

HP solutions help find difficult-to-reach oil and gas faster

MicroSeismic, Inc. processes seismic data eight times faster, using solutions based on HP Converged Infrastructure technologies



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Brian Gibbons, IT Manager, MicroSeismic, Inc.

Objective

Decrease processing cycles by deploying a more powerful processing solution for oil and gas field data

Approach

Turn to HP Elite Partner TSA for advice on how to speed processing with HP Converged Infrastructure-based technologies

IT improvements

- 8x faster server management with HP BladeSystem
- 50% reduction in power consumption with HP BladeSystem
- Business continuity solution with replication of data across two sites

Business benefits

- 8x faster processing of data for optimizing well stimulation
- 20% reduction in TCO for total server count due to virtualization
- Increase in revenue due to improved productivity
- Faster growth with enhanced ability to service more customers
- \$100,000 USD in equipment savings with HP StorageWorks P4000 SAN



The sweet sound of oil and gas

To find “unconventional” hydrocarbons in the ground, you have to be able to listen—with very sensitive instrumentation—to what’s going on in the subsurface. “Unconventional” or “hard-to-get” oil and gas is often found in shales. When these shales are stimulated by a hydrofrac job, tiny noises that indicate how the rock is breaking up occur. The patterns of these sounds tell geoscientists about the stimulation job’s effectiveness, which enables the subsurface to release the hydrocarbons. That’s where Houston, Texas, based MicroSeismic, Inc. (MicroSeismic) comes in;

HP customer case study:

high-performance computing;
converged infrastructure

Industry: oil and gas



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Brian Gibbons, IT Manager, MicroSeismic, Inc.

it is a geophysical service company providing real-time monitoring and mapping of hydraulic fracture operations for the development of unconventional oil and gas extraction.

Conventional oil and gas exploration will record and analyze “active” seismic data acquired at the surface using controlled, small explosions or vibrations. MicroSeismic is the only company to provide “passive” seismic monitoring of oil and gas assets with recordings at or near the surface, listening for microseismic energy generated in the oil-and-gas-bearing rock formation during stimulation or production. The company uses its BuriedArray™ service to monitor seismic events that occur during fracture operations. The service consists of a series of permanently installed geophones buried near the surface with a monitoring range of up to 500 square miles. Being able to gather data over such large geographical areas is significant because when MicroSeismic analyzes and processes the data it can show exactly where the fractures are going and how the rock is breaking. This analysis allows operators to make better decisions about how to complete their wells and develop their fields, which ultimately yields more hydrocarbons for less cost. The alternative for the operators is to drill monitoring wells, which cost \$2–4 million USD and yield more-limited views.

Once the data is gathered from the field it is processed at a field office using MicroSeismic’s proprietary software, Passive Seismic Emission Tomography (PSET), and analyzed in the company’s Houston data center with off-the-shelf software to develop maps. The field processing should be real-time—and MicroSeismic is the only company capable of showing clients how their fractures are propagating through a reservoir in real-time so they can make adjustments to their fracture operations stage by stage. However, the Dell servers and EMC storage that the company used previously could not meet the real-time requirement and took as much as 20 minutes for one job, which limited how many jobs could be processed during the day.

8x faster processing

MicroSeismic turned to HP Elite Partner Technical & Scientific Application, Inc. (TSA, www.tsa.com), also based in Houston. “I invited TSA to come in and make some recommendations on how we could upgrade our infrastructure,” says Brian Gibbons, IT manager, MicroSeismic. “TSA suggested that we incorporate NVIDIA Tesla graphics processing units with HP ProLiant rack-mounted servers. We went to the HP High Performance Computing Group and they recommended the HP ProLiant DL160se G6 with the Tesla 1070. TSA and Tesla demonstrated those for us and they greatly improved the performance of our code, processing jobs in just a few minutes that once took 20—about eight times faster. We were also able to run two jobs per server, which really accelerated the process.”

MicroSeismic built a grid of 60 HP ProLiant DL160se G6 servers with NVIDIA Tesla 1070 GPUs. The HP ProLiant DL160se G6 is an ultra-dense rack server that is designed for high-performance computing (HPC) environments. The grid software is Cluster Resources Moab, and the company uses Force 10 network switches.

Customer solution at a glance

Hardware

- HP ProLiant 460c G6 server blades
- HP BladeSystem c7000 enclosures
- HP Virtual Connect Flex-10 10Gb Ethernet Modules
- HP ProLiant DL160se G6 servers
- HP ProLiant DL180 G6 servers
- HP StorageWorks P4000 SAN
- HP EliteBook 8540w Mobile Workstations
- HP Networking solution

Software

- HP Remote Graphics Software
- HP Integrated Lights-Out 2 Advanced (iLO2 Advanced) management software
- Microsoft® Hyper-V Server
- Microsoft Exchange Server
- Cluster Resources Moab grid management software

Operating system

- Microsoft Windows® Server 2008 R2 Operating System

Network protocols

- 10 Gigabit Ethernet
- Gigabit Ethernet

Company profile

MicroSeismic, Inc.

