CASE STUDY

TwinStrand Biosciences: Overcoming Bioinformatics Challenges to Rapidly Scale Genomics Pipelines

TWINSTRAND™ BIOSCIENCES

COMPANY OVERVIEW

Dedicated to Detecting Ultra-Rare Variants with Unparalleled Sensitivity and Specificity

TwinStrand Biosciences is a Seattle-based genomics company developing methods for detecting ultra-low frequency genetic variants that are not possible to detect by conventional methods. TwinStrand Duplex Sequencing™ technology uses proprietary biochemistry and bioinformatics to improve the accuracy of next-generation sequencing (NGS) by over 10,000-fold. DuplexSeq™ technology is used by researchers across the genomics landscape, including those who are studying mutational signatures, measureable residual disease (MRD), cellular immunotherapy persistence, and other applications that require the detection of low-frequency variants. Essentially, it supports anyone looking for a genetic needle-in-a-haystack.

> "It would have been an enormous project to try to recreate all the security layers, all the credentialing, all the certifications by ourselves... Instead, we can now point people to a lot of the existing literature showing that those layers offered by the DNAnexus platforms are industry accepted. The DNAnexus solution just makes sense."

Jesse Salk
TwinStrand CEO & CSO & Co-founder

THE FIRST CHALLENGE:
Speed-to-Market for Duplex Sequencing Technology

TwinStrand's end-to-end solution includes a DNA library preparation kit that customers use prior to sequencing and purpose-built bioinformatics applications to analyze DuplexSeq™ data. As it prepared for the launch of its first products in 2020, TwinStrand needed a more streamlined approach to deploy and release its bioinformatics applications to its customers.

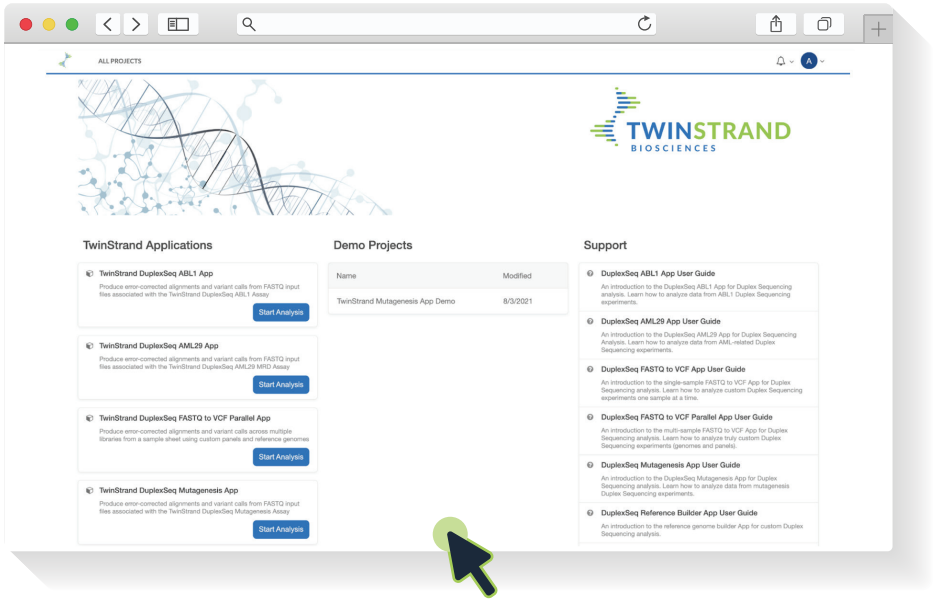
TwinStrand was seeking an easy-to-use compute infrastructure to host its bioinformatics applications. But they also understood the high cost and lengthy development time of building a proprietary functional, secure, and scalable platform themselves. The company needed a cost-effective platform that allowed it to bring its bioinformatics applications online in time for the product launch and was stable and scalable so that customers could continuously rely on it for high uptimes. Finally, TwinStrand was seeking a solution that could flexibly handle the diverse needs of its customer base in multiple regions around the world. TwinStrand customers routinely analyze billions of raw reads across various application areas including genetic toxicology, oncology, and cell therapy.

"DNAnexus provides ironclad security and data governance and provenance features, which complements our high accuracy bioinformatics applications. Security discussions become table stakes with our customers, enabling us to focus discussions on how to best impact and advance science."

Clint Valentine, *TwinStrand Senior Director of Data Sciences*

THE SECOND CHALLENGE:
Meet Data Security and Privacy Requirements

TwinStrand knew that modern safety and security guarantees were a priority for users of its bioinformatics applications to comply with industry-standard operational and regulatory requirements. They needed a platform that had compliance by design in addition to features that enabled best-in-class data governance and provenance. This includes things like complete data traceability, audit logs, and granular permissions settings for collections of data. Building a platform with these strict security and privacy requirements internally would require hiring dozens of full-time employees simply to secure, and continuously manage, the platform. Taking on such an intense development effort would distract and inhibit TwinStrand's ability to focus on its innovative core science.



THE SOLUTION:

Three Key Components. One Platform.

TwinStrand chose DNAnexus to provide the scalable and secure cloud infrastructure it needed to support customers of its DuplexSeq™ kits. Customers can quickly log in, upload their raw DuplexSeq data, and use TwinStrand's bespoke bioinformatics applications to conduct ultra-rare variant analysis without the need for labor-intensive infrastructure configuration or support from bioinformatics, software, and security subject matter experts.

Customers at all levels of technical experience, including those with no prior genomics experience, can confidently analyze and extract meaningful high-accuracy DuplexSeq™ variant calls in an efficient, secure, and compliant environment. DNAnexus' platform is compliant with the strongest security requirements in the industry, including SOC2 and FedRAMP Moderate, which addresses TwinStrand's customers' security needs.

Customers remain in complete control of their DuplexSeq data and results and only share them with approved parties. Through the DNAnexus interface, TwinStrand customers can share projects, data, and third-party tools with collaborators who have been approved for access via opt-in sharing permissions.

Finally, hosting their bioinformatics applications on the DNAnexus platform frees TwinStrand's bioinformatics and software teams to spend their time and resources developing differentiating scientific solutions rather than building and maintaining cloud compute and storage infrastructure. TwinStrand's team can also spend more time engaging researchers on the potential impact of their science.

RESULTS:

Rapid Pipeline Deployment and Instantly Burstable Compute

In choosing DNAnexus, TwinStrand was able to take advantage of an industry-accepted cloud-based platform to deploy and release its bioinfomatics applications, providing their customers with a streamlined end-to-end experience from sample to insight. All users of the DNAnexus platform can parallelize analysis across dozens of samples simultaneously to significantly speed up turnaround time for faster scientific discovery.

TwinStrand's data science teams can decentralize genomic analysis for global customers while enabling instant release of meticulously crafted and accurate version-controlled bioinformatics applications. Development teams can deploy new features easily to all end-customers, and every published release is immutable and perfectly reproducible. When planning for future growth, TwinStrand confidently relies on DNAnexus to expand its customer base globally without the distraction of building and maintaining best-in-class cloud informatics infrastructure.