



HOW THE APPLICATION OF NEW HPC TECHNIQUES IMPACTS OIL AND GAS DATA ANALYSIS

EMC Isilon solutions for oil and gas

EMC PERSPECTIVE

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INTRODUCTION: MEETING THE CHALLENGES OF TODAY'S ENERGY AND DATA DEMANDS

Energy demand is expected to rise significantly over the next few decades, particularly in underdeveloped regions of the world, including Asia and Africa. Oil and gas companies are trying to meet today's growing demand and the anticipated demands of the future by looking for new sources of energy.

To aid their search, oil and gas companies are turning to modern exploration technologies. New seismic acquisition sensor technology, designed to provide a clearer understanding of the Earth's subsurface, will be generating 10x the amount of data as typical existing sensor technologies. In addition, depth imaging software is available to more accurately delineate geological structure from this data. Both of these technologies aid in risk assessment and help operators improve drilling success rates.

To process these larger volumes of data and support the new workflows provided by tools such as depth imaging, oil and gas organizations are leveraging high-performance computing (HPC) technologies. In particular, organizations are moving to clusters built around the latest multicore processors, with petabytes of storage, the fastest-available networking, and the intelligence to divide and handle workloads across an array of compute nodes. Use of these technologies naturally changes the I/O operations per second (IOPS) and throughput requirements of the associated storage systems supporting these operations. This document will look at the storage implications when newer HPC technologies are used to accelerate oil and gas seismic processing workflows.

IMPROVING COMPUTATIONAL WORKFLOWS

With a need to make quick decisions, oil and gas exploration organizations need to analyze the vast volumes of data collected in the field as rapidly as possible. Given the enormous amounts of data that must be manipulated, analyzed, moved, and visualized, the key to success is to have highly honed computational workflows in place to handle the work.

With the advances in processor technology over the past few years, today's HPC clusters are capable of providing the computational power equal to that of supercomputers—making them an appropriate match for the challenges of oil and gas exploration.

Additionally, oil and gas exploration organizations today are trying to accelerate their workflows by optimizing their increasingly sophisticated analysis algorithms to take advantage of a hardware-assisted speedup by running them on graphics processing units (GPUs). Use of these technologies can significantly change the IOPS and throughput demands on a storage system. Furthermore, exploration data analysis makes use of a broad mix of applications. Some algorithms are CPU-intensive, others are memory-intensive, others still are I/O-intensive, and some are all three. This again places varying IOPS and throughput demands on a storage system. What's needed is a storage solution that has the flexibility to handle the application mix found in most energy exploration organizations.

EMC ISILON AS YOUR TECHNOLOGY PARTNER

EMC® Isilon® offers scale-out storage for the oil and gas exploration industry. Its solutions are already used in some of the most demanding and leading-edge organizations in the industry. Isilon hardware platforms are designed for simplicity, value, and outstanding performance.

Every Isilon solution can seamlessly scale on the fly, enabling organizations to add hundreds of terabytes of storage or expand performance in minutes.

Isilon systems can scale-up to support 20 petabytes of storage capacity, more than 100 gigabytes per second of throughput, and up to 1.6 million file operations per second in a single file system. Additionally, organizations can mix and match various hardware elements to meet their specific needs. For example, the EMC Isilon S-Series delivers the performance needed for IOPS-intensive applications, the X-Series is ideal for high-concurrent and sequential throughput workflows, and the NL-Series provides economical storage that enables organizations to keep data online and available for longer periods of time.

Every Isilon solution can seamlessly scale on the fly, enabling organizations to add hundreds of terabytes of storage or expand performance in minutes. At the same time, the Isilon modular architecture and intelligent software make deployment and management simple.

Powered by the seventh-generation EMC Isilon OneFS® operating system, every Isilon cluster is a single pool of storage with a global namespace, eliminating the need to support multiple volumes and file systems.

OneFS combines the three layers of traditional storage architectures—file system, volume manager, and data protection—into one unified software layer, creating a single intelligent file system that spans all nodes within a cluster. Unlike simple NAS namespace aggregation products, the Isilon OneFS operating system is truly distributed and intelligently stripes data across all nodes in a cluster to create a single, shared pool of storage. OneFS offers unsurpassed mission-critical reliability and industry-leading drive rebuild times.

OneFS also delivers unique cluster-aware symmetric multiprocessing (SMP) capabilities that enable the system to move tasks between processors for extremely efficient workload balancing. In conjunction with the OneFS operating system's ability to stripe data across all nodes in a cluster, Isilon solutions achieve the high aggregate bandwidth and transactional performance required to power next-generation enterprise data centers.

With these capabilities, OneFS enables:

- Scalability of performance and capacity to over 100 gigabytes per second of throughput, and up to 20 petabytes of capacity in a single file system
- A single point of management for large and rapidly growing data repositories
- Mission-critical reliability and high availability with state-of-the-art data protection

As data management becomes an even more essential core element of storage, there is a growing need for software applications to protect and secure the data. To that end, Isilon offers many software solutions to help meet critical data protection, access, management, and availability needs.

The combination of Isilon hardware, file system, and management software helps deliver the requisite performance needed in today's oil and gas exploration organizations, all while simplifying data management, providing robust data protection, and lowering operating costs.

CONTACT US

To learn more about how EMC products, services, and solutions can help solve your business and IT challenges, [contact](#) your local representative or authorized reseller—or visit us at www.EMC.com/Isilon.

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