



Case Study

Nor-Tech Uses Seagate Drives To Find Gravitational Waves¹

Challenge

Find rock-solid storage solutions for ultra high-performance computers used in science, government and military applications.

Solution

Seagate® enterprise drives

Benefits

- Superior reliability
- Low power consumption
- Speed

In 1915, Albert Einstein predicted gravitational waves—fallout from astronomical events so catastrophic that they ripple the fabric of space-time itself. It took more than 100 years for scientists to confirm Einstein's theory and they did it using laser-equipped sensors and super high-performance computers. The experts at Nor-Tech built computers that helped prove the existence of gravitational waves, and they used Seagate drives exclusively in the build.

With many Fortune 500 clients and dozens of well-known universities and colleges, Nor-Tech has earned a reputation as premier high-performance computing (HPC) experts.

Nor-Tech President and CEO David Bollig said, "High-end clusters run at 98% utilization and they'll run like that for years," he said. "You need rock solid parts and we've found that over time and the hundreds of clusters we've built, we always have our best luck with Seagate. When it comes to our clusters, my engineers will use only Seagate drives."

Nor-Tech Cluster Plays Key Role in Observing Gravitational Waves

Nor-Tech's coolest project is arguably the Orange County Relativity Cluster for Astronomy (ORCA). The system was instrumental in the recent groundbreaking observation of gravitational waves at the Laser Interferometer Gravitational-Wave Observatory (LIGO). Built to collect data and process it with custom software, ORCA provided confirmation of the measurements made with LIGO.

It has more than 1500 terabytes of overall storage, including 30 terabytes of local storage and 576 compute cores that are capable of more than 7 trillion operations per second. In addition to the LIGO gravitational waveform modeling and characterization algorithms, ORCA can simulate other astronomical phenomena like neutron stars.

¹ Case Study Developed By Seagate

LIGO is the largest and most ambitious project ever funded by the National Science Foundation.

The work of LIGO, supported by Nor-Tech's ORCA, has forever changed the way researchers view and study the universe—ushering in a new era of gravitational wave astronomy.

Why Nor-Tech Clusters Use Only Seagate Drives

Nor-Tech used Seagate drives exclusively for the ORCA build. In fact, the firm uses Seagate drives for every build unless a client insists on another manufacturer. After years of testing components to near failure, Seagate drives came out on top. For every high-performance computing cluster, Nor-Tech builds a test cluster for evaluation.

"We'll send the client several nodes and they will test for two, three months, just heat those machines up and work on them to make sure they're going to be bulletproof," explained Bollig. "Once they determine we've created a bulletproof unit, they'll go to bid." This process has given Nor-Tech a strong reputation for ruggedness and reliability.

Seagate support has also helped maintain that reliability. Nor-Tech Vice President of Engineering Dom Daninger recounts an experience with the Seagate support staff. Nor-Tech built a series of storage servers using Seagate drives for the University of Wisconsin to help support the IceCube Neutrino Observatory. Due to the unique demands of the project, some of the drives were experiencing intermittent issues. Daninger called Seagate support.

"The field engineer from Seagate, Joel Schulze, took the ball and ran with it," Daninger said. "It turned out that the firmware had to be updated on the drives. The Seagate support team wrote a script and emailed a link to my technician out in the field. He put the script on a thumb drive and that automated the installation, solving the problem all in one day for the client."

Seagate Enterprise Capacity 3.5 HDD: Superior Reliability for High-Density HPC Clusters

The Seagate Enterprise Capacity 3.5 HDD drive is an optimal match for Nor-Tech clusters because it combines enormous capacity, speedy performance and true enterprise-class ruggedness and reliability. With its industry-leading 6-disk technology, the Enterprise Capacity 3.5 HDD delivers up to 33% more capacity than its predecessor in the same storage slot. Supporting the industry's best response times for an 8TB nearline drive, it also enables the fastest data transfers, thanks to Seagate's comprehensive and advanced caching technology.

Factor in the drive's industry-leading rotational vibration tolerance design that helps ensure consistent performance in dense multi-drive systems, and the result is a capacity-optimized enterprise drive that's ideal for bulk-data applications:

- Up to 8TB for maximum density server and storage solutions
- Built to support enterprise-class 24x7 workloads of 550TB/yr
- 2 million hours MTBF
- 5-year limited warranty

About Nor-Tech

Nor-Tech built its reputation on the industry's easiest-to-deploy cluster solutions and guaranteed no wait time support. The company designed and built the HPC cluster that enabled the first detection of a gravitational wave—a discovery destined to change history. In addition to HPC clusters, Nor-Tech's custom technology includes workstations, desktops, and servers for a range of applications including CAE, CFD, and FEA. Clients include some of the most respected organizations in the world. Nor-Tech engineers average 20+ years of experience and are responsible for significant high performance computing innovations. The company has been in business since 1998 and is headquartered in Burnsville, Minn. just outside of Minneapolis. To contact Nor-Tech call 952-808-1000/toll free: 877-808-1010 or visit <http://www.nor-tech.com>. Full release at: <http://www.nor-tech.com/category/news/>