MicroSeismic, Inc. (www.microseismic.com) is a world-leading service company providing acquisition and analysis of passive seismic data, especially microseismic monitoring. The company pioneered the use of surface and near-surface arrays for monitoring hydraulic fracture stimulations. MicroSeismic is leading the way in developing analysis tools to extract more information and value from the data.

"We have a 10-gigabit backbone for our network, so we put the Tesla device cards in the ProLiant servers and a 10-gigabit card, so we can get the throughput for all the data, because the data is so big," says Gibbons. "Our process increases the size of the data so that we can extrapolate the points we need, even though the output is quite small. For just one job, we can be working with 5 to 10 terabytes of data."

The geophysicists do their mapping work with HP EliteBook 8540w Mobile Workstations. Interpretation of microseismic data is a 4D problem. The events are imaged in time and space, which is key to understanding results. Interpretation of this kind of data requires specialized software to visualize the events in 3D and to allow animations to understand the timing of these events. HP EliteBook 8540w Mobile Workstations deliver the graphics power to run this software, and allow the flexibility to take the entire visualization environment into the client's office or the conference room.

50% reduction in power consumption

MicroSeismic is using HP BladeSystem c7000 enclosures with HP ProLiant BL460c G6 server blades to host a number of supporting applications. "With the HP BladeSystem, I don't have to take up two racks for all my infrastructure servers," states Gibbons. "I can just have two c7000s in one rack, and they use less power. Instead of running at 16, 18 kilowatts, we're running at 9 kilowatts, because we're only using what we need."

Gibbons' team uses HP server blades to host the domain controller, file servers, Microsoft Exchange Server, and Linux servers. There are three enclosures in the Houston data center and one scheduled for the Denver site that is being built now. The team uses Microsoft Hyper-V for a Windows-based virtualized environment on other server blades.

"We use the virtual machines primarily for database servers and license servers," explains Gibbons. "We have 9 physical servers with about 21 virtual servers, or 3-4 virtual servers per physical server. That takes approximately 20% off our total cost of ownership for our total server count." MicroSeismic uses the HP ProLiant DL180 G6 servers as file and backup servers.

8x faster server management

At MicroSeismic, just four people on the IT team are needed to support 80 users, as well as manage the data center. A key component in saving IT staff time is HP Virtual Connect Flex-10 10Gb Ethernet Modules. This solution provides server administrators with the simplest, most flexible way to connect servers and virtual machines to any LAN or SAN. "I love Virtual Connect," says Gibbons. "Now I don't have to use switches for all my DMZs or remember which port was VLAN. I can run multiple VLANs, multiple connections depending on how I want to set it up."

Gibbons' team also uses the HP Virtual Connect Flex-10 modules to tailor the bandwidth they allocate to applications, choosing how many connections each server has, and setting the bandwidth of each connection in increments of 100 Mb. The PSET processing uses 100% of the 10 gigabits, but the Web page and the applications that run on the server blades are all 100 megabits.

Management of the HP BladeSystem is fast and easy using HP Remote Graphics Software or HP Integrated Lights Out 2 Advanced (iLO2 Advanced). "The convenience of HP remote management is really that I can just use my Web browser to log into the HP BladeSystem enclosure for management," says Gibbons. "I just asked one of our staff to get a server blade from a different site, and he brought it in and popped it in; the whole task minus drive time took 30 minutes. With a rack server that would have taken two people two hours."

\$100,000 USD savings with HP StorageWorks P4000

MicroSeismic has to manage in storage 240 terabytes of data that is growing every day. For its secondary storage solution, the company chose HP StorageWorks P4000 SAN solutions, with eight nodes in Houston and eight more planned for the Denver site. The company will replicate its business data between the two sites. The built-in Remote Copy, Snapshot, and Thin Provisioning features of the HP StorageWorks P4000 series require no additional license fees—in contrast to the EMC storage used previously.

“We look to HP for the technology we need to grow.”

**Brian Gibbons, IT Manager,
MicroSeismic, Inc.**

“With the EMC, I couldn’t do any iSCSI, it was all Fibre Channel switches,” says Gibbons. “With the HP StorageWorks P4000, it’s all iSCSI and I can create a volume on the fly and connect it to server ‘x’ and do the same thing the next day to server ‘t’. With EMC, it took up twice as much space, it had ten times the number of drives, and then if you wanted to do anything, you had to buy a license. If you wanted to change the size, forget it, you had to delete the volume or the log and re-create it.”

Not only is the HP StorageWorks P4000 SAN solution more robust and easier to manage, it is also less expensive than it would have been to upgrade the prior EMC solution. “I would have had to replace the whole system just to get the iSCSI,” says Gibbons. “We saved \$100,000 by going with HP and we ended up with far more capabilities. Thin provisioning enables us to allocate storage space without leaving storage space unused and helps us defer purchasing more disk.”

MicroSeismic is consulting with TSA on how best to deploy the Denver disaster recovery site and what hardware and software to use. “TSA is responsible for our service and helping us support our aggressive expansion,” affirms Gibbons. “Anytime I need to put anything together, we’ll sit down and devise the correct design for what we want. Right now, we’re looking at replacing our phone system with an IP telephony phone system. We’re sitting down together to determine what Power over Ethernet (PoE) switches to use and we’ll probably choose an HP Networking solution. We look to HP for the technology we need to grow.”

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