

Cloudwick

Empowering Genomics Innovation: Accelerating Cloud Data Integration and Management for Omics Startups



Streamline your
multi-omics data modalities
with last mile integration
approach on AWS



The rapid growth of genomics and multi-omics startups has the potential to revolutionize healthcare and life sciences through the development of innovative therapies and diagnostics. However, these startups often face significant challenges related to the complexity of last mile integration of cloud data platforms, which can delay time-to-market for their products. In this white paper, we explore:

- Key challenges faced by genomics and multi-omics startups in managing their data workloads and navigating complex cloud data platforms.
- Critical role of last-mile integration of cloud data and analytics services to make a production ready platform.
- Strategies for startup companies to fast forward their innovation and product development by using Amorphic.

Leveraging Data and Artificial Intelligence for Genomics Innovation: Driving Healthcare Outcomes

Genomics and omics companies are increasingly recognizing the potential of data-driven technologies and artificial intelligence to transform healthcare outcomes. According to a report by the McKinsey Global Institute, AI has the potential to create an additional \$13 trillion in economic value by 2030. Within the genomics industry, data and AI-driven technologies are playing a critical role in driving breakthrough solutions in personalized medicine and drug development.

Leading genomics companies are leveraging cloud's scalable compute and storage infrastructure to expedite drug discovery and development cycles, and to provide unmatched patient experience.

For instance, Moderna leveraged cloud's scalable compute and storage infrastructure to design and analyze mRNA sequences for protein targets in record time, enabling them to deliver their first vaccine candidate for COVID-19 in just 42 days.

Numerous instances exist where genomics companies leverage data and AI technologies to achieve speed-to-market and promote business innovation. Although these examples showcase innovation in different healthcare sectors, they share a commonality in their use of cloud's computing infrastructure, data storage, and artificial intelligence, facilitated through cloud-based data and analytics platforms.



The science behind mRNA medicines is advancing at a rapid pace, and building Moderna's technology platform on AWS gives our scientists the insights, agility and security they need to continue to lead in the industry.

Stephane Bancel
CEO Moderna

Fast-tracking Genomics: Unlocking Actionable Insights from Raw Sequencing Data

The key business driver for genomics companies is to accelerate the translation of raw sequencing data into actionable insights. Genomics companies aim to create value by providing insights and solutions that enable the development of breakthrough therapies and diagnostics that improve patient outcomes.

Converting raw sequencing data into actionable insights involves the use of sophisticated data analysis tools and techniques, which require a robust and scalable data management infrastructure. By leveraging cloud-based data and analytics platforms, genomics companies can streamline their data management and accelerate their analytics and business processes, allowing them to focus on the interpretation and translation of results into clinically relevant insights.

The ability to provide insights and solutions that enable the development of breakthrough therapies and diagnostics is a critical success factor for genomics companies. The competitive landscape in the genomics industry is rapidly evolving, and companies that can deliver innovative solutions that improve clinical outcomes are more likely to succeed in this market.

Navigating the Complexities of Genomics Data Workload at scale

Genomics companies encounter different challenges in managing intricate data workload, collaborating on data for research, and leveraging data-driven technologies to drive innovation and growth. These challenges include data storage and management, data integration, data analysis, data privacy and security, data sharing and access, data standardization, and intellectual property.

To overcome these challenges, genomics companies must leverage cloud-based data and analytics platforms, develop clear policies and frameworks for data sharing and collaboration, and establish standardized data formats and annotation. The following table summarizes these challenges and offers recommendations on how to address them.

