NetApp
Go further, faster

Industry Solution

Optimized Data Management for Upstream Oil and Gas

KEY BENEFITS

Accelerate time to production
Eliminate data bottlenecks that reduce asset team productivity.

Increase overall performance
Reduce the time needed to generate sophisticated volume analyses and multiple attribute cubes.

Enhance flexibility
Adapt to continuously changing demands for data with flexible provisioning support for multiple protocols and storage tiers in a single storage system.

Improve data protection
Protect critical property information more frequently, with no disruption to geoscientists.

Reduce costs
Increase storage utilization as much as 2x while decreasing space, power, and cooling requirements.

Accelerate time to production by providing geoscientists with the data they need, when and where they want it.

THE CHALLENGE

Provide access to the data that your scientific team needs to make optimal decisions about oil deposition, field characteristics, well placement, and reservoir management.
The changing economic conditions place exploration and production (E&P) operations under more pressure to precisely characterize prospects and existing dormant assets. More than ever, your geoscientists and reservoir engineers are focused on maximizing oil extraction by understanding and exploiting field geological formations. The sophisticated software they run to perform virtual field characterizations and volumetric analysis generates terabytes of valuable intellectual information. As oil-field data mounts into petabytes, data managers need to stretch shrinking information technology budgets. By optimizing information resources, exploration and production managers can improve decision making and companies can begin drilling and pumping faster and more efficiently.

THE SOLUTION

Build your seismic-interpretation and reservoir-modeling data-management infrastructure with NetApp.
NetApp, the innovation leader for storage and data management solutions, has long experience helping the world's top oil and gas producers. The NetApp® unified storage architecture works in concert with seismic interpretation and reservoir-visualization applications including those from leading providers Schlumberger and Landmark, allowing you to:

- Provide high-availability access to critical data for volume analysis.
- Leverage data from legacy and parallel systems to fully characterize a property.
- Support distributed decision making and collaboration.
- Protect and manage valuable property information.
- Reduce overall storage and management costs.

PROVIDE HIGH AVAILABILITY TO SUPPORT HIGH-SPEED VISUALIZATION

Asset teams often combine seismic information from an original survey conducted years ago with data from current operations. Field managers need accurate models of brown field reservoirs in order to make better decisions about drilling and other aspects of operational efficiency as reservoirs mature. Data sets vary in quality, are available on mixed platforms, are generated by various applications, and represent data from different periods in the evolution of the property. NetApp FAS storage systems are designed specifically to address the challenges of high-performance, high-volume

> "After we implemented NetApp, users actually complimented us on performance gains. We estimate that NetApp immediately gave us a 40% improvement. Better performance and better reliability have meant faster time to results."
>
> **Bradley Lauritsen**
> Team Lead, Exploration Computing Department, Apache Corporation

data access applications such as seismic interpretation and reservoir modeling.

FlexVol
When raw storage performance is the key, NetApp FlexVol® technology delivers as much as two times the performance improvement over traditional volumes—without significant upfront planning. You can scale NetApp systems dynamically without interrupting your scientists, allowing the same infrastructure to expand simply and efficiently with increases in analysis and modeling data.

Data ONTAP GX
For even greater acceleration, the Data ONTAP® GX storage management system joins multiple storage systems together into a scalable cluster. You can stripe volumes and files across storage systems for performance that far exceeds that of any single system, all while under a single name space.

ACCELERATE COLLABORATIVE DECISION MAKING

To improve time to production and reduce risk of damage to a property, geophysicists, geologists, petrophysicists, and engineers need to work simultaneously on the same massive data sets. To make the best possible drill-positioning and work-over decisions, all these professionals need to share their interpretation of results and collaborate to form an accurate picture.

Multiprotocol support
NetApp unified storage supports various file-retrieval protocols—CIFS, iSCSI, FCP, and NFS. From one desktop, users can access the same underlying datastores without data migrations, reboots, or reinstalls. Data in any store can fuel GeoFrame, ProSource, ECLIPSE, Petrel, SeisWorks, and OpenWorks. Unified storage eliminates data bottlenecks that prevent engineers from working together and eliminates the capital and management costs of multiple separate storage environments.

FlexClone
NetApp FlexClone® technology allows each user to "clone" a copy of a data set, manipulate it, and save it without placing huge overhead demands on storage infrastructure. As scientists create and change attribute cubes, FlexClone dynamically expands and shrinks volumes on demand. The approach allows users to create as many copies as they need without concern for storage space.

