CASE STUDY

FAA research for commercial space travel made possible by sealed cluster from Nor-Tech

The Challenge

As commercial aviation companies prepare to usher in an age of space tourism, regulatory bodies such as the Federal Aviation Administration 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 up to 100 km above the Earth.

It is expected that the short duration of suborbital missions will likely result in lower exposure than the crew and passengers of long duration commercial air flights. Nonetheless, it is necessary that providers of commercial suborbital missions are able to provide passengers with reliable information regarding the effects of radiation and the anticipated exposure the crew and passengers will accumulate from their missions.

In order to conduct radiation propagation studies, the medical research arm of the FAA required an HPC Compute solution that could function securely in the field, outside of the data center and in varying physical conditions. Due to security concerns pertaining to the work being done on this Super Computer system, it was required that the system not be connected to the Internet.

The Solution

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

Nor-Tech spent two and a half years working with physicists, medical doctors, physical engineers, and technicians at the FAA to learn the intricate details of their requirements.

Nor-Tech proposed a portable data center that could run completely sealed without overheating, thanks to a liquid cooling system and low powered Intel XEON Processors. Using Intel XEON processors also addressed the connectivity issue: since the cluster would be unable to leverage the power of the Internet for expansion into the cloud, the Intel XEON Processors offer the advantage of the best performance on a gigaflop per watt ratio.

Nor-Tech also used Seagate Constellation series disk drives throughout the cluster for reliable 24x7x365 storage. As their HPC provider, Nor-Tech has had a long relationship with Seagate and values their innovative engineering and exceptional support.

Another unique requirement for this project was the high density of computing that was needed due to limited deployment space. Elliptical Mobile Solutions assisted Nor-Tech with the design of the liquid cooled cabinets which can handle up to 80KW of power for each 42U cabinet. This gives Nor-Tech an unprecedented density of computing.

Nor-Tech was able to optimize the airflow inside the unit by using 3M's innovative new 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 allows much better airflow for superior cooling of high density computing.

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 offered the client the ability to remotely 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 the deployment of the cluster while providing hands-on training for the customer.

"We're confident the success of this project will lead to many new opportunities with the customer and their related partners who are also benefitting from the unique solution that Nor-Tech has provided," said Dom Daninger, Nor-Tech's VP of Engineering.

901 East Cliff Road
Burnsville, MN 55337
TEL: 952.808.1000 FAX: 952.808.1001
TOLL FREE: 877.808.1010 www.nor-tech.com