



# Developing a Next-Gen Enterprise Performance Dashboard

## ABOUT THE CLIENT

Our client is a healthcare payor with considerable clinical data and associated processes needed to both pay for care and to supply providers with the best possible information to improve the quality of care and resulting outcomes for their patient populations.

## CLIENT CHALLENGE

IT monitoring is an essential element of the client's enterprise IT strategy. The IT organization administrators and its business leaders track metrics over time to maintain a strong level of production using trends to validate infrastructure updates and changes long before applications and services are affected. With a variety of monitoring tools used across the enterprise, the client lacked the ability to have a singular view across all monitoring systems.

Client Executives reached out to Ventech Solutions asking our technical team to design and develop a dashboard that would collect and communicate information from a variety of sources in the enterprise. This "single pane of glass" concept would use the latest technologies from AWS.

## OUR SOLUTION

### Data Streams Drive Insights

Ventech Solutions provides oversight of the Information Technology (IT) services that manage the client's enterprise. Our support teams use the data streams that come from AWS suite of services, as well as New Relic, Tenable, Splunk and other third-party tools. Each of these tools provides important data that determines the health of the enterprise along with unique data structures. Our first step was to classify how each tool provides its data. We identified three key data stream categories.

- Provider Supplied Data Streams (i.e., AWS)
- Agent Based Data Streams (i.e., New Relic)
- Synthetic Monitoring (active probing of applications, i.e., Tenable)

When considering the health of each application in the enterprise, we discovered that each application Development Contractor Organization (ADCO) supporting the client had its own approach to monitoring its specific application, yet these ADCOs were operating at varying levels of maturity.

Our initial data stream research and ADCO maturity profile helped inform the design and development of this new dashboard application.

# THE HEALTHCARE QUALITY DATA REPORTING SYSTEM (HCDRS) OPERATIONS DASHBOARD SOLUTION

Our HCDRS Operations Dashboard design contains software and services that address four key areas: dashboard rendering User Interface (UI), logic functions within the application tier, data storage in the data tier and AWS supporting services. Each of these is described below:

## DASHBOARD RENDERING

Beginning with the end user in mind, our team required a visualization tool with a supporting dashboard that provides a variety of options including graphs to see data and understand events taking place. Grafana was our top choice for its ability to work well in a cloud environment, as well as receiving high marks for its interactive visualization web application. Panels in the Grafana dashboard connect to each data source so that each can be tracked. Results are then displayed on the dashboard and can be viewed intuitively by the user.

## APPLICATION LOGIC TIER

Our application tier demanded a strong solution for collecting metrics from a wide array of inputs then writing them into a wide array of outputs. We selected Telegraf for its plugin-driven approach for both collection and output of data so it is easily extendable. Telegraf supports AWS components and virtually all major cloud vendors, which also made this a “best choice” product.

## DATA TIER

With an ever-expanding array of inputs, the Data Tier needed to perform as a fast, elastic, serverless real-time monitoring platform that contained an analytics service and event and metrics processor. InfluxDB is an open-source, time-based data store that met these needs. We use InfluxDB in our solution to retain data collected from New Relic, Splunk, AWS CloudWatch, and other Application Programming Interfaces (API).

Finally, to address the need for real-time data, we needed a complement to InfluxDB. Our team needed to create individual application streams that fed into the database for each component we wanted to monitor. Think of this as a constantly updating table. AWS Kinesis was the ideal choice for its flexibility with collecting, processing and providing real-time analysis for major vendors. AWS Kinesis provides the streaming data elements needed to obtain timely insights and react quickly to the latest information.