IMPROVE DATA PROTECTION

Comprehensive data protection is imperative to protect your investment in valuable property-characterization data and to enable round-the-clock access. Time lost to unplanned system outages, as well as planned downtime for backups, can slow time to production.

Prevent data loss
RAID-DP® is a double-parity RAID 6 implementation that prevents data loss when two drives fail. We integrated RAID-DP with the WAFL® file system so that dedicated drives do not become a performance bottleneck. You get protection plus the performance needed for your E&P applications.

Eliminate long backup windows and back up more frequently
NetApp Snapshot™ technology allows you to create and save up to 255 instantaneous, point-in-time versions of a data volume; additional storage space is consumed only when you make changes. Meanwhile, the Snapshot version remains completely stable.

You can create a consistent backup of your entire seismic interpretation environment in a matter of seconds, eliminating long backup windows that can keep engineers idle. Because Snapshot backup is fast and efficient, you can perform more frequent backups for greater protection compared to competing products. Should an application become corrupted, you can recover quickly by rolling back to a recent Snapshot copy with NetApp SnapRestore®.

Efficient disk-to-disk backup
NetApp SnapVault® software delivers efficient, disk-to-disk backup to a local or remote secondary storage system.

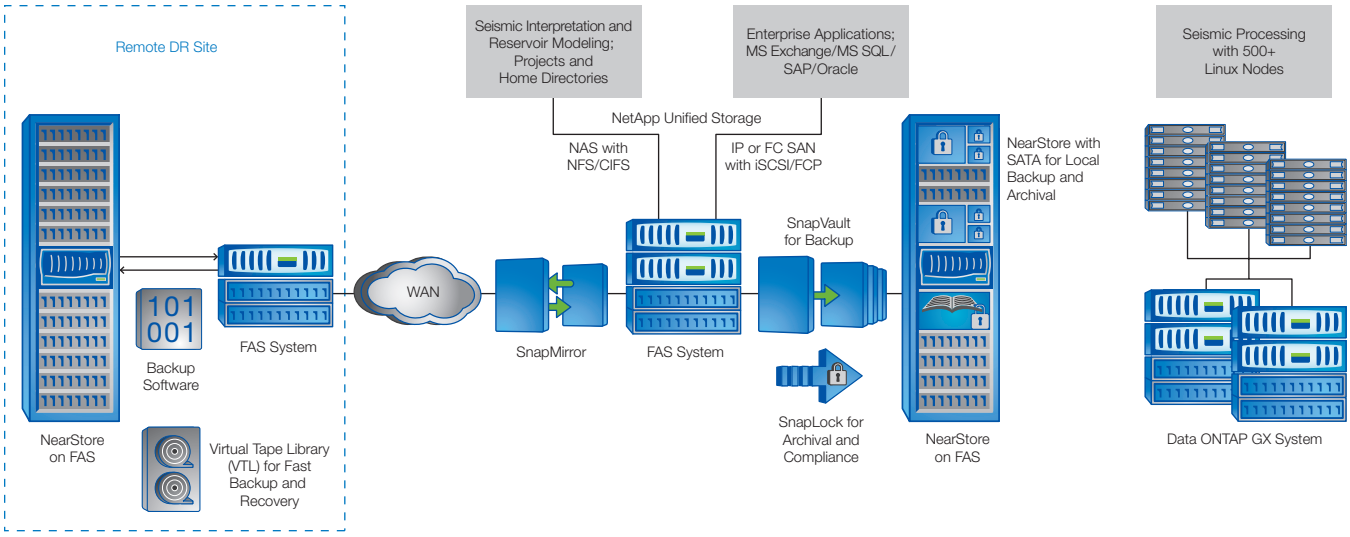

Figure 1) Sample upstream oil and gas environment running NetApp storage solutions.

SnapVault automatically eliminates the duplication that results from other backup methodologies, so you spend less time managing data and keep more backups online longer. And NetApp NearStore® Virtual Tape Library (VTL) brings the advantage of disk-to-disk backup to your existing tape environment.

Simplified disaster recovery
NetApp SnapMirror® technology efficiently mirrors designated data volumes to a remote location for replication or disaster recovery. Our complete suite of cost-effective data-protection tools lets you protect every aspect of your exploration and production operations. Data is always available, so engineers are free to work anywhere in the word and around the clock in order to meet time-to-production objectives.

