Healthcare

Bringing personalized medicine to citizens

Novo Genomics

Healthcare startup Novo Genomics is laying the foundations for personalized medicine in Saudi Arabia, with cutting-edge sequencing using the Lenovo Genomics Optimization And Scalability Tool (GOAST) architecture—based on Lenovo ThinkSystem SR630 V2 servers, powered by Intel® Xeon® Scalable processors, and Lenovo ThinkSystem DM Series unified storage arrays.

Powered by up to 4th Gen
Intel® Xeon® Scalable processors

Who is Novo Genomics?

Based in Riyadh, Novo Genomics is one of Saudi Arabia's leading biotech startups. The organization aims to harness genomics and multiomics to develop personalized medical treatments for genetic diseases—improving the health and wellness of people across the region.

With a dedicated team of bioinformatics scientists, consultants, and clinicians, Novo Genomics leverages cutting-edge next-generation sequencing (NGS) techniques to further its research. The organization is also active in the field of agrigenomics—analyzing the whole genomes of crops and livestock to help enhance agricultural productivity and sustainability.

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The
Challenge

Since the late 2000s, NGS technologies have dramatically reduced the cost and time of DNA sequencing. Advances in high-performance computing (HPC) technology mean that it is now possible to perform genomics sequencing for entire populations.

However, managing the massive volume and velocity of data—which ranges from 10 to 300 GB per sample—still presents tough technical challenges. Researchers must filter the raw data multiple times to make it useable for downstream clinical analysis—a demanding and resource-intensive process.

Abdulrahman Alasiri, Biomedical Informatics Director at Novo Genomics, explains: "Our ultimate goal is to be able to offer every citizen in the Kingdom access to personalized medical treatments based on their genes. In the past, there was no facility in the country that could perform genomics analysis on this scale. As a lean startup, our objective was to deploy a HPC infrastructure that would enable us to bring the latest sequencing techniques to Saudi Arabia for the first time."

"After a thorough market evaluation, we determined that Lenovo GOAST was the ideal fit for our needs. By choosing a ready-made HPC solution that's specially designed for genomics and bioinformatics, we avoided the significant cost and complexity of designing and building our own cluster."

Abdulrahman Alasiri
Biomedical Informatics Director, Novo Genomics

Decoding genomics *at speed and scale*

The Novo Genomics team's solution research led them to Lenovo GOAST. Based on an Intel® Select Solution, Lenovo, GOAST is a cost-effective, open source, CPU-based solution including active and archive storage, designed to accelerate genomics analysis and enable personalized medicine at population scale.

"As soon as we started exploring Lenovo GOAST, we were very impressed—the solution offers the perfect combination of server and storage hardware, software, and system tuning to run demanding NGS workloads," recalls Alasiri. "The bioinformatics pipeline in Lenovo GOAST has been carefully optimized, which means it significantly improves performance on whole-genome and whole-exome sequencing compared to a typical HPC architecture."

Hardware
Lenovo ThinkSystem SR630 V2 Server powered by Intel® Xeon® Scalable processors
Lenovo ThinkSystem DM3000H Unified Hybrid Storage Array
Lenovo ThinkSystem DM5100F Unified Flash Storage Array

Software
Lenovo Genomics Optimization and Scalability Tool (GOAST)

Services
Lenovo HPC Services

Working with HPC experts from Lenovo, Novo Genomics deployed two GOAST nodes at its on-premises data center in Riyadh. Each node is based on a Lenovo ThinkSystem SR630 V2 server powered by Intel® Xeon® Scalable processors, connected to a low-latency Lenovo ThinkSystem DM5100F Unified Flash Storage Array for hot-tier storage and a Lenovo ThinkSystem DM3000H Unified Hybrid Storage Array for archiving. Both nodes run in an active/active configuration, helping to ensure that genomics workloads will continue to run even if one node experiences an outage.

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"One of the big advantages of GOAST is that we can use smooth, automated workflows to analyze multiple samples in parallel—significantly improving our genomics processing capacity."

Abdulrahman Alasiri
Biomedical Informatics Director, Novo Genomics

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Results

Using the Lenovo GOAST architecture, Novo Genomics can rapidly sequence and analyze genomics data at true population scale—supporting the organization's public health goals for the Kingdom.

