aws | intel

Cloud at the Edge for Healthcare and Life Sciences

AWS allows HCLS organizations to realize the advantages of cloud on-premises

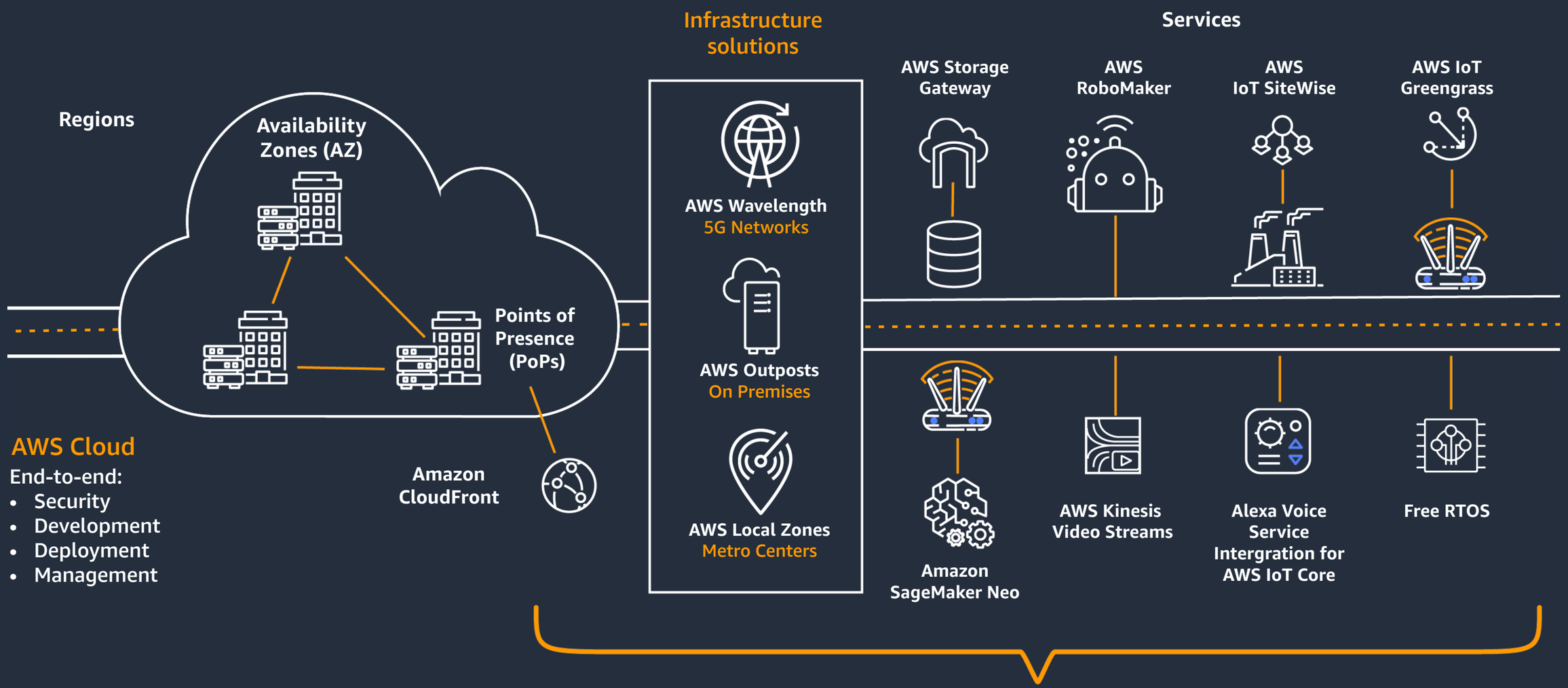
How AWS is Meeting Healthcare and Life Sciences Challenges

For many healthcare and life sciences (HCLS) organizations, meeting data management requirements and processing latency-sensitive workloads to occur locally is critical. In this sector, regulations that govern the location and storage of data, as well as end-users' need for low-latency and availability, can often mean that certain data and workloads need to remain on-premises. Like many other types of organizations, there's a drive towards modernizing and migrating suitable workloads to the cloud.

The ever-expanding reach of cloud services has enabled the shift of computing power and storage options closer to where they are needed and closer to the point of origination—the edge; for example, hospitals or research facilities. That shift to the edge enables low latency through faster access to data when it's needed most. AWS edge computing services provide infrastructure and software that allow data processing and analysis to occur as close as possible to the point of data origination and use. This includes deploying AWS managed hardware and software to locations outside AWS data centers, and even onto customer-owned devices themselves. AWS at the Edge provides the ability to securely connect and manage a broad range of device types and sizes at scale with a single programming model, reducing costs, and helping developers solve the problems of managing connected devices. AWS Outposts helps meet on-premises demands in your own data center, colocation space, or on-premises facility by providing the agility and speed of AWS infrastructure and services that many businesses already use in their cloud environments. Like an AWS Region, it offers an answer for organizations that aspire to cloud migration for modernization, while also providing eligibility for HIPAA compliance, as well as eligibility for GxP manufacturing best practices.

Edge Services for HCLS Organizations

AWS edge computing infrastructure and services offers solutions to meet HCLS workload demands, wherever they are.



AWS Cloud

End-to-end:

- Security
- Development
- Deployment
- Management

AWS Edge

- Reduce latency, process data locally, and control where your data resides
- Integrate with a broad set of cloud services and edge specific capabilities
- Reduce cost of development with single programming model

Intel® Xeon®
Scalable processors

AWS Outposts: A Bridge From On-Premises to Cloud

AWS is well suited to meet the needs of the HCLS sector and brings cloud functionality wherever it's needed, from AWS Regions to on premises data centers to the edge. AWS Outposts helps address multiple use cases required by this sector (rapid medical imaging, patient data locality) and offers a viable path for HCLS on-premises computing and storage.

Outposts is a fully managed service that brings the same AWS infrastructure, services, APIs, and tools to virtually any data center, colocation space, manufacturing floor, or on-premises facility where it might be needed. These benefits provide a truly consistent hybrid experience, while also reducing operational costs associated with modernization and migration. Outposts simplifies the complexity of procurement and provisioning, making IT teams efficient and more responsive to more urgent business demands. This hybrid cloud experience comes with all the advantages of the cloud, including data storage and compute power. It also helps to leverage workloads that require low latency, local data processing, local data storage, and accommodation of legacy systems and applications, such as the connectivity to an existing mainframe.

A variety of AWS cloud-native services can be seamlessly extended into an on-premises environment. Amazon EC2 instances powered by Intel® Xeon® processors and AWS storage services (Amazon S3 and Amazon EBS), can be used to build, manage, and rapidly scale on-premises applications. Outposts infrastructure and AWS services are managed, monitored, and updated by AWS just as they are in the cloud, saving time and expenses for HCLS IT teams. In particular, being a fully managed service removes the overhead associated with designing, procuring, and managing infrastructure, which in turn improves IT efficiency and reduces operational risk.

The Draw of Modernization and the Cloud Journey

The broad availability of cloud technologies and services have transformed how businesses operate and innovate. Yet, the journey to cloud is never straightforward and there are some common challenges HCLS organizations face when modernizing, such as ensuring low-latency and meeting their local data processing needs.

Due to these low-latency and modernization requirements, organizations continue to maintain on-premises infrastructure, yet they still aspire to explore cloud capabilities and leverage emerging technologies such as AI, ML, and data analytics. Without these capabilities, some HCLS businesses find their ability to innovate is hindered. On-premises infrastructure can often be expensive and time-consuming to maintain. Yet modernization requires significant capital and time investment, which many HCLS enterprises have to prioritize. Many choose instead to take their cloud journey in stages, along a cloud progression from assessment through migration to application modernization. Most web and enterprise applications, such as email and intranet, are the easiest to move to the cloud. However, legacy applications and complex workloads that are sensitive to low-latency, such as imagery modeling and R&D data and analytics, or real-time patient diagnostics of serious conditions—can be run in the cloud but require more transition time. If you're already running your applications on Intel® Xeon® servers on premises you can expect consistent and robust application performance when you run them on AWS Outposts.

Read more about enterprise modernization with AWS Outposts in our separate eBook and infographic.

AWS Outposts Use Cases for HCLS Organizations

Changes to HCLS priorities over the last few years have shifted, and industry analysts are predicting a renewed surge in cloud adoption amongst enterprises in the foreseeable future. The global HCLS market is expected to be worth $11.9 trillion by 2022[1]. To capitalize on market opportunities, HCLS organizations are investing in digitalizing their businesses to deliver a more streamlined customer experience and relevant value proposition. However, modernizing current business models can bring certain challenges into the mix. Providers, major healthcare vendors, and pharmaceutical R&D teams continue to strive towards meeting their on-premises demands, by ensuring they meet their data residency requirements, are able to process data on-premises with low latency, and efficiently run manufacturing systems close to lab equipment. Outposts addresses these challenges, giving HCLS organizations the services, tools, and APIs needed to meet all of their workflow requirements, providing a full migration to the cloud with minimal disruption.

Migrate your HCLS IT to the AWS Cloud

Use case: The modernization strategy of a HCLS organization may include shifting workloads to the cloud as well as an on-premises data center refresh. Legacy applications often require the low latency of on-premises infrastructure to maintain performance, such as for accessing medical imaging data. If a business chooses to shift these workloads to the cloud, while still requiring them to communicate with systems of record (running on mainframes), the higher latency could lead to further internal challenges.

Solution: AWS Outposts enables organizations to start transitioning legacy applications to benefit from the cloud while keeping them on-premises to meet low-latency requirements. Outposts is HIPAA eligible and meets GxP quality guidelines and practices. Outposts makes the process of modernization easier for IT teams because it is a fully managed service that has multiple procurement models including all upfront, partial upfront, and no upfront term options. Outposts eliminates many of the challenges associated with procuring, installing, and maintaining infrastructure in-house.

Philips: AWS Outposts in action

In healthcare, clinicians must access information quickly. In diagnostic applications, they may need that information within seconds. Philips uses technology to improve consumer, patient, provider, and caregiver experiences. The company uses Outposts to develop and deploy applications on the same infrastructure on-premises that it does in the cloud.

"Working with Amazon Outposts fits better into some of those more critical care solutions. It allows us to extend all of the capabilities that we need to be available all the time on-prem and to make that fit seamlessly into the things that we've already developed to run in the cloud," says Rich Ridolfo, Sr Director, Operations for Philips.

Run manufacturing control systems close to equipment

Use case: For pharmaceutical and healthcare supply manufacturers, many of their mission-critical tech applications, such as manufacturing execution systems (MES) and supervisory control and data acquisition (SCADA) tools, run on-premises. These tools require low-latency and local processing to enable real-time feedback loops necessary to maintain system efficiency.

Solution: With Outposts, manufacturers can achieve edge processing while seamlessly integrating with services running in the AWS Region for centralized operations. This consistency proves valuable to manufacturers who need to enable operational and IT teams to modernize applications and run them on cloud-ready, secure infrastructure. The ability to operate AWS cloud services on-premises allows legacy control systems to run with agility and low latency, as well as generate higher utilization of both lab and human resources.

Allow local data storage and low-latency access for genomic sequencing

Use case: Genomics has revolutionized all aspects of life sciences, with the ability to analyze the building blocks of biological information. However, this compute-intensive analysis undergoes a lengthy process, often taking days to run; which hinders its clinical use. Conversely, next-generation sequencing has evolved genomics into a new model of data-intensive computing. Large sequencing centers are already producing terabytes of genomic data each day. With the ability to produce billions of DNA reads in a single run, cloud permits the analysis of such information with speed and unparalleled resolution. As genomic enterprises head toward a more digital future, the importance of local data processing and low-latency remains the priority.

Solution: By moving genomics workloads to the AWS Cloud, researchers can process, analyze, and interpret data at ever-accelerating speeds using AWS compute instances based on powerful Intel® Xeon® Scalable processors. AWS Elastic Block Storage (EBS) and Amazon S3 storage options are available on Outposts and can connect to storage in the AWS Region to scale and meet demand. There's also a partner ecosystem that is certified to handle sensitive data and workloads. Outposts and other services can accelerate genomics insights and construct a bridge between current on-premises infrastructure and workloads in the AWS Region.

Data residency for Independent Software Vendors (ISVs)

Use case: As customers continue to adopt a hybrid approach to modernizing IT, Independent Software Vendors (ISVs) are evolving their technology strategy to meet their customers' needs for data locality, by making it easier to deploy and manage their solutions. However, as major ISVs transition to a SaaS model (Software-as-a-Service), the journey from a conventional licensing model to a usage-based model involves considerable challenges. With the need to develop and analyze software from a variety of sectors, the demand to meet their data residency requirements remains paramount.

Solution: With AWS Outposts, ISVs can help customers meet their data locality/residency needs by removing the need to deploy or access their solution from an AWS region. Outposts validated ISVs such as Turbot mitigate risk by ensuring cloud infrastructure is secure, compliant, and cost-optimized. Qumulo's File Data Platform complements AWS Outposts by giving customers the same powerful software file data experience on Outposts as in the region, by providing a solution to securely store and process sensitive customer data on-premises. Read more about Data residency solutions in our Outposts Data Residency eBook.

Deliver rapid cloud access on-premises

Use case: Medical imaging is compute-intensive and generates large, high-resolution data files. Clinical care providers as well as vendors need fast access to these files to review patient history, consult with colleagues, and create care plans for patients. With these workflows to observe, providers and vendors are considering the practicality of running Picture Archive and Communication Systems (PACS) workloads on Outposts, but have requested low-cost, high-density storage for multiple PBs of data to consider running their entire PACS in the cloud. Pharma R&D teams need fast access to imagery for 2D microscopic snapshots and 3D molecular behavior modeling, driving the need for low-latency.

Solution: Outposts delivers low-latency local compute, with options for GPU instances designed for graphics-intensive applications. Outposts also partners with providers of Picture Archive Communications Systems (PACS) and Vendor Neutral Archive (VNA) solutions and works across multiple vendor applications to ensure full cloud migration with zero workflow disruption.

Why Choose AWS Outposts for the HCLS Enterprise?

AWS Outposts helps HCLS organizations overcome the challenges of migrating to the cloud, by offering the ability to reach their data residency requirements, meet local data processing needs, and remain highly latency-sensitive.

- **Accommodate the need for local processing**
  Many on-premises applications, such as cryo-EM, require the ability to process data locally to analyze results faster. These types of healthcare providers can benefit by using Outposts to successfully process data intensive workloads locally.

- **Reduce latency**
  HCLS business applications, such as manufacturing execution systems (MES), and medical diagnostics, require single-digit millisecond latencies to operate effectively. Outposts enables organizations to easily apply analytics and machine learning to health management systems that need to remain on premises due to low latency processing requirements.

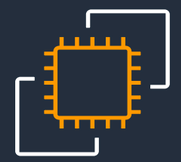
- **Simplify IT**
  Outposts does away with the complexity of procurement and provisioning. By bringing a fully managed service to on-premises infrastructure, the HCLS enterprise can improve IT efficiency and better respond to business needs.

- **Reduce operational costs**
  Organizations no longer need to maintain, upgrade, or patch hardware in their on-premises location. AWS takes over that responsibility, allowing organizations to focus resources on innovation and care.

- **Meet HCLS provider data residency needs**
  Outposts permits the secure storage and processing of sensitive data that must remain on premises or in countries where there are contractual, legal, or corporate data residency requirements.

- **Enable rapid scalability**
  Businesses can scale up their Outposts configuration to meet their needs. The process is as simple as working with the Outposts team to scope and price a customized configuration.

- **Enable a two-step cloud migration process**
  It takes capital and time to fully refactor and modernize legacy applications. Outposts makes transitioning legacy applications to the cloud, easy and secure.



- **Consistent Intel-powered infrastructure**
  Outposts offer the same Amazon EC2 infrastructure-as-a-service on your edge as in the cloud featuring Intel® Xeon® Scalable processors. With consistent, low latency edge infrastructure, your on-premises applications running on Outposts can be seamlessly migrated to the AWS Cloud and back.

Getting Started With AWS Outposts

AWS Outposts empowers HCLS organizations to meet their low-latency, local data processing, and data residency requirements. AWS Outposts is fully managed and supported by AWS, from delivery to installation to monitoring to updating. Enterprises choose their desired Outposts compute and storage configuration from a pre-validated catalog of options. Within a few weeks of placing an order, AWS personnel deliver Outposts hardware fully assembled to your preferred physical site, connect it to power, and set up network connectivity to the AWS Region and local networks. This fully managed service reduces the time, resources, operational risk, and maintenance downtime required for managing IT infrastructure.

The AWS Partner Network (APN) Consulting Partners can provide expertise and training to help achieve the desired outcomes. Many also offer consulting services to help plan application modernization and solution deployment. APN Technology Partners provide specific solutions that integrate with on-premises workloads using Outposts. There is an Outposts Service Ready program for independent software vendor (ISV) solutions that have validated their applications to run on Outposts.

Validated AWS Outposts Partners

Migration and modernization programs can be complex. The capability to execute these programs relies on experienced internal staff and sufficient time and resources. AWS Partners can help.

As customers adopt AWS Outposts, they need the right solutions to help deploy, monitor, secure, and integrate their Outposts-based workloads. The AWS Outposts Ready Program makes it easy for customers to find integrated storage, networking, security, and industry-specific solutions that have been validated by AWS and tested on Outposts. This enables customers to easily identify solutions that will integrate with Outposts deployments.

Next Steps

AWS Outposts offers all the advantages of cloud while still supporting the on-premises use cases of low latency, local data processing, and legacy application migration. Take the next steps to modernize your HCLS organization today with AWS Outposts.

1. Engage

Reach out to your account team or fill out our contact form. Alternatively, go into the AWS Management Console.

2. Choose

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

3. Install and Launch

AWS will install and deliver your configuration. Use standard AWS APIs or Management Console to launch and run AWS resources locally.

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

1 https://www.businesswire.com/news/home/20190625005862/en/The-11.9-Trillion-Global-Healthcare-Market-Key-Opportunities-Strategies-2014-2022---ResearchAndMarkets.com