefits.

The Amara solution is a hybrid on-premise and SaaS solution. In the local model, Amara delivers a local install with replication. Leveraging Cassandra's automatic replication and always-on benefits, Amara designed their software to be similar to Cassandra's architecture in that they have multiple

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**"DataStax Enterprise translates to lower total cost for us to deliver our system over time and more agility in meeting customer's needs."**

*Steve Nathan  
CEO  
Amara Health Analytics*

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nodes where each node fails over to the next node so rolling upgrades can be performed without down time. Amara's SaaS model has geographically distributed data centers ensuring 100% uptime to accommodate varying data sources.

Amara ingests all of its incoming data into a variety of column families, the main one being called a patient timeline, time-series in nature. All incoming data is organized into patient timeline in chronological order giving users a holistic picture of patient history from the moment they walked into the hospital until they leave and after.

Amara also generates a report column family for analysis. The solution is a combination of natural language processing, machine learning and rules-based analytics so the team has built up a large set of fairly complex rules that deduce the state of the patients based on the data they're getting and then identifying risks to patients health. Amara's software is looking for an accumulation of evidence that indicates degradation in the patient's state, so the system has complex rules.

One of the important aspects of Amara's solution is that in order to really demonstrate value, Amara has to show that its alerts are having a significant impact on the care of patients. It is imperative to show over a period of time that patients that got alerts, and therefore received treatment sooner, have better outcomes.

### The Results

DataStax Enterprise and Apache Cassandra gives Amara the flexibility to create and modify their underlying data model in the live system. DataStax's search capabilities and enterprise stability right out of the box shortened development time. The fact that the schema isn't hard-wired is part of Amara's overall design. For example, if Amara gets a new type of data DataStax Enterprise allows the Amara team to introduce that new information into the live system without having to re-install it or modify the code. This dynamic solution empowers users to get immediate insight on new information for analysis and reporting.

DataStax Enterprise is operationally simple for the Amara team. Administrators manage everything remotely with predefined alerts that notify administrators of problems should they occur. For the business, DataStax Enterprise translates to lower total and more agility in meeting customers' needs. The great thing about Cassandra and DataStax Enterprise is that users have the power to slice and dice data, generate reports and gather insights in a variety of ways showing tangible benefits of the Amara system alerts versus other factors.

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### About DataStax

DataStax is the fastest, most scalable distributed database technology, delivering Apache Cassandra to the world's most innovative enterprises. DataStax is built to be agile, always-on, and predictably scalable to any size.

With more than 500 customers in 45 countries, DataStax is the database technology and transactional backbone of choice for the world's most innovative companies such as Netflix, Adobe, Intuit, and eBay. Based in Santa Clara, Calif., DataStax is backed by industry-leading investors including Lightspeed Venture Partners, Meritech Capital, and Crosslink Capital. For more information, visit [DataStax.com](http://DataStax.com) or follow us @DataStax.  
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