Multi-Omics in the Cloud
How DNAnexus & AWS Accelerate Scientific Discoveries

1 Overview

Today’s genomics landscape is rapidly evolving with the accelerated adoption of multi-omics by biopharma organizations, clinical diagnostics companies, and healthcare systems. Organizations that are addressing new market opportunities and embracing innovative multi-omics applications and technologies are looking to the cloud to stay agile, innovative, and economical.

DNAnexus and Amazon Web Services (AWS) have helped organizations such as City of Hope, Regeneron, and Human Longevity optimize their businesses and build scalable infrastructure to accelerate scientific discoveries.

DNAnexus’ platforms are purpose-built to handle the complexity of multi-omics data, including single cell expression, population genomics, microbiome, and epigenetics research. Life Science organizations of all sizes and disciplines choose DNAnexus and AWS to help navigate the complexity and scale of their biomedical research to meet their immediate unique business needs, as well as long-term growth plans.

2 DNAnexus Provides Purpose-Built Biomedical Data Analysis Platforms

DNAnexus is built on top of AWS specifically for bioinformaticians and data scientists, incorporating the latest advances in cloud computing, analytics, and knowledge management. We are your DevOps team, helping you stand up and maintain your AWS environment. DNAnexus extends the capabilities of your current systems and software. DNAnexus Apollo and Titan Platforms come with ready-to-use frameworks, pipelines, and an open SDK for researchers to conduct analysis or build their own custom application using preferred programming languages in a robust command-line interface.
3 Reduce Time to Discovery

Multi-omics is a data-heavy discipline with massive datasets that require extensive compute resources to analyze samples. In addition, to extract actionable insights, pharma and clinical teams need to collaborate efficiently.

To accelerate discoveries, DNAnexus leverages the scalability of the AWS cloud delivering a dynamic platform for precision medicine. Purpose-built for advanced informatics, DNAnexus provides powerful multi-omics and computational biology focused capabilities, designed for enhanced collaboration to accelerate research workflows for R&D teams globally.

Leading life science companies leverage the robust computation power of DNAnexus and AWS to analyze multi-omic datasets, accelerate research, and uncover new discoveries.

DNAnexus has in-house experts both in cloud engineering, and in life science research and clinical applications. DNAnexus Platforms provide robust data management and support custom and common data models such as OMOP. We provide critical domain support for workflow development, pipeline optimization, data harmonization, and more to get you up and running quickly.

DEMOCRATIZE DATA ACCESS & SIMPLIFY COLLABORATION

Progress in science and medicine accelerates when researchers collaborate around responsibly shared datasets. As the complexity and scale of data increases, collaboration becomes more difficult to manage. DNAnexus on AWS enables distributed research teams access to the same data and analysis tools to advance scientific discovery.

UK Biobank’s Research Analysis Platform is powered by DNAnexus, unleashing transformative potential of the diverse dataset containing phenotypic, genomic, and imaging data from 500,000 volunteers. AWS provides computational and storage resources.

4 Lower Costs

Today you have access, through AWS, to all the parts to build your own cloud-based bioinformatics system, however this can turn into a distraction from focusing on your core scientific work. The cloud allows you to skip the large upfront investment required by on-premises setups, but continuous resources will still be required to maintain, operate, and support the system you built. With DNAnexus, you’ll be able to leverage the latest AWS technology automatically, without having to pay for expensive consultants and new staffers to upgrade your system.

Life Science organizations continue to invest in more data heavy applications, such as Jupyter Notebooks, AI, and machine learning for discovery. These powerful and computationally intensive analytical methods require the latest GPU instances for deep learning frameworks like tensorflow. DNAnexus puts guardrails on these expensive AWS instances to efficiently optimize analysis.

DNAnexus on AWS can also reduce research and development costs. By automating data intensive tasks for speed and accuracy, Myriad Genetics reduced its costs by 20 percent while accelerating pipeline development from two-weeks to two-hours.

