Edge computing in action: Healthcare

Improve healthcare outcomes by analyzing data at the point of care

Use cases

- Supporting clinical decision making

- Predicting disease for proactive intervention

- Simplifying compliance with privacy regulations

- Standardizing data formats for centralized analytics and population studies

Why Red Hat for edge computing?

- **Security:** Meet healthcare security and privacy requirements.

- **Lower costs:** Our subscriptions can cost less than proprietary software licenses and support contracts.[1]

- **Partner ecosystem:** Access an extensive network of compatible technology and service providers.

Assisting providers by identifying conditions requiring intervention

The Internet of Things (IoT), artificial intelligence (AI), and machine learning (ML) are transforming clinical decision making with intelligent healthcare analytics. These solutions relieve busy clinicians by processing real-time data from medical sensors and wearable devices to detect conditions like sepsis, skin cancer, antibiotic resistance, neurodegenerative diseases, chronic illnesses, and more.

Cloud computing delivers the high performance and capacity needed to quickly process large data sets to identify health conditions requiring intervention. However, moving huge volumes of data to the cloud is impractical in some cases. For example, rural clinics often lack wide area network (WAN) telecommunications bandwidth to upload or download large medical image files to and from the cloud. Even large urban hospital systems lack the bandwidth to transmit readings from multiple sensors on hundreds of thousands of hospital beds. And for image storage, per-gigabyte cloud data fees add up quickly.

Extending cloud capabilities to clinics and hospitals

Edge computing offers a new, cost-effective solution for healthcare informatics. Instead of sending data to the cloud, processing is completed in-place where data is generated—at devices or networks in the clinic, hospital, or even directly on patient devices outside of clinical settings. As a result, care providers can diagnose and begin treating conditions faster, improving patient outcomes.

1. An edge device takes in data from diverse sources, such as medical sensors, electronic health record (EHR) systems, or imaging systems.

2. Processing takes place on compact edge hardware, often equipped with graphics processing units (GPUs) optimized for AI/ML.

3. AI/ML applications running on the edge device rapidly identify health conditions requiring intervention, often faster than manual chart review by the provider

To consolidate data from multiple locations—for population studies, ML model training, data archiving, or other scenarios—providers can create rules specifying which data should be sent to the cloud after automatically stripping personally identifiable information (PII). This approach supports the use of hybrid cloud infrastructure to take advantage of a combination on-premise, public cloud, and private cloud environments to meet data protection and security requirements.

Security-focused edge and analytics technology from Red Hat

With Red Hat® OpenShift®, healthcare providers can develop applications and services once and then deploy anywhere—to hospitals and clinics, to your datacenter, or to managed public clouds.

- Integrate with EHR and medical imaging systems.

- Standardize data into a common format to train ML models or share information with a health information exchange (HIE) or an organization conducting population studies.

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1 *The Linux Foundation. "6 reasons why open source software lowers development costs." Feb. 2017.*

Other Red Hat solutions for healthcare analytics

- **Massively scalable storage:** Red Hat OpenShift Data Foundation and Red Hat Ceph® Storage

- **Messaging and communication:** Red Hat Application Services (formerly Red Hat Middleware)

- Build analytics capabilities that help providers identify symptoms and conditions and predict the risk of chronic disease

- Introduce alerts based on events in a data stream or ML model predictions.

Red Hat's intelligent Data-as-a-Service (iDaaS) solution for healthcare helps providers process data from various sources, make rules-based decisions, and route data to the correct destination.

Success with edge computing: HCA Healthcare

Challenge: Traditional sepsis diagnosis required manual chart review, potentially delaying diagnosis of a condition that becomes 4-7% more deadly every hour.

Solution: HCA clinicians, data scientists, and IT professionals collaborated with Red Hat to build Sepsis Prediction and Optimization of Therapy (SPOT). Deployed in a distributed environment, SPOT automates the collection and analysis of clinical data such as patient location, vital signs, and laboratory results. When the data indicates potential sepsis, SPOT notifies team members so they can initiate care. Data scientists can retrain the models for continual improvement.

Benefits: HCA Healthcare now detects sepsis indicators up to 20 hours sooner, saving lives. The hospital can use the same platform to improve other aspects of patient care.

To learn more, read the success story.

About Red Hat

Red Hat is the world's leading provider of enterprise open source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers integrate new and existing IT applications, develop cloud-native applications, standardize on our industry-leading operating system, and automate, secure, and manage complex environments. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500. As a strategic partner to cloud providers, system integrators, application vendors, customers, and open source communities, Red Hat can help organizations prepare for the digital future.

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