IMPROVED STABILITY AND HIGH CAPACITY WITH LOWER MAINTENANCE COSTS

Among the top oil and gas producers in the Gulf of Mexico, Newfield was struggling with a complicated and unstable direct-attached-storage system. At any given time, multiple terabytes of storage were scattered across UNIX®, Windows®, and Novell servers. The company chose NetApp because their scientists were clamoring for more storage with no reduction in performance, a demand that the previous system could not meet.

Unifying their entire operation on NetApp has resulted in no storage failures and a simple eight-minute restore from production-server crashes. The entire storage system, which supports 600 users, requires only one-quarter of a person per year to administer. The company has also been able to support engineering demand. On one occasion, Newfield expanded a 500GB volume by 40% in 90 seconds to permit a geophysical process. The company recovered the same space later in the same amount of time. "The NetApp architecture has seamlessly scaled from 6TB to 48TB and then to 84TB," explains Mark Spicer, IT manager at Newfield. "Standardizing on NetApp means that our architecture won't hit a dead end for five or six years."

SCALE STORAGE RAPIDLY TO SUPPORT GROWTH

In another example, Noble Energy, one of the United States' leading independent oil exploration and production companies, doubled its oil and gas reserves in a single year. The company's drilling success is supported by its top scientific staff and by seismic interpretation and analysis. Noble Energy chose NetApp when the company hit the wall with its existing architecture and was looking to provide high availability without a major hardware overhaul. To meet these needs, Noble implemented clustered NetApp FAS hardware. For seismic-data processing, the storage is connected using network-attached storage architecture to make applications run faster. In four years Nobel has grown its storage capacity from 13TB to 750TB with the same number of staff supporting the system today as at the beginning. The NetApp system allows Noble Energy to:

- Scale storage on the fly without interrupting seismic applications.
- Increase uptime by improving data backup and recovery times by as much as 97%.
- Reduce or eliminate the need for incremental storage units to meet storage demand.

REDUCE STORAGE COSTS

Storage virtualization and thin provisioning
By striping data across all your disks in a common pool of storage, FlexVol can as much as double your storage utilization over that of traditional provisioning[1]. Early in an exploration assessment project, space requirements may not be clear—traditional upfront provisioning methods can result in overprovisioning and wasted space. With FlexVol technology, you can thin provision your storage so that multiple volumes share a single pool of free space. You add additional storage only as you need it and avoid the pain of both overprovisioning and underprovisioning.

“Adding storage used to be a major undertaking. With NetApp we added 20TB in literally 20 minutes.”

Dan O’Hare
Technical Computing and Services Manager, Noble Energy

Deduplication
NetApp deduplication minimally impacts performance and allows you to realize greater than 48% disk-space savings for seismic interpretation environments[2]. Deduplication can reduce the initial storage acquisition costs and permits longer intervals between storage-capacity upgrades. The NetApp FAS deduplication feature deduplicates entire volumes without user input and without interrupting processes. Deduplication enables you to reduce the cost of keeping and managing seismic data online because it deduplicates data at the block level. When you copy and change a seismic attribute, NetApp FAS deduplication keeps only the changed blocks stored on disk. Unchanged blocks are referenced back to the original attribute file. No “copied” data is duplicated on disk.

Proven efficiency
NetApp storage makes more efficient use of the resources you have, reducing requirements for physical space, power, and cooling. Recent studies by Oliver Wyman demonstrate that NetApp solutions used 50% less rack space and 52% less power and produce 51% less heat, all while cutting total cost of ownership by 44% for file services, 39% for VMware®, and 35% for archiving, in comparison to other leading vendors.

PARTNERS

For over a decade, NetApp has forged close partnerships to provide the best possible integration with the developers of the leading seismic interpretation and reservoir visualization solutions. NetApp works closely with leading ISVs like Schlumberger and Landmark to develop best practices for our many joint customers, including solutions to help customers move to the latest seismic interpretation platforms.

HELPING YOU SUCCEED

At NetApp, we help you succeed by becoming a storage partner with the solutions, partnerships, and support that free your engineers and designers to focus on innovation.

MAXIMIZE YOUR SUCCESS

NetApp Global Services has years of experience supporting NetApp technologies in the world’s largest upstream oil and gas organizations. Our support engineers understand the unique issues that geoscientists and reservoir managers face and respond accordingly.

1,2 Source: “Optimizing Data Storage and Management for Petrel Seismic Interpretation and Reservoir Modeling,” a white paper for Upstream Oil and Gas Data Managers, by David Lin, Storage Architect, Schlumberger Information Solutions, and Tom Ledoux Global Architect, Energy, NetApