



GeoEnergy Experiences a Seismic Shift in Data Processing Throughput with sTec Enterprise SSDs



The **Challenge**

GeoEnergy needed faster SSD performance, as well as greater reliability and durability.

The **Solution**

Invest in 800GB s840 SAS SSDs from sTec for dramatic improvement in throughput performance.

The **Result**

Sixfold durability and reliable, consistent project execution.



Specialized seismic processing company deploys sTec enterprise SSDs for up to 10-times-faster job performance and consistent, reliable project execution.

GeoEnergy, based in Houston, Texas, provides specialized seismic processing services to the oil and gas industry. Its clients include small independents, as well as the world's largest energy producers. GeoEnergy's seismic processing system was challenged to keep up with growing job queues due to performance and reliability issues with the consumer-grade SSDs in its server. To solve the problem, the company deployed sTec enterprise SSDs for up to 10-times-faster job performance and consistent, reliable project execution.

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Consumer SSDs Buckle Under Seismic Workloads

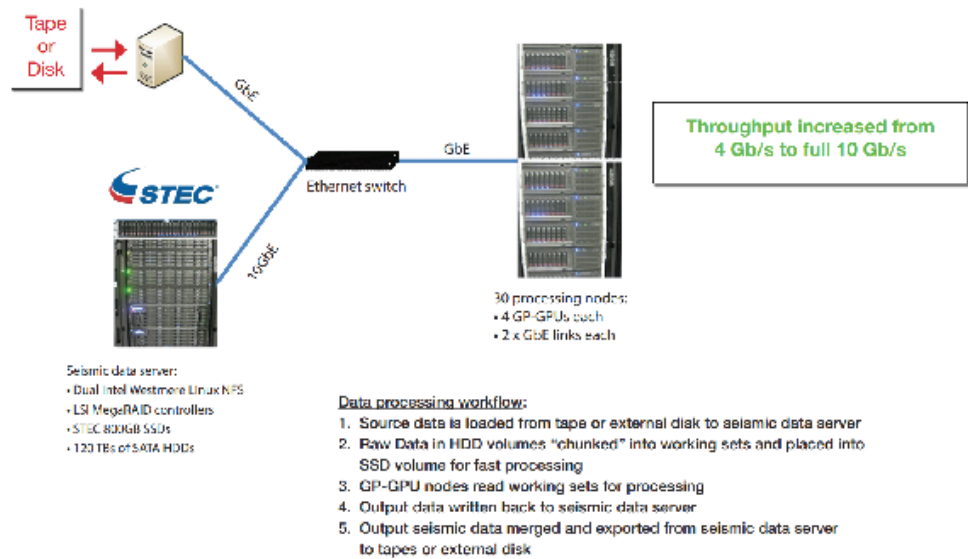
GeoEnergy applies proprietary mathematics and geoscience expertise to the refinement of 3D images from seismic surveys. By improving the accuracy and insight of seismic analysis and accelerating time to discovery, GeoEnergy plays a valuable role in oil and gas exploration and production.

GeoEnergy operates a computational cluster for seismic processing in its data center. Several high-performance computing applications are used to process large data sets ranging from the tens to hundreds of terabytes. Business had grown 50% in a matter of months and, as larger projects quickly approached, the company faced several technical challenges related to scaling the infrastructure.

The biggest problem was the reliability and performance of the consumer-grade SSDs used in its seismic data server. GeoEnergy’s processing workflow starts with 3D survey images loaded from tape or external disk to a seismic data server using NFS (see Figure 1 on page 3). The raw data is initially stored on the server in SATA HDD volumes. Applications are then used to split this raw data into smaller working sets which are copied onto an SSD volume for fast processing. Currently, a cluster of 30 processing nodes, each with 4 GP-GPUs, reads and processes the working sets and writes the output back to this NFS server. This repeats until the job is complete, and then the output data is merged and exported to tape or external disk.

All of GeoEnergy’s storage systems are built with LSI® MegaRAID® controllers. These controllers are designed to deliver exceptional IOPS and bandwidth performance for high-performance computing applications. They have proven to be dependable, delivering sustained high throughput to support the seismic processing workflow.

