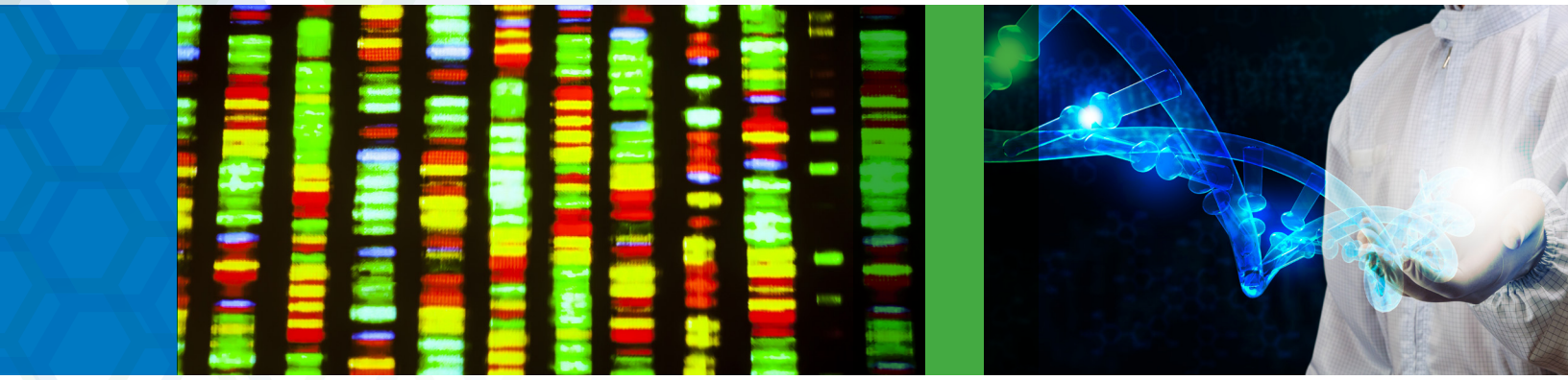
SGI Helps Inova Translational Medicine Institute (ITMI) Power Research with one of the Largest Genomic Family History Databases in the World

Background Information

Organization:
Inova Translational Medicine Institute

Location:
Falls Church, VA

Field:
Healthcare



Overview

Inova Translational Medicine Institute (ITMI), an institute of the Inova not-for-profit healthcare system based in Northern Virginia, is working to transform healthcare from reactive to predictive medicine. The institute conducts groundbreaking studies to collect data from thousands of patients and utilizes sophisticated protocols to store and analyze this data.

Using the collected data, ITMI researchers look for the causes of diseases and rare disorders, how they develop and what the best treatments are.

"At ITMI, we currently have one of the largest collections of genomic data linked to family history in the world. Our scientists work with this data to locate molecular biomarkers that help answer questions about individual predispositions to a disease, optimal treatment, and ultimately prevention," said Aaron Black, Director of Informatics at ITMI. "Having a partner like SGI work with us has proven to be an asset to our research team. We know we have the technology behind us to ensure we can analyze data with speed and precision, proving to be invaluable to our research team."

The Challenge

As a new institute funded by the Inova healthcare system, ITMI spent its infancy looking for providers to meet their computing and data storage needs. However, due to the intense computing and data centric nature of the genomic research being conducted, it became apparent many of the solutions evaluated would quickly became inefficient for future scalability, as well as costly.

In order to perform the analysis needed to advance their research program ITMI required local infrastructure with massive compute capacity coupled with extremely fast data storage and retrieval.

Currently, ITMI researchers have collected large genomic and clinical data sets from three core studies:

1. Pre-term prediction study to determine if a mother will likely have a pre-term birth.
2. Longitudinal birth study, with the goal of enrolling 5,000 to 10,000 expecting families (~25 thousand genomes) and tracking the infant over the course of 18 years to find correlations between disease, genomics and environmental factors.
3. Translational study that focuses on babies in the neonatal intensive-care unit (NICU) who are sick and not yet diagnosed.

As a result of these types of studies, researchers obtain insights that enable them to diagnose with more accuracy and speed, ultimately ensuring a higher level of treatment and care for the diverse population it serves.

The Solution

"Our team goal is to alleviate the need for our clinicians and researchers to focus on the data infrastructure and security. We want them to focus on the science and results of their data analysis questions. We want to enable them to do what they do best, and do it at a speed that exceeds their expectations." said Aaron Black. "Having the SGI® UV™ 2000 in-house has proven vital for this work."

This work is extremely compute intensive. To handle the workload, ITMI selected the SGI UV 2000 and directly attached InfiniteStorage 5600. The UV configuration has 512 compute cores, using Intel® Xeon® Processor E5-4650L and 8TB of memory. Unlike a traditional cluster, the compute resources are managed by a single copy of the Linux operating system. Using a single operating system allows each researcher to run their individual analyses using the resources needed to tackle the project. For data storage, ITMI attached four high performance InfiniteStorage 5600 RAID arrays to the SGI UV 2000 populated with disks to provide 1PB of data storage capacity in a single file system. The connection to the SGI UV 2000 is accomplished with 16 host based adapters (HBA) spread evenly among the blades of the UV, allowing large amounts of data to flow freely and eliminate bottleneck.

The Benefits

ITMI's SGI UV 2000 system is SGI's most I/O intensive UV machine capable of delivering 50GB per second of disk I/O to a single system image. The UV system at ITMI is one of the highest performing direct attached file systems in the world.

In addition to compute capacity, ITMI looked for a way to simplify management of the system as they do not have a large IT infrastructure team, and no deep experience in high-performance computing (HPC). ITMI was able to design a research solution around the SGI UV 2000 platform that enables scientists to use their own code. Not having to learn new coding to use the SGI UV 2000 lowered their administrative IT burden while simultaneously increasing research workflow capabilities. SGI also provided an integrated package of professional services and training specifically tailored to ITMI's needs.

"The SGI UV 2000 system we have deployed is a unique worldwide resource with 1.2PB of storage," said Black. "Thanks to the I/O capabilities of the system, we can now run data analysis pipelines in hours that would previously take days or never finish."

About SGI

SGI is a global leader in high performance solutions for compute, data analytics and data management that enable customer to accelerate time to discovery, innovation and profitability. Visit sgi.com for more information.

To purchase SGI UV 2000, please contact SGI Sales at 1-800-800-7441.

About Inova

Inova is a not-for-profit health care system located in the Washington, D.C. metropolitan area, serving over two million people with over 1,700 licensed beds based in Northern Virginia. Inova consists of five hospitals including the area's only Level 1 Trauma Center and Level 4 Neonatal Intensive Care unit. Inova encompasses many health services including the nationally and internationally recognized Inova Heart and Vascular Institute (IHVI), Inova Translational Medicine Institute (ITMI) on genomics, Inova Neuroscience Institute and Inova Children's Hospital. Inova's mission is to improve the health of the diverse community it serves through excellence in patient care, education and research. More information and statistics about Inova is at www.inova.org.

Global Sales and Support: sgi.com