Case Study: HL7 Message Integration for ReadySet Surgical

About ReadySet Surgical

ReadySet Surgical (RSS) offers a cloud-based Software-as-a-Service (SaaS) platform for effective transfer of healthcare data quickly, reliably, and securely. Health Level Seven (HL7) integration simplifies the healthcare process by providing a standardized and cost-effective data exchange system and helps in exchange of information securely using a standardized format.

Designed to improve surgical workflow, ReadySet Surgical's software closes the communication gaps that have existed between hospitals and vendors/other medical facilities. HL7 integration services are considered the backbone in this progress. This integration adopted by ReadySet Surgical acts as a health communication protocol that assists in the exchange of data between applications involved in the healthcare process.

Solution

Based on ReadySet requirements and challenges, Dinoct architect and developers designed a cloud-based HL7 integration engine. Google Cloud Platform (GCP) was selected to provide the reliability and

Challenges

The surgical scheduling data from the healthcare system to the ReadySet application was received in a CSV file format via FTP and in a third-party flat file format. Some of the challenges were:

- Multi-step data upload process
- Handle all security issues with the data upload
- Large data volume during on boardings
- Case update lag of of 24 to 36 hours
- Increased time to add/modify data

redundancy required by RSS. The solution is designed as a high-available fault tolerance architecture utilizing GCP network, compute, storage and other core services, dedicated multiple GCP accounts for development, stage and production environments, GCP HIPAA eligible services and resources, SSL/SSH/VPN based access for data security in transit, multi-layered Identity and Access Management (IAM) groups.

As the diagram shows, through the IPsec tunnel the healthcare provider system reaches the Minimal Lower Layer Protocol (MLLP) adapter hosted in Google Kubernetes Engine (GKE) and the MLLP adapter receives HL7 messages and validates HL7 format. The invalid messages are discarded and the valid

messages are stored into the Health Level Seven International Version 2 (HL7 V2) store and after transforming the message it will be sent to the ReadySet server with business required fields.

ReadySet Surgical HL7 Integration - Deployment Architecture v2
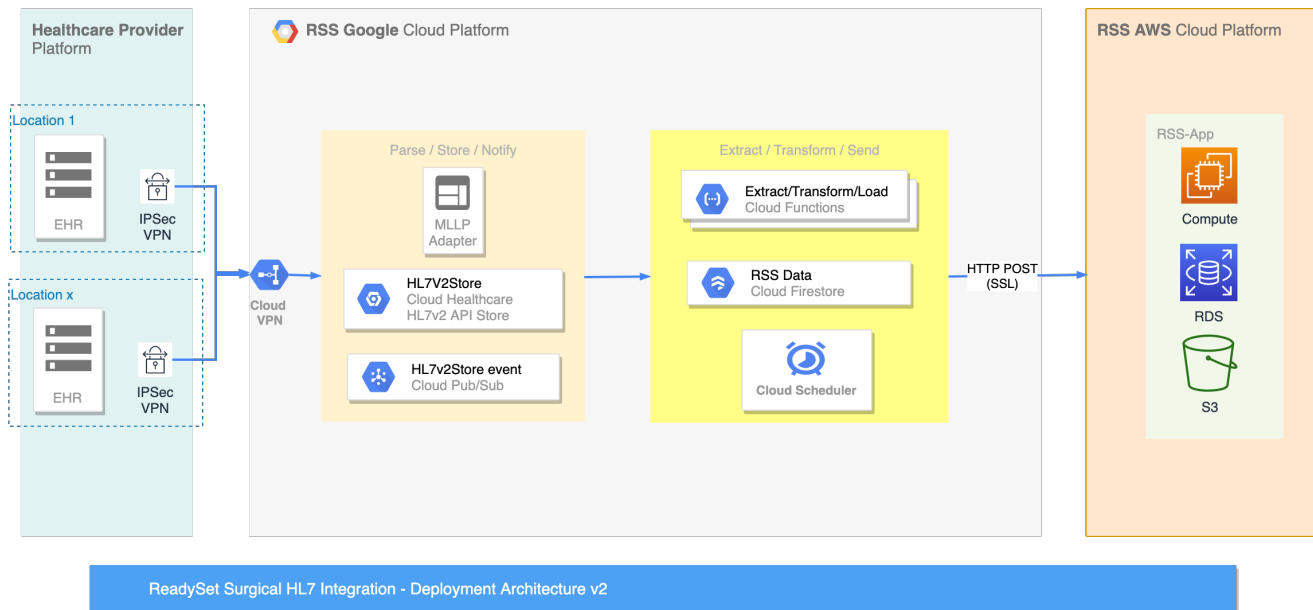
The GCP, other services used to build the integration engine components are detailed below.