Figure 1: sTec SSDs Accelerate Seismic Processing Workflow



Unfortunately, the consumer SSDs were failing after only six months of use, interrupting the workflow. "With each drive failure, we would have to take down the server, replace the drives and start the job all over again," said Shawn Stephens, Senior IT Administrator for GeoEnergy. "These jobs have deadlines! We were losing three or four hours every time this happened."

They also experienced performance and compatibility issues with the consumer SSDs after upgrading to a new file server capable of handling the large seismic data files. "We tried everything but simply could not get the performance and predictability we needed," recalled Stephens. "When we began lining up multiple I/O threads, the cheaper SSD's performance just fell apart." However, workload demands forced the company to run the system in production for six months in mid-2012.

Stephens is the first to admit that GeoEnergy is hard on SSD storage. "We require very high-speed, high-volume I/O. When the SSDs started failing, we asked ourselves, 'can we do this using traditional and more affordable spinning disks?'" He consulted Dr. Lionel Woog, Chief Technology Officer for GeoEnergy, who has in-depth knowledge of the computational resource demands for image processing. According to Woog, SSDs were the only viable technology to parse and distribute data for their heavy-duty application.

sTec Enterprise SSDs Make the Grade

It was clear that GeoEnergy needed enterprise SSDs with significantly greater performance, reliability and durability. After evaluating SSDs from sTec, Intel and others, Stephens chose sTec for its demonstrated reliability and value. He then needed to obtain budget approval for the upgrade. GeoEnergy is a specialized company that owns all of its computing equipment. "We don't have the luxury to lease high-end computers or to overbuild our data center," explained Stephens. "Given our size and the competitive environment, we're forced to be very resourceful."

With evaluation units from sTec, Stephens and Woog went to work to determine how far they could push I/O performance. They tuned and optimized the pilot system and were able to increase performance of several jobs by up to 10 times. The results convinced senior management to invest in 800GB s840 SAS SSDs from sTec.

Rock-Solid Performance and Reliability

The installation of sTec SSDs was plug-and-play and the drives were fully compatible with the server's LSI MegaRAID controller. The seismic data server's performance improvement was so dramatic that it shifted the I/O bottleneck. The server's 10 Gb Ethernet link is now fully utilized under aggregate client load.

"Today, we can saturate the 10 Gb/s interface to its limit," noted Stephens. "In the past, we were only able to get 4 Gb/s on a good day—and lack of reliability was creating far too many bad days." Additional improvements to system performance will have to come from enhancements to the network links and RAID controllers because the SSDs already deliver ample throughput. In fact, sTec will continue to work closely with LSI and GeoEnergy to further enhance processing throughput in the storage systems and fully leverage the capabilities of the SSDs.

Stephens projects the service life of sTec SSDs will be three years or more, compared to as little as six months for consumer SSDs, a sixfold improvement. sTec's advanced flash management techniques maintain consistent performance with use, unlike consumer SSDs which degrade over time. Greater predictability and performance have allowed GeoEnergy to pursue more and larger projects with confidence that it can deliver on tight deadlines.

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GeoEnergy's larger projects can include 4 to 5 TB sized images. The data volumes quickly multiply as variations are run on each 3D model to achieve the best seismic image detail. "It's not uncommon to end up with a dozen working copies of each image that need to be distributed and processed," said Stephens. Thanks to the performance improvements, GeoEnergy has increased its processing capacity to handle larger data sets. These capabilities allow the company to pursue additional business opportunities and offer new services that may create even greater computational processing demands.

Asked what advice he would offer peers facing similar data center performance and reliability challenges, Stephens replied, "There are many areas where you can cut corners to maximize value, but going with cheap SSDs can be a costly decision. sTec SSDs are not just fast—they're very reliable!"

Since 1998, GeoEnergy (www.geoenergycorp.com) has brought its broad range of expertise in mathematics and geosciences to bear on the toughest problems in seismic processing.

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