“‘The best thing you can do with DNAnexus is give them a problem to solve.’
Jeffrey Reid, PhD | Chief Data Officer

“DNAnexus allows us to collaborate across partner cancer centers and optimize the translation of basic discoveries into practical clinical applications accelerating the development of more precise cancer treatments.”
Samir Courdy | Chief Informatics Officer

Myriad Genetics moving their pipelines to DNAnexus resulted in faster informatics at a lower cost.

80% FASTER
20% CHEAPER
Many factors impact spikes and lulls in genomics workloads. Even if your organization has a powerful HPC cluster, AWS cloud offers advantages you shouldn’t ignore. DNAnexus is a purpose-built system on top of AWS and designed to scale to handle large volumes of complex multi-omics and clinical data.

DNAnexus offers unparalleled scalability, and the latest AWS technology, automatically provisioning new resources as demand increases, and preventing computational bottlenecks.

DNAnexus also supports parallel and distributed computing. This allows scientists to run hundreds of analysis jobs in barely more time than you’ll need to run just one.

DNA is the most personal source of data. As genomics becomes an increasingly global practice, organizations must consider their current and future regulatory standards, both domestic and international. Keeping up with complex, ever-changing compliance and security standards requires specialized skills and is more than a full-time job.

The AWS Global Cloud Infrastructure is the most secure, extensive, and reliable cloud platform. DNAnexus adds additional security and compliance layers on top of AWS’ leading cloud infrastructure to handle diverse and complex multi-omics data and is continuously monitoring and patching so you can have peace of mind.

DNAnexus offers industry leading security and full audit trail support—and keeps you in regulatory compliance, in every region where your organization works.

DNAnexus is the trusted partner to Life Sciences, Healthcare, Government, and Academia in over 48 countries, and serves the world’s top pharmaceutical companies and national research initiatives.

“DNAnexus helped move our whole genome sequencing product up the stack. Our bioinformatics engineers and scientists can now focus on adding features and content that benefit our clients, instead of maintaining infrastructure and pipelines”

Wayne Delport | VP Technology and Bioinformatics

“UK Biobank relies on DNAnexus’ robust security and compliance framework to keep data safe and compliant while still allowing thousands of approved researchers worldwide access to specific datasets to make discoveries that improve human health.”

Mark Effingham | Deputy CEO

Leading Security, Privacy & Quality Framework

FedRAMP, HIPAA Accredited, CAP Accredited, ISO 27001, ISO 9001, GxP Compliance
### DNAnexus Shared Responsibility Model

Choosing a partner who understands the criticality of your data is pivotal. DNAnexus handles the control points and functions that organizations would be responsible for if they managed their own on-premise HPC cluster or built their own bioinformatics solution on AWS.

The DNAnexus shared responsibility model helps reduce operational burden while keeping life science organizations in full control of their data.

#### CONTROL FUNCTION

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<thead>
<tr>
<th>Function</th>
<th>DNAnexus (IaaS)</th>
<th>DIY with AWS (IaaS)</th>
<th>On-Prem HPC</th>
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<tbody>
<tr>
<td>Data Management &amp; Data Governance</td>
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<td>User Devices (Mobile &amp; PC)</td>
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<td>User Accounts, Identities, and Roles</td>
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<td>Open Source Component Updates &amp; Security</td>
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<td>Technical Staff to Fix Issues &amp; Perform Upgrades</td>
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<td>Continuous Monitoring &amp; Control Improvement</td>
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<td>Develop/maintain API + CLI Tooling</td>
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<td>Build System Resilience &amp; Multi-geo Support</td>
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<tr>
<td>Physical Systems, Storage, &amp; Hardware</td>
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<td>Physical Facilities &amp; Networks</td>
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#### Responsibility

- **Responsibility Always Retained by Customer**
- **Responsibility Varies by Service Model**
- **Responsibility Transfers to AWS**

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**Getting started in the cloud: easier than you think**

DNAnexus’ purpose-built biomedical informatics platforms leverage AWS’ scalable infrastructure, providing unique solutions that are continuously maintained so that businesses can focus on their science.

Access the [Moving to the Cloud: The Lure & Limits of DIY whitepaper](#) to dive deeper, or visit [DNAnexus Better Together Landing Page](#).