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Google Healthcare API and Its Impact on the Healthcare Industry

White Paper

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Digital transformation is causing sweeping changes in the healthcare industry. Covid-19 has further accelerated the need for automation and the use of artificial intelligence, data analytics, IoT, and many other Industry 4.0 technologies to be able to meet the changing needs of the industry. The digital health market size is estimated to be USD 141.8 billion in 2020 and grow at a CAGR of more than 17.4% between 2021 and 2027.

While this is good news for patients and service providers as it makes access to healthcare services easier, it also comes with its own challenges.

stored in legacy systems with the cloud to provide a single source of truth that can improve innovation, governance, and interoperability.

For healthcare service providers using the Google Cloud Platform (GCP) to host their applications, the Cloud Healthcare API acts as a bridge with the existing care systems, providing a managed solution for storing and accessing healthcare data. It empowers users to build the next generation of healthcare solutions using new capabilities such as data analysis, machine learning, and application development.

How Does the Cloud Healthcare API Work?

The API enables the implementation of key industry-wide standards for healthcare data using three modality-specific interfaces. These include:

- The emerging FHIR, a health data interchange standard
- A widely adopted health systems integration method, HL7v2
- DICOM, the primary standard for radiology and imaging-related disciplines

A standards-compliant data store backs each of the interfaces that enable reading, writing, searching, and other operations on the data. A clean, secure integration point for applications happens through an interface into Google Cloud's high-capacity Publish-Subscribe (Cloud Pub/Sub) product, which can be integrated to enable the following:

- Invoking data transformations in Cloud Dataflow
- Using Cloud Functions to execute serverless applications
- Streaming data into the popular BigQuery analytics engine
- Sending data to the Cloud ML Engine machine learning platform to generate clinical outcome predictions

Key Features of Cloud Healthcare API

Some of the key features of the Cloud Healthcare API that enable bridging legacy technologies to the cloud-based healthcare systems and applications include:

Conforming to Standards

The Cloud Healthcare API, the API associated with the data store specific to each modality conforms with its relevant standard. For instance, DSTU2, STU3, and R4 are implemented in FHIR stores, DICOMweb in DICOM stores implement, medical image exchanging is linked to a web-based standard. In future updates too, additional versions of these specifications will be supported while also allowing requesting for a resource in a different version than its canonical representation.

Compliance with Privacy Regulations

Cloud.google.com/security/compliance provides detailed guidance on the standards and how it supports compliance.

Data Location Control

The data location is a core component of the Cloud Healthcare API, allowing users to select the storage location for the datasets from a list of currently available locations, mapped to different geographic areas aligned with GCP's regional structure. In the future, GCP regions will allow storage to be distributed across wider geographic areas.

Security

Google's proven Identity and Access Management (IAM) system forms the basis of the Cloud Healthcare API security model and provides complete control over access to your healthcare data using fine-grained permissions. Securely exposing sensitive ePHI with patient and provider applications becomes possible because of comprehensive threat detection and traffic management capabilities made possible by the use of open-source proxies for the Apigee API Management system.

Bulk Transfer

Bulk import and export data via the Cloud Storage system is enabled by the Cloud Healthcare API's DICOM and FHIR modalities support.

De-identification

Patient information from studies for research and other purposes can be redacted using de-identification support for DICOM and it operates on a data store basis.

Auditability

Google Cloud's Stackdriver hybrid monitoring system makes available logs of administrative and data access requests for auditing.

High Availability

Google Cloud's robust and highly redundant infrastructure makes availability for mission-critical scenarios possible.

Use Cases

The wide range of capabilities of Cloud Healthcare API makes it useful across functions such as administrative, clinical, and research. We list a few:

- Integration with current electronic health records systems or with integration engines such as NextGen Connect, Cloverleaf and others. For greater security, an EHR system or integration engine can be hosted alongside an open-source adapter for the HL7 Minimal Lower Layer Protocol (MLLP).

- Making HL7v2 data received through the Cloud Healthcare API (or imported in batch into Google Cloud Storage) immediately available to customer-specific logic and transforming the messages into a standardized FHIR format leveraging GCP services such as Cloud Dataflow.

- Not only does it facilitate conversion of core format to FHIR but also the coding system and conversion, extraction and classification of important content from clinical notes, and other processes. Storing, making the data available to applications via the Cloud Healthcare FHIR API, forwarding it to BigQuery for deep analysis, or being processed by TensorFlow models via Cloud ML Engine is also possible.

- For advanced administrative, clinical and research analysis, and reporting, the converted data conforming to the FHIR or the OMOP Common Data Model, is used in BigQuery to produce insights. You can customize the data visualization and reports to suit your needs.

- The Cloud Healthcare API makes potential diagnosis faster by using machine learning on patient data. The predictions can be stored directly in the DICOM images, which can help radiologists benefit from this analysis in the context of existing workflows. Clinicians can perform advanced, consistent scanning for the occurrence of common diseases using high-volume analysis and detect anomalies that can help begin treatment early in case of a problem.

Indium -- Leveraging Cloud Healthcare API

Indium Software, a next-generation digital services company, with several years of experience in the healthcare segment, has the expertise to help healthcare service providers leverage the Cloud Healthcare API and improve key metrics across service delivery and patient outcomes.

We are working with a leading healthcare service provider to use the API as a bridge and integrate enterprise-wide data residing in legacy and cloud-based systems to improve administration, diagnosis, and security.

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