Landmark SeisWorks® with EMC Upstream Application Accelerator

Application performance 2-3 times faster than traditional NAS

Abstract
This white paper summarizes the findings from two sets of tests performed independently by EMC in the Celerra labs. Each test compared the performance and scalability of the SeisWorks® 3D seismic data analysis and interpretation application on traditional NAS to that of EMC Celerra with MPFS. I/O throughput improvements up to 4.6x times over traditional NAS were achieved using the EMC Upstream Accelerator.

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Executive summary

The SeisWorks® 3D application from Landmark run on an EMC Celerra with EMC Upstream Application Accelerator configuration delivered superior results over traditional NAS.

- **Performance** – Using EMC Celerra with EMC Upstream Accelerator the time required to render 3D project data in SeisWorks® was dramatically reduced wait time for geoscientists. I/O throughput improvements up to 4.6 times were achieved over traditional Network Attached Storage (NAS) using EMC Upstream Accelerator.

- **Scalability** - As more seismic workstations are added to the infrastructure, this solution scales by providing greater I/O bandwidth through the use of multiple data paths to the Celerra NAS array. Higher throughput results in shorter elapsed time for data access and seismic rendering operations.

- **Application transparency** - EMC Upstream Accelerator works seamlessly with all seismic interpretation and analysis applications, so no application changes are required to get the benefits of increased performance and scalability, consolidated cost reductions, and manageability of NAS storage with Celerra and EMC Upstream Accelerator.

Introduction

SeisWorks® 3D software provides 3D viewing and interpretation capabilities and easy-to-use interpretation productivity tools to support and enhance horizon and fault interpretation. It is an industry standard for 3D seismic data analysis and interpretation. With SeisWorks® 3D software, interpreters can work with a 2D project and multiple 3D projects concurrently for great interpretation flexibility.

Combining SeisWorks® from Landmark Software with EMC Celerra and EMC Upstream Accelerator provides the following benefits;

- **Rendering Performance**: With typical NAS solutions, geoscientists must wait for seismic data to be rendered. For large datasets waiting can be disruptive to a geoscientist’s thought process. EMC Upstream Accelerator significantly reduces the time required to render variable density or wiggle traces for interpretation and analysis. In fact, EMC Upstream Accelerator can return results two to three times faster than traditional NAS solutions using NFS.

- **Scalability**: Traditional NFS environments are limited by the number of physical Ethernet connections to the NAS solution. NFS connections are optimized with EMC Upstream Accelerator by using the multiple paths to deliver metadata and data separately. Meta data operations use conventional IP connections while data operations use iSCSI or Fibre Channel for read and write operations. This offloading or separating data from metadata allows for additional iSCSI or FC connections directly to the backend storage array, and thereby delivers a highly scalable architecture as additional seismic workstations are added into the Celerra EMC Upstream Accelerator environment.
Infrastructure test environment

The storage configuration tested consisted of an EMC Celerra NS-480 Unified Storage Platform with iSCSI connectivity between six Dell seismic application workstations and the Celerra NS-480. The network switch was a Cisco Catalyst 6509.

The EMC Upstream Application Accelerator file system was created and optimized across 20 disk spindles using 4 GB fibre drives with 300 GB capacities each.

Single and dual iSCSI paths on the Dell workstations were used for block based data read and write activity directly to the storage in the NS-480 Unified Storage Platform.

Test variables and iterations

Two sets of tests were performed by EMC in our Celerra labs. Each test compared the performance of traditional NAS to that of EMC Celerra with EMC Upstream Application Accelerator. Tests were conducted to measure the throughput as well as the elapsed wall clock time to render files using variable density with the same test bed and same file system.

Prior to every test iteration, each seismic workstation was rebooted to eliminate any effects of operating system or MPFS caching on the client, and to ensure repeatability of the test results.
**Test results**

EMC Upstream Application Accelerator improved the aggregate I/O throughput measured in Mbytes/second by an average of 4.6X on a 64 GB seismic file over traditional NFS protocol. When measured by wall clock response time, the speed to perform variable density rendering of the 64 GB project was an average of 2.5 times faster than NFS.
Conclusions

EMC Celerra with EMC Upstream Application Accelerator provides significant performance advantages for Landmark Software’s SeisWorks® application over traditional NFS particularly for seismic operations requiring high bandwidth I/O between shared NAS storage and the seismic workstations.

The performance advantage is delivered by the Celerra NS-480 configured with EMC Upstream Accelerator to accelerate data transfer between the Celerra storage and the seismic application workstations by providing separate transports for file data and metadata. EMC Upstream Application Accelerator achieves this by sending CIFS and NFS metadata traffic over IP to the Celerra, while all file read and write data passed over high performance SAN iSCSI directly to the integrated storage array.

In other words, Celerra and EMC Upstream Accelerator delivers all the traditional operational benefits of NAS in terms of consolidated storage, manageability, and file sharing, while at the same time, delivering the performance and scalability benefits of traditional SAN block storage architectures by sending large read and write operations directly to the backend storage array.

Testing at EMC labs is ongoing to further quantify the benefit of using EMC Upstream Application Accelerator across a broader portfolio of Landmark’s interpretation applications.

About Landmark

Landmark’s integrated software and services help the upstream oil and gas industry turn critical information into useful knowledge. With this knowledge, our clients can see further, deeper, more accurately and more comprehensively than ever. So they can make better decisions with less risk than ever. Landmark Software is a division of Halliburton. With more than 50,000 employees in approximately 70 countries, the company serves the upstream oil and gas industry throughout the lifecycle of the reservoir – from locating hydrocarbons and managing geological data, to drilling and formation evaluation, well construction and completion, and optimizing production through the life of the field. Visit the company’s Web site at www.halliburton.com.

About EMC

EMC Corporation (NYSE: EMC) is the world’s leading developer and provider of information infrastructure technology and solutions that enable organizations of all sizes to transform the way they compete and create value from their information. Information about EMC’s products and services can be found at www.EMC.com/oilandgas.

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