Challenge	Description	How to Address
Data storage and management	Genomics data sets are often very large, making data storage and management a significant challenge.	Leverage cloud-based data storage solutions that are scalable and cost-effective.
Data integration	Genomics data sets are diverse and intricate, making data integration a significant challenge.	Develop standardized data formats and annotation to facilitate data integration.
Data analysis	Genomics data sets require sophisticated analytical tools and techniques to generate meaningful insights.	Leverage cloud-based data and analytics platforms that provide computational resources, flexibility, and expertise.
Data privacy and security	Genomics data sets contain sensitive and confidential information that requires secure storage and management.	Ensure the privacy and security of data by implementing robust security and compliance features.
Data sharing and access	Sharing and accessing large and complex data sets across different organizations and locations can be challenging.	Develop a secure and efficient data-sharing infrastructure that ensures privacy and compliance while facilitating collaboration.
Data standardization	Genomics data sets are diverse and complex, making data standardization a significant challenge.	Create standardized data formats and annotation to ensure data consistency and accuracy.
Intellectual property	Collaborative research projects involving genomics data may raise issues of intellectual property rights, which can be complex and challenging to manage.	Establish and implement clear policies and frameworks for data sharing and collaboration that address issues such as data ownership, privacy, security, and intellectual property.

Addressing Genomics Data Workload Challenges with Last-Mile Integration on AWS

The term *'last mile integration'* typically refers to the final stage of integrating different components of a system or platform to ensure that it is fully functional and ready for use. A cloud-based solution with last mile integration services can effectively address the challenges faced by genomics companies in managing intricate data workloads and collaborating with data for research purposes. The strategies mentioned in the "How to Address" column in Table 1, such as leveraging cloud-based storage and analytical tools, standardizing data formats, and implementing robust security and compliance features, can be fulfilled through the adoption of cloud-based services supplemented with last-mile integration.

Last-mile integration services help tailor AWS services to address the challenges of data integration, standardization, sharing, and access in genomics. They facilitate the consolidation of different types of data into a cohesive and standardized format, ensuring data consistency and accuracy, and providing secure and efficient data-sharing infrastructure for collaboration.

Taking a Closer Look at Cloudwick's Solution for Genomics

Cloud-based solutions are essential to address aforementioned challenges, and **Amazon Web Services (AWS)** is one of the leading cloud platforms offering a range of services for genomics companies. However, managing these services can be complex and challenging, requiring tailored solutions for specific use cases.

Cloudwick, a managed cloud service provider, offering a comprehensive solution for genomics companies on AWS, leveraging the capabilities of Amorphic for complex data management, and providing professional services for seamless integration of AWS services, can play a crucial role.

Amorphic, Cloudwick's last-mile integration platform, simplifies the adoption of AWS services into a user-friendly process owing to its pre-built functions. It extends the power of AWS services to handle large datasets, complex algorithms, and machine learning models, generating valuable insights from vast amounts of genomics data. Amorphic provides out-of-the-box data storage solutions for Fast Healthcare Interoperability Resources (FHIR), diagnostic and research imaging data (Image store), and Omics. Amorphic utilizes AWS native services,

enabling customers to build use cases such as Patient Health Record, Clinical Decision Support, Radiology, Precision Medicine, and more. FHIR is a standard for exchanging healthcare information electronically, while the Imaging store stores and manages medical images, and **Omics store** stores and manages genomic, transcriptomic, proteomic, and metabolomic data.

Cloudwick acts as a last-mile integrator, while Amorphic's pre-built functions help to fast-track the overall build time. By using Amorphic, Cloudwick is able to streamline the integration of various services and technologies needed for managing large volumes of intricate genomics data on AWS. This results in faster implementation, reduced complexity, and lower costs for genomics companies while they focus on clinically relevant product development.

