



Case Study

Federal Aviation Administration

FAA research for commercial space travel was made possible by a groundbreaking sealed cluster from Nor-Tech. And the cluster had a second chapter....

Their Challenge

As commercial aviation companies prepare to usher in an age of space tourism, regulatory bodies such as the Federal Aviation Administration (FAA) are tasked with the challenge of conducting research and collecting data to establish safeguards for the emerging industry. One area of concern is the amount of radiation passengers and crew of suborbital commercial space flights will be subjected to as they reach altitudes more than 60 miles above the Earth. Providers of commercial suborbital missions will need to provide passengers and crew with reliable information regarding the effects of radiation and anticipated exposure.

In order to conduct radiation propagation studies, the medical research arm of the FAA required a high performance compute solution that could function securely in the field, outside of the data center and in varying physical conditions. Due to security concerns, it could not be connected to the Internet.

Our Solution

The FAA approached Nor-Tech to develop a custom HPC solution. Nor-Tech's extensive experience and innovation on portable and ruggedized clusters made the company uniquely qualified for the project. Additionally, among the major tier one manufacturers, Nor-Tech's proposal was the only one that came remotely close to the FAA's budgeted price.

Nor-Tech spent 2-1/2 years working with FAA physicists, medical doctors, physical engineers, and technicians to learn the intricate details of their requirements. Nor-Tech ultimately proposed a portable data center that could run completely sealed without overheating, thanks to a liquid cooling system and low-powered Intel Xeon processors.

These processors also addressed the connectivity issue. Since the cluster would be unable to leverage the power of the Internet for expansion into the cloud, it was important that the processors offered the best performance on a gigaflop/watt ratio. Nor-Tech also used Seagate Constellation series disk drives throughout the cluster for reliable 24x7x365 storage.

Another unique challenge of this project was limited deployment space, which would require high computing density. A specialty cabinet developer assisted Nor-Tech with the design of the liquid cooled cabinets which can handle up to 80KW of power for each 42U cabinet—yielding an unprecedented computing density.

Nor-Tech was able to optimize the airflow inside the unit by using 3M's innovative Twin Axial Cable for InfiniBand. Because the cable is flat and not round, it can be packed into cable guides much tighter than round InfiniBand cable would allow. Tight turns and tight packing allow much better airflow for superior cooling.

Their Success

Nor-Tech's engineers developed a complete solution; even including building modifications and floor loading calculations to ensure the client would be prepared for the eventual delivery of the cluster. Also included, was an option for complete bare metal recovery, allowing for maximum data restoration in the event of a disaster.

Nor-Tech gave the client remote access their cluster prior to deployment, allowing them to install, test, and benchmark their applications before it left Nor-Tech's facility. Additionally, a team of engineers from Nor-Tech accompanied the cluster to the client site and assisted with deployment while providing hands-on training. The client's project, powered by Nor-Tech high performance technology, was a resounding success.

Chapter 2

The FAA later contacted Nor-Tech about repurposing the cluster for Big Data and machine learning—with a specific critical study in mind. Nor-Tech's world class engineering team knew it was possible, but it would be a challenge.

Working with an elite team of partners, Nor-Tech was able to draft a design. It required a 1PB+ Compute Node storage upgrade, using 140 Seagate 8TB Hard Drives, a Spectra-Logic tape Library and software purpose-built for AI & Data Sciences (Bright Computing). Nor-Tech also built a 200TB central storage server. All of the integration was performed at the Nor-Tech facility in Greater Minneapolis.

This is an excellent example of the value Nor-Tech's engineering team brings to all high performance computing projects. Nor-Tech's Executive Vice President Jeff Olson said, "With us, it's never one and done. We are always looking for ways that our clients can continue to get the most out of the technology we build—whether it's adding additional nodes, updating processors, integrating new software or a complete reconfiguration. We have both the motivation and the capabilities to maximize our clients' investments."

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/>

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