"If we'd selected one of the other solutions we'd considered, we'd have needed to process samples one by one," explains Alasiri. "With Lenovo GOAST, we can process a batch of 32 exomes in parallel in as little as three hours—delivering up to 27 times faster analysis. In fact, the Lenovo and Intel solution allows us to analyze an entire human genome in less than an hour, accelerating our cutting-edge research."
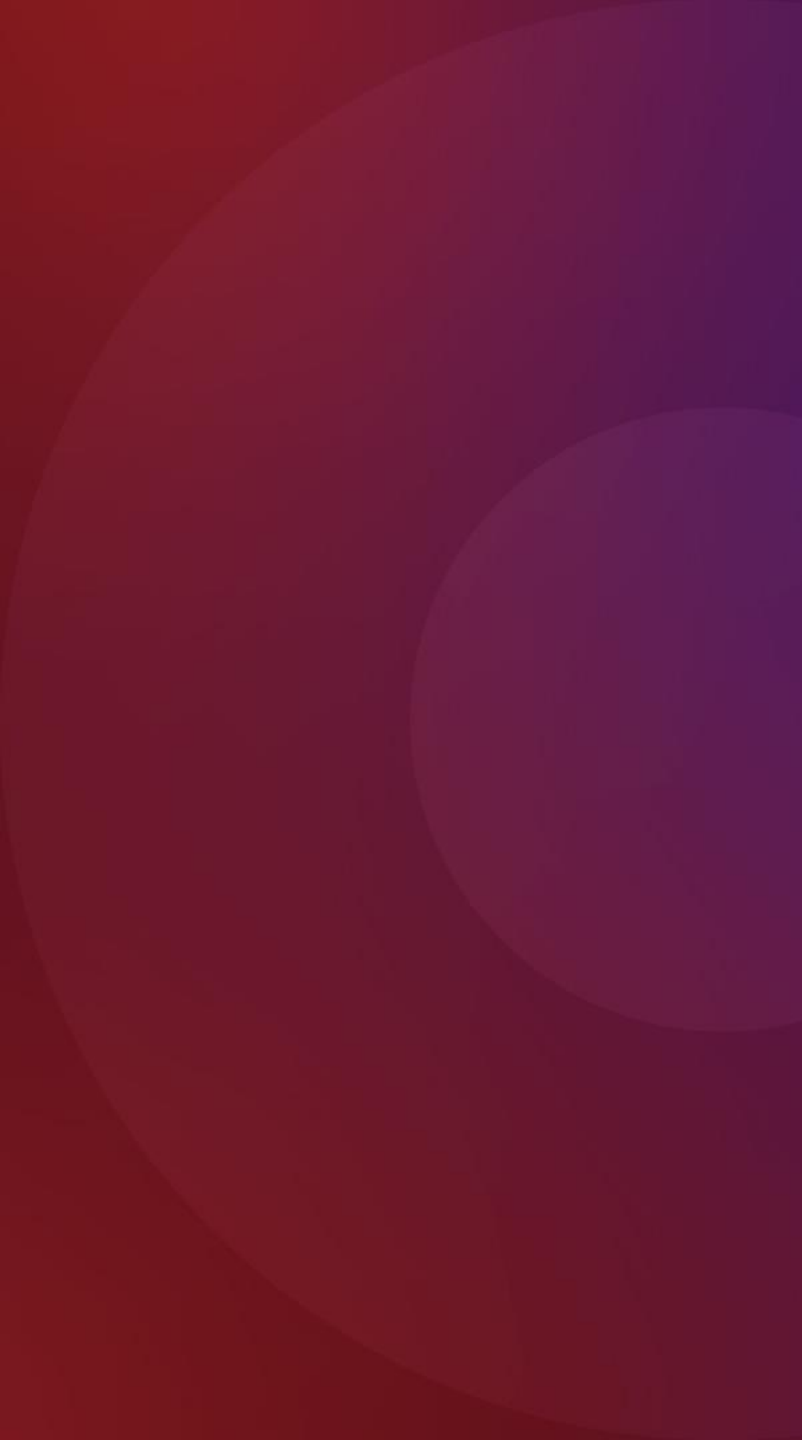
✓ 27x faster genomics analysis

✓ <1 hour for genome sequencing

✓ Enables population-level research

[1] Data provided by Novo Genomics

Alasiri adds: "Managing the solution has been really straightforward. Lenovo helps us stay up to date with the latest updates for our bioinformatics tools, and we've not experienced any issues with the platform."

By leveraging insights from the GOAST solution, Novo Genomics can now perform in-depth clinical evaluations to find the specific gene variants or mutations causing inherited diseases. Healthcare organizations across the country can now send genetic samples to Novo Genomics for processing, enabling them to get faster insights than ever before.

"We are one of the first organizations to perform analysis and archiving of genomics data in the Kingdom of Saudi Arabia," confirms Alasiri. "Looking ahead, we're planning to extend our research beyond the human genome to agrigenomics and microbiomics—and Lenovo GOAST will play a crucial role in our groundbreaking work."

Why Lenovo?

Following an in-depth proof of concept, Novo Genomics was confident that Lenovo GOAST was the ideal solution for its genomics research requirements.

"The life sciences team at Lenovo was extremely knowledgeable," comments Alasiri. "Lenovo went out their way to explain the principles behind GOAST and show us how the whole solution worked—they even gave us a demo unit so we could validate the solution for ourselves."

From the initial deployment and beyond, Lenovo has worked closely with Novo Genomics to enhance the solution and unlock new research capabilities.

"In close collaboration with Lenovo, we're continually improving the GOAST solution," states Alasiri. "For example, we've recently worked together with Lenovo to complement the solution's germline genotyping and sequencing capabilities with somatic analytics. This will enable us to detect the unique somatic mutations that build up inside cancer cells, and the new feature will become available to all GOAST users in the next software release."

"Thanks to our work with Lenovo and Intel, we're leading the way for genomics research in Saudi Arabia by making it easier for healthcare providers to order and use genomics insights to develop effective, personalized treatments."

Abdulrahman Alasiri
Biomedical Informatics Director, Novo Genomics

How do you make personalized medicine a reality?

Supporting the development of personalized therapies for genetic diseases with Lenovo and Intel® technology.

Powered by up to 4th Gen Intel® Xeon® Scalable processors

Explore Lenovo GOAST