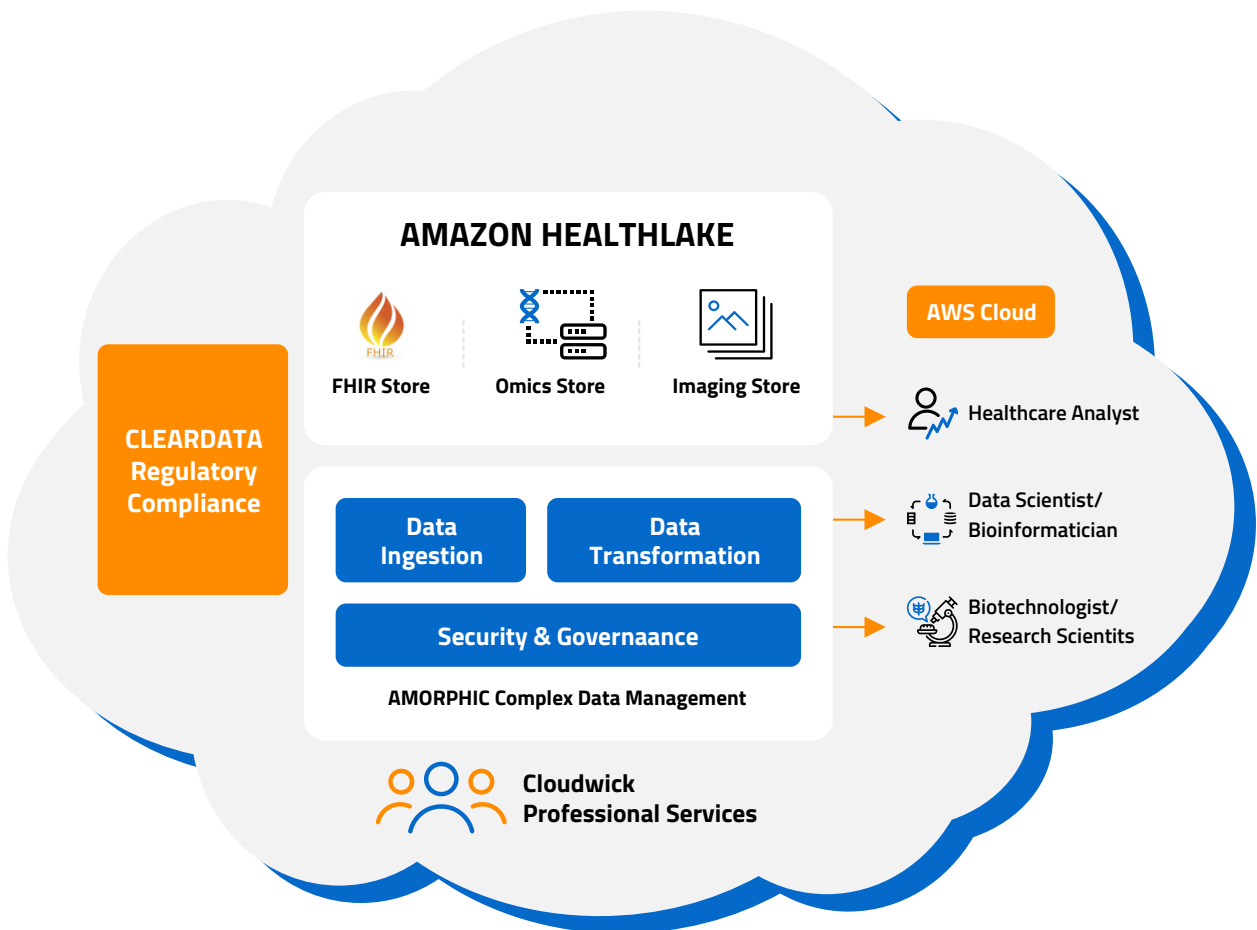


Figure 1: High-level schematic for Cloudwick's managed Amorphic solution for Genomics on AWS

Cloudwick's managed Amorphic solution on AWS in action

In this section, we will explore how the managed Amorphic solution is utilized in the genomics industry. The Cloudwick solution includes seven critical steps designed to optimize the ingestion, management, and transformation of genomics data for maximum impact. The diagram below outlines these steps, highlighting the specific actions taken at each stage to ensure continuous regulatory compliance, diverse data ingestion, data masking, downstream transformation, and end-user consumption. By leveraging these six steps, genomics companies can efficiently manage their data, derive valuable insights, and accelerate the development of innovative treatments and therapies.

