

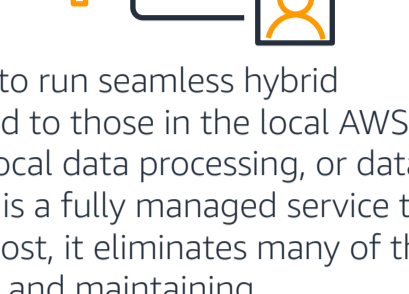
Meeting Healthcare and Life Sciences Workload Demands With AWS

AWS provides specific solutions to meet the low-latency, local data processing, and data residency needs of healthcare and life sciences organizations

AWS offers comprehensive solutions for healthcare and life sciences (HCLS) workloads. With AWS solutions for the Edge, HCLS organizations can make medical data and insights accessible with ultra-low latency, from local image capture and storage with AWS IoT and AWS Outposts, to classification at the edge with analytics and Machine Learning for health management systems. Store and process sensitive, regulated data locally at the edge with AWS Outposts or AWS Snowball, and warm/cold data in the cloud, all using common AWS services and APIs. A key solution is AWS Outposts, designed for HCLS workloads that must remain on-premises. Outposts brings familiar AWS infrastructure and services to a location of the customer's choice, for a truly consistent hybrid experience.

The HCLS sector has made progress in moving to the cloud, but still has many workloads on-premises for a variety of reasons. Medical data and insights can require ultra-low-latency access by operational systems. Equally, regulations may stipulate that sensitive patient information is stored in a specific location.

AWS Outposts solves HCLS challenges by extending AWS infrastructure, services, APIs and tools into virtually any data center, colocation space or on-premises facility.

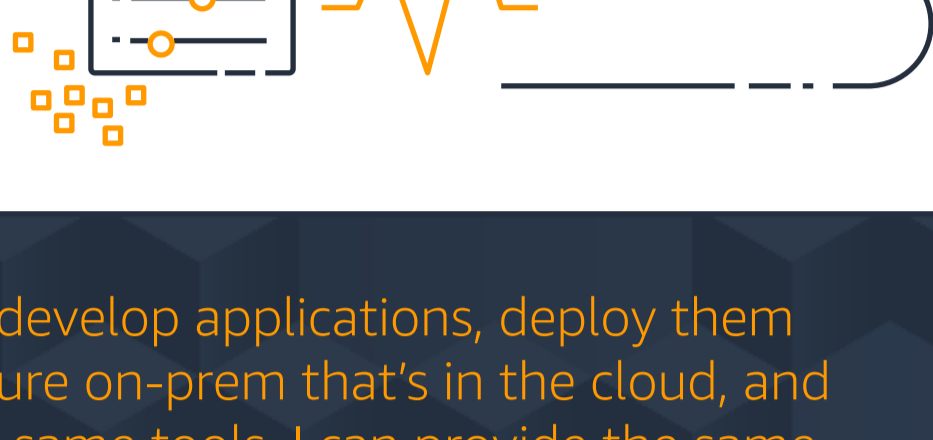


Using Outposts empowers HCLS organizations to run seamless hybrid environments — on-premises apps can be linked to those in the local AWS Region, while continuing to meet low-latency, local data processing, or data residency requirements. And because Outposts is a fully managed service that can be procured without no upfront hardware cost, it eliminates many of the headaches associated with procuring, installing, and maintaining infrastructure in-house.

Top three reasons for adopting cloud in HCLS

- 1 To keep up with the latest data security mechanisms¹
- 2 To meet evolving end customer needs¹
- 3 To achieve high levels of availability and resilience in systems and processes¹

Outposts helps HCLS organizations achieve these goals, while keeping workloads on-premises to meet their needs for low-latency, local data processing and data residency.



“With Outposts, I can develop applications, deploy them on the same infrastructure on-prem that’s in the cloud, and manage them with the same tools. I can provide the same view end-to-end to both our care providers and our IT administrators.”

- Rich Ridolfo, Sr. Director, Operations, Philips

AWS Outposts is the ideal home for a variety of HCLS use cases, from medical imaging and record systems, to research workloads and pharmaceutical manufacturing.

Deliver fast image access on-premises



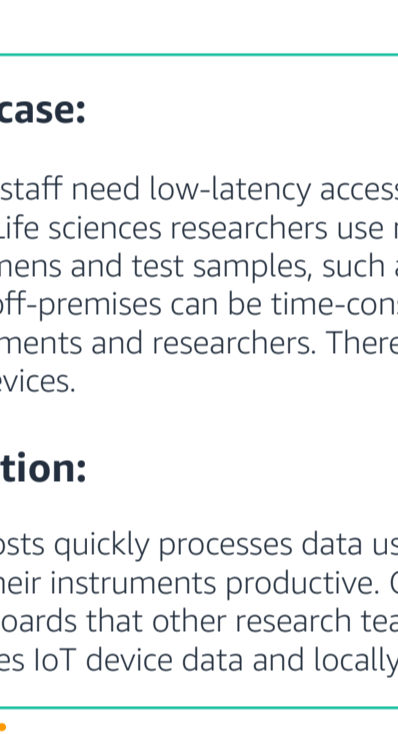
Use case:

Medical imaging is compute-intensive and generates large, high-resolution data files. Care providers need fast access to these files to review patient history, consult with colleagues, and create care plans for patients. Latency during file review drags down productivity for high-value staff and impedes patient care.

Solution:

Outposts delivers low-latency local compute, with options for GPU instances designed for graphic-intensive applications. AWS EBS and S3 storage on Outposts further enable local processing. Outposts delivers the same core AWS infrastructure and services on-premises as found in the AWS Region. Outposts' compute is powered by Intel® Xeon® Scalable processors with Intel® Mesh Architecture, designed for efficient and scalable low latency data flow across both edge and cloud environments.

2,314 exabytes
The volume of healthcare data expected to be generated globally in 2020.²



Process lab instrument or IoT data locally with low latency

Use case:

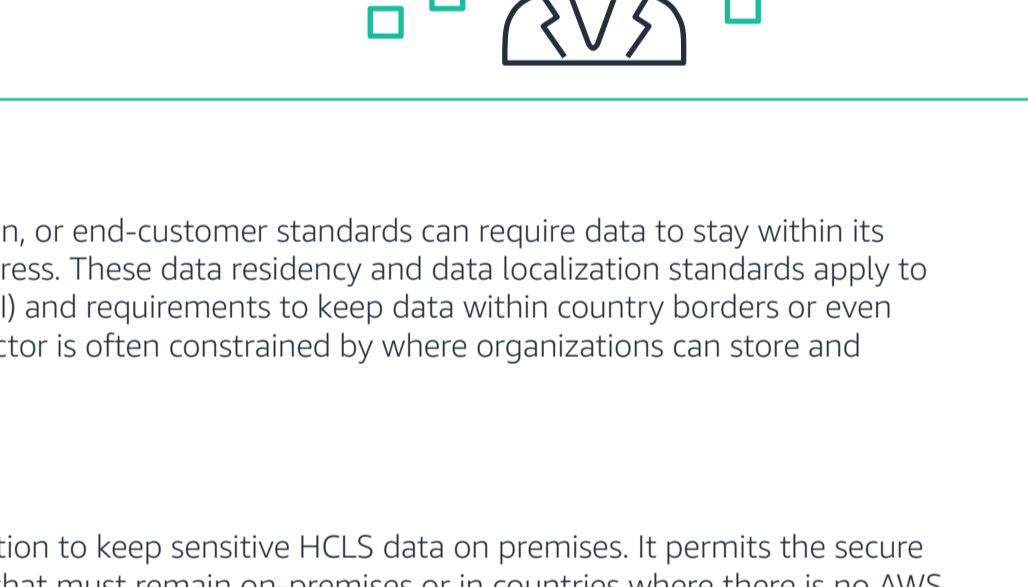
HCLS staff need low-latency access to data, whether in the research field or in day-to-day patient care. Life sciences researchers use multi-million-dollar microscopes and other lab instruments to study specimens and test samples, such as for cryogenic electron microscopy (cryo-EM). Sending instrument data off-premises can be time-consuming and costly, causing unnecessary downtime for both the instruments and researchers. There can be similar problems with data generated from healthcare IoT devices.

Solution:

Outposts quickly processes data using local compute and storage functions, keeping both scientists and their instruments productive. Outposts can also sync to an AWS Region to sync databases and dashboards that other research teams can access soon after Outpost processing is complete. Outposts handles IoT device data and locally runs AI/ML processes in real-time, creating instant feedback loops.

5,000 to 8,000
The number of movie-size files a single cryo-EM instrument can generate daily captured via direct detector-device (DDD) cameras.³

Ensure data residency of critical workloads



Use case:

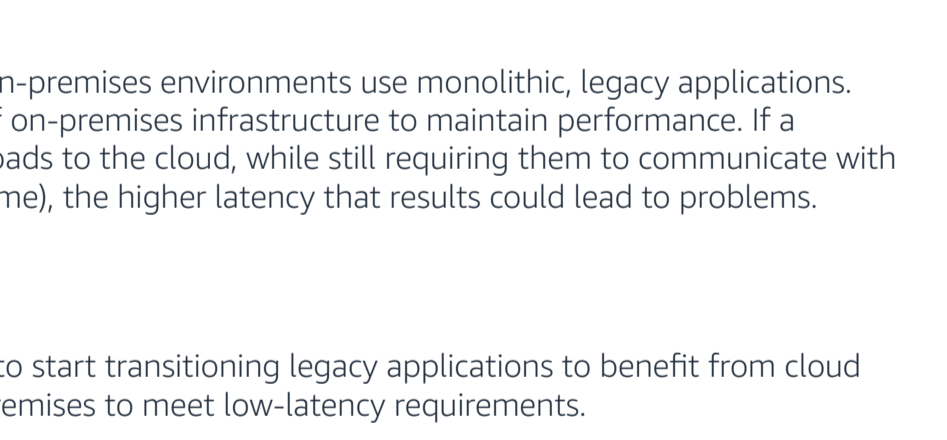
Regulatory, industry, or end-customer standards can require data to stay within its originating country or given address. These data residency and data localization standards apply to personal health information (PHI) and requirements to keep data within country borders or even at a given address. The HCLS sector is often constrained by where organizations can store and process data.

Solution:

Outposts enables your organization to keep sensitive HCLS data on premises. It permits the secure storage and processing of data that may remain on-premises or in countries where there is no AWS Region. This helps address the needs of highly regulated industries and those located in countries with data residency requirements. Outposts is on the AWS HIPAA Eligible Services list.⁴

36%
Healthcare data volume will experience a compound annual growth rate (CAGR) of more than a third by 2025⁵

Provide the first step in migrating to the AWS cloud



Use case:

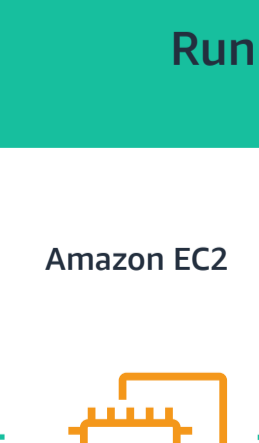
Many organizations with traditional, on-premises environments use monolithic, legacy applications. These often require the low latency of on-premises infrastructure to maintain performance. If a business chooses to shift these workloads to the cloud, while still requiring them to communicate with systems of record (often on a mainframe), the higher latency that results could lead to problems.

Solution:

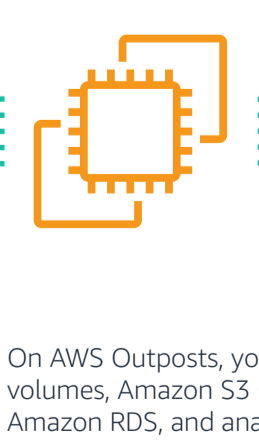
AWS Outposts enables organizations to start transitioning legacy applications to benefit from cloud capabilities, while keeping them on-premises to meet low-latency requirements.

25% of HCLS organizations surveyed have started cloud adoption but not yet completed it for enterprise applications. AWS Outposts helps accelerate cloud migration and reduce overheads and management.¹

Get started with AWS Outposts in three easy steps



1. Engage
Reach out to your account team or fill out our online form: <https://aws.amazon.com/contact-us>. Alternatively, go into the AWS Management Console.



2. Choose
Select your size and then order the Outpost rack configuration that best suits. Custom pricing is available.



3. Install and Launch
AWS will install and enable your configuration. Use standard AWS APIs or Management Console to launch and run AWS resources locally.

Run AWS Services on premises with AWS Outposts

Amazon EC2 Amazon EBS Amazon S3 Amazon EKS Amazon RDS

On AWS Outposts, you can run Amazon EC2 instances using the latest Intel® Xeon® Scalable processors, Amazon EBS volumes, Amazon S3 Cloud Object Storage, container-based services such as Amazon EKS, database services such as Amazon RDS, and analytics services such as Amazon EMR. You can use the same AWS APIs, tools, and security controls to run, manage, and secure your applications on premises just as in the cloud.

Meet healthcare and life science workload needs now...

Start using cloud on-premises with AWS Outposts to run imagery and genomics workloads, process lab instrument data, maintain data residency standards, and begin cloud migration that respects your on-premises requirements.

Learn more <https://aws.amazon.com/outposts>

¹ Intelligent Healthcare and Life Sciences: The Movement of Enterprise Applications to the Cloud, Infosys Knowledge Institute, 2019. <https://www.infosys.com/services/cloud/insights/documents/cloud-apps-healthcare-life-sciences.pdf>
² <https://www.statista.com/statistics/1037970/global-healthcare-data-volume/>
³ "Abstract: High-throughput cryo-EM enabled by user-free preprocessing routines," Yilal Li, Jennifer N Cash, John J.G. Tesmer, and Michael A. Cianfrocco, December 20, 2019. <https://www.biorxiv.org/content/10.1101/2019.12.20.885541v1.full.pdf>
⁴ <https://aws.amazon.com/compliance/hipaa-eligible-services-reference/>
⁵ Health IT Analytics, "Big Data to See Explosive Growth, Challenging Healthcare Organizations," December 3, 2018. <https://healthitanalytics.com/news/big-data-to-see-explosive-growth-challenging-healthcare-organizations>