



MICROSEISMIC INC.

MicroSeismic, Inc., based in Houston, Texas provides highly sophisticated seismic imaging services to the oil and gas industry. What sets them apart from other providers of these services is their leadership in passive seismic processing.

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Michael Thorton, Vice President, Data Analysis, MicroSeismic

Unlike conventional seismic imaging, passive seismic processing does not require the use of air guns or dynamite which can have a negative environmental impact in difficult-to-reach or environmentally-sensitive terrain. When collecting seismic data, the MicroSeismic team of experts lay out an array of thousands of receivers that listen to the vibrations in the earth and underneath the ocean floor. The data they collect from the arrays monitor reservoir response and other production-related activities which helps their customers increase the efficiency of discovery and the volume of produced oil and gas.

Like conventional seismic processing, passive seismic processing requires massive amounts of data to be collected and manipulated on a daily basis. It relies on high-performance computing to develop fast, yet meaningful results for further expert interpretation on where and how deep to drill within a given area. MicroSeismic uses a patented methodology for processing their data which runs on dual-core processor-based Linux clusters. The clusters perform compute-intensive operations at ultra high speed to help accelerate results and reduce decision-making time.

The Challenge

MicroSeismic’s competitive advantage is based in part on the company’s ability to quickly produce seismic images in difficult locations, such as mountainous or earthquake-prone geographies where only passive seismic processes are feasible. In addition to deploying high performance Linux clusters they rely on parallel file system storage to drive the processing demands of complex algorithms and other computations produced from raw field data.

Initially, MicroSeismic relied on a SAN storage solution in conjunction with the company’s Linux clusters, but as new processing applications were introduced, the storage I/O became a bottleneck and the servers were ill-equipped to handle the increased workload. In effect, the prior storage architecture was not optimized to handle the increased workload, causing the overall production process to slow to unacceptable levels.

SUMMARY

Industry:
Oil and Gas exploration services

■ **The Challenge:**

Inadequate storage architecture slowing production processing was impacting MicroSeismic’s ability to deliver meaningful seismic imaging data to customers in a timely manner

■ **The Solution:**

- Panasas ActiveStor Parallel Storage with DirectFLOW® client software
- An integrated software/hardware solution that includes the Panasas ActiveScale® Operating Environment with the PanFS™ parallel file system and Panasas DirectorBlades® and StorageBlades®

■ **The Result:**

- 10X application performance improvement
- Increased productivity as a result of dramatically faster processing/response times
- Reduced administration as a result of simple installation and management
- Increased IT productivity and overall system availability

“Once we introduced a new process, the existing storage was not viable because it couldn’t handle the large files that were generated by the data. So we added more storage, but it filled up within days. Then we purchased even more storage and that filled up within weeks. It became a domino effect so that as more capacity was made available, it was immediately allocated and used. Something had to be done and fast,” said Michael Thorton, Vice President of Data Analysis at MicroSeismic.” By using Panasas ActiveStor parallel storage with the DirectFLOW® protocol, we’ve increased performance of our applications deployed on our Linux servers ten-fold and now have all of the throughput we need for existing and future applications.”

The Solution

MicroSeismic tested several competitive storage products over a two-month evaluation period with the expectation that the company would use a storage-area network (SAN) with Fibre Channel connectivity. However, after rigorous benchmarking of both SAN and NAS (network-attached storage) solutions that mostly run on Sun computing systems, MicroSeismic uncovered performance and throughput limitations in both third-party SAN and NAS products as compared to the Panasas ActiveStor Parallel Storage Cluster with DirectFLOW client.

“When your business involves mammoth data files such as those used by MicroSeismic, you’re looking at several hours to transfer data to perform seismic processes. With a SAN, we were lucky to get processing time that averaged 100 megabytes per second (MBps), whereas with the Panasas parallel storage with the DirectFLOW software, we’re achieving up to 300 MBps. The sooner we can turn around these jobs, the sooner we can get meaningful results out to our customers. Perhaps a cliché, but in our business time is definitely money,” said MicroSeismic’s Thorton.

Using Panasas parallel storage allows high-speed, parallel data transfer between MicroSeismic’s Linux clusters and Panasas storage so that data can be simultaneously transferred at optimum speeds. Previously, MicroSeismic would move completed projects to a SAN and later to tape archival systems. Now, the data is moved from Panasas parallel storage directly to tape archiving, saving time, increasing IT productivity, and reducing administration costs.

The Result

MicroSeismic is the world leader in passive seismic monitoring for oil and gas companies. To date, no seismic processing vendor offers the same capabilities as MicroSeismic, although the company concedes that competitors are expected to unveil their own versions of passive seismic software within the next year or two.

“We expect to see competitors in this space in the future because it is very cost effective and you don’t have to wait for legal permits to dynamite in terrains that might be environmentally fragile or unstable. Unlike our competition, our team sets things up within a day or two and then we start recording. We listen for the vibrations coming back and then use our patented calculations in conjunction with Panasas parallel storage to derive meaningful results very fast. When necessary, we can easily add more Panasas ActiveStor clusters to the production line as a shelf can be up and running within 30 minutes,” added Thorton.

When problems do occur, as MicroSeismic experienced one long weekend, a telephone call to Panasas’ customer service dispatched a team of experts who worked with Thorton to locate and solve the problem quickly, thus, minimizing disruption of the seismic operation.

MicroSeismic has not only achieved 10X application performance improvement since deploying Panasas parallel storage, and increased productivity as a result of these dramatically faster processing times, but more importantly, they are positioned to retain their industry leadership and maintain their competitive advantage.