## ADDITIONAL AWS ELEMENTS

Our solution also included the following AWS service offerings: EC2, S3, CloudFront, AWS ECS to support Docker containers, Cloud Formation, Autoscaling, SageMaker, Lambda and EBS. The diagram below shows how these components work collectively to present information to the end user:

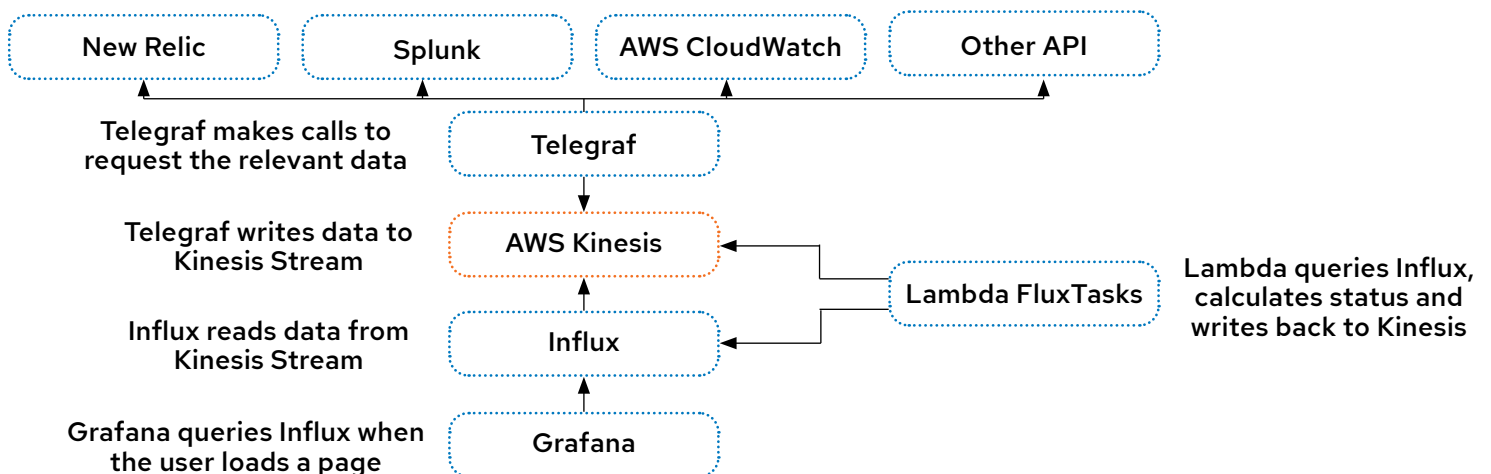


Figure 1: QualityNet Operations Dashboard Workflow

An example of what the end user sees from our data streams is shown in the diagrams below:

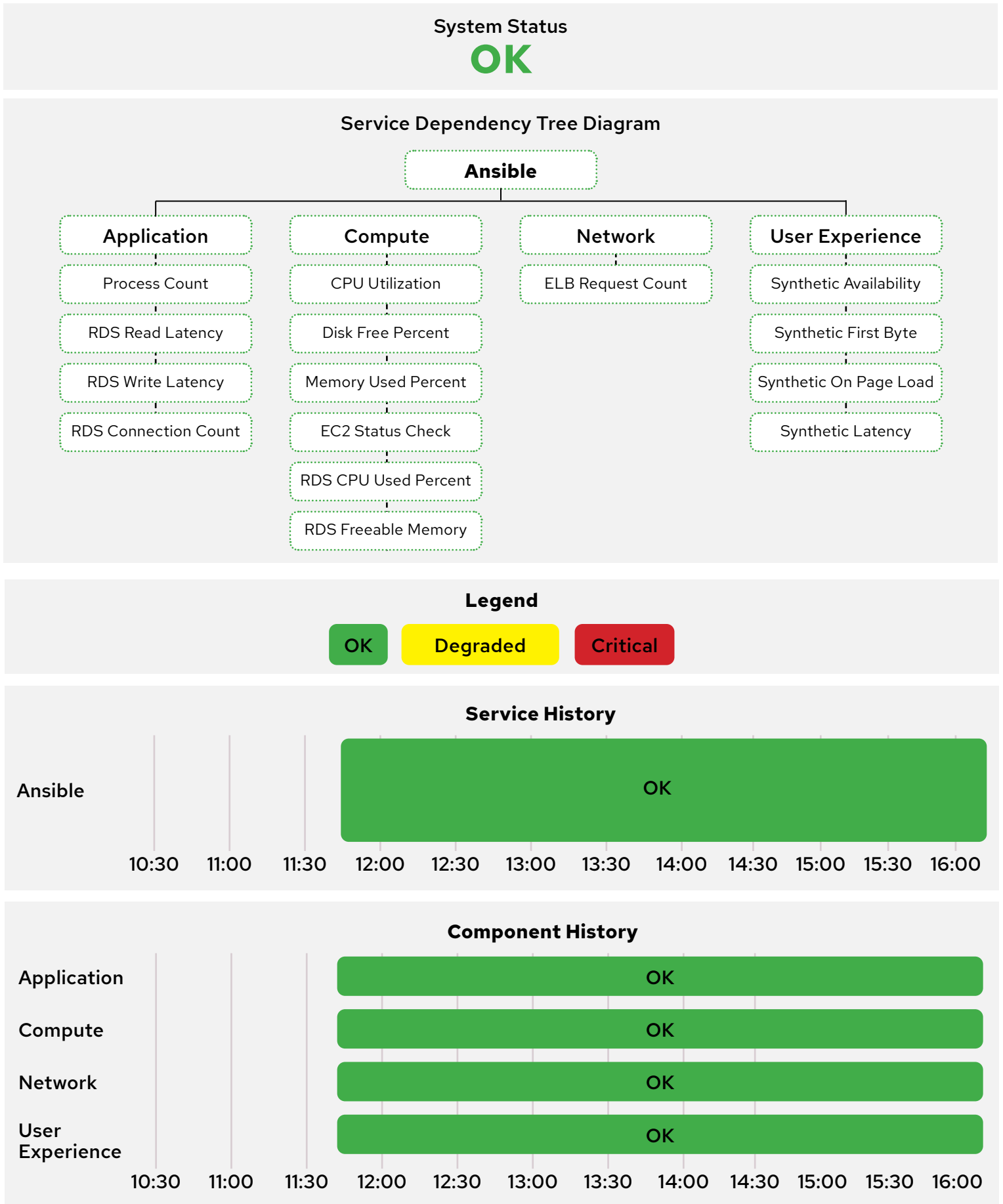


Figure 2: Observable information showing the health of Ansible

Another aspect of our UI model is that it provides an executive view, which allows stakeholders to quickly assess the health of the enterprise within each category of service:













Collaboration	DevSecOps Tools	Security
Confluence 	Ansible 	ClamAV 
HARP 	GitHub 	Syslog 
Jira 	Jenkins 	Tenable 
ServiceNow 	Nexus 	Zscaler 

Figure 3: Executive views show the enterprise health at-a-glance

### THE COMPOSITION REPOSITORY

As with any Performance Dashboard, metrics can change. We needed a method to abstract threshold criteria and other metrics so we could make adjustments in real time. To achieve this, we created a “Composition Repository” using an AWS S3 bucket. The Composition Repository allowed our team to centrally review and apply new rules used by the system.

### INTRODUCING MACHINE LEARNING

As part of our observability mindset, we introduced AWS Machine Learning software SageMaker. SageMaker was “trained” with the help of our Composition Repository. Rather than manually documenting thresholds and metric logic, our Meta model informed SageMaker of the desired end goals as it monitored Kinesis pipelines. The result was an increased accuracy of labeled data and automated logic adjustments based on incoming information.

We have been pleased with the early outcomes of this effort. Today, our client departments and ADCOs are working closely with our development team to enhance the quality of the information being rendered within the dashboard and understanding more about the client infrastructure’s health in near real-time.

### RESULTS & BENEFITS

Ventech Solutions now actively uses the HCDRS Operations Dashboard to understand the health of over 30 critical elements within the client’s IT infrastructure. This specialized approach has reduced average response time to incidents by 50%. This benefits our client’s end users by reducing both downtime events and the severity of incidents since many problems are detected and resolved before becoming critical.

We continue to expand the features and functions of the HCDRS Operations Dashboard as we plan for the integration of Internet of Things (IoT) and other enabling technologies.

### ABOUT VENTECH SOLUTIONS

Ventech Solutions is a technology and healthcare solutions provider that leverages emerging technologies to deliver a wide range of enterprise services including cloud modernization, infrastructure, data, security and service integration support. Ventech Solutions leads and manages some of the most critical technology transformation initiatives for the public sector that empower government agencies to achieve their mission. For more information, visit [www.ventechsolutions.com](http://www.ventechsolutions.com).