Cloud VPN: For secure connection between healthcare provider and the HL7 Integration Engine hosted in GCP. Separate IPsec VPN tunnels are used for each healthcare provider.

Minimal Lower Layer Protocol (MLLP) Adapter: This component receives the HL7v2 message from the healthcare provider system over the TCP connection and ingests the message into the HL7v2 store.

Google Kubernetes Engine (GKE): The MLLP adapter is deployed in GKE for high availability and fault tolerance.

Healthcare API HL7v2 DataStore: The Cloud Healthcare API parses and validates the messages as they are ingested into the HL7v2 data store.

Cloud Pub/Sub: Messaging service for ingestion into HL7v2Store. Pub/Sub triggers the Cloud Function for data transformation.

Cloud Function: Platform for creating functions that respond to cloud events. First function runs parallel and stores the transformed data into the Firestore and the second function sends the data per the sequence to the backend.

Firestore: Cloud-native document database used to store processed SIU data and necessary mappings and dynamic changes.

Cloud Scheduler: Cron job to continuously fetch a batch of messages and send serially to ReadySet.

Cloud Build API: This service uses GitLab CICD to deploy Google services.

Cloud Logging: Use the logging service, to store, process and analyze custom and system event logs for troubleshooting and continuous improvement decisions.

Benefits

Implementing Dinoct's HL7 Integration Engine helped ReadySet integrate EHR/EMR systems from 100s of customers and update surgical case data in near-real time. Some of the key benefits are:

- Near Real Time update of the surgical case details to RSS application
- Enhanced interoperability eliminated the possibility of errors or incomplete data
- Enhanced the privacy and security of health data and meet HIPAA compliance
- Greater automation and streamlined business processes reduced manual work and minimized human error
- Maintain 100% data accuracy via automation
- Business scalability was possible with the ability to make changes faster
- Easy data-mapping with workflow set up benefitted data collection, processing, and quality assurance
- Highly scalable integration engine powered by massively scalable Google Cloud network, compute and storage services

Results in 2021

✅ **11 hospitals live**   ✅ **80-120 sec process time**

*4.88M in 2021

*602K in a month

*31K in a day

* HL7 messages ingested

About Dinoct

Dinoct empowers healthcare, life science, financial and other regulated businesses to focus on innovation and not worry about healthcare interoperability, cloud security, compliance, and reliability. We are the cloud technology experts that design and build healthcare interoperability solutions using HL7 V2, HL7 FHIR, DICOM standards and cloud infrastructure with best practices, security controls, frameworks, and guidelines such as CIS, NIST SP 800-66, ISO 27002 to meet HIPAA, HITECH, FedRAMP, GLBA or GDPR compliance requirements on AWS, Azure or GCP.
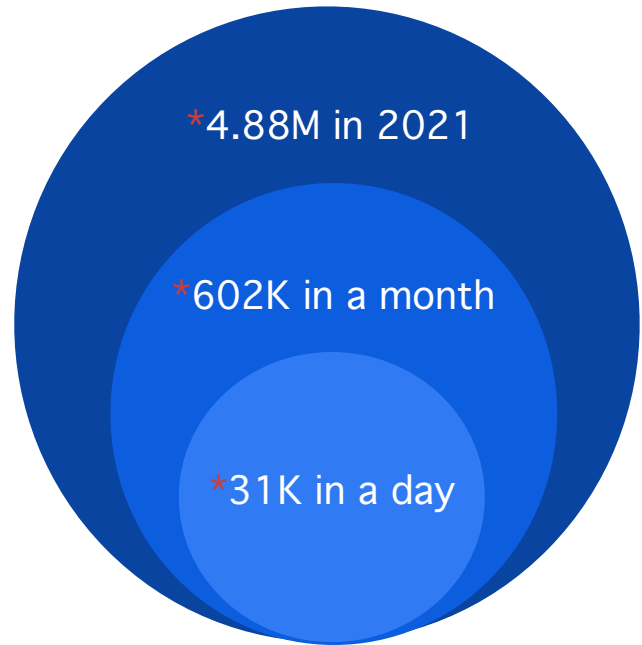
Client Speak

" Dinoct's fully hosted and managed HL7 integration solution has the flexibility to scale and incorporate changes as business demands at a reasonable cost. It's developers worked directly with the integration team to fine tune the capability and capacity. Their team and their software solutions have been key in helping us to support our healthcare clients. We had a very positive experience working with Dinoct Solutions."

Keerthi Kanubaddi CEO, ReadySet Surgical

" Dinoct has handled our HL7 interface development and support and we've been very pleased with the interface engine software as well as their customer service and technical expertise. We now have production interfaces with a number of hospitals that help us retain our customers' business."

Srinivas Raghavan CTO, ReadySet Surgical