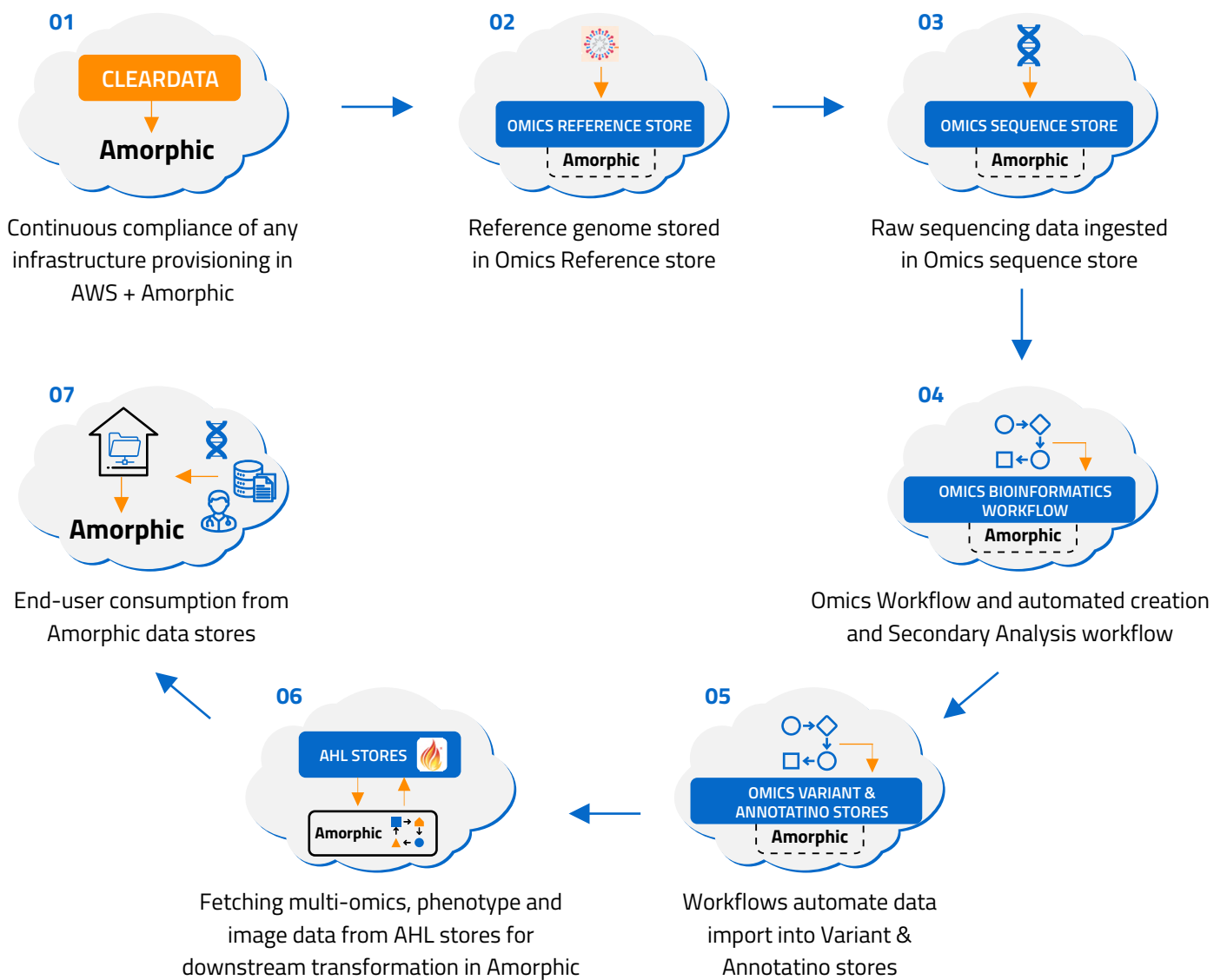


Figure 2: Cloudwick's managed AWS solution for Genomics in action

Conclusion

In conclusion, the managed Amorphic solution, along with Cloudwick's professional services, provides a powerful data analytics solution for genomics companies. By leveraging Amorphic's capabilities for complex data management, genomics companies can efficiently process and analyze large datasets to derive actionable insights. With Cloudwick's support, organizations can optimize their data analytics workflows, maintain data security and compliance, and ultimately enhance clinical outcomes. By utilizing these cutting-edge technologies and services, genomics companies can unlock the full potential of their data and drive innovation in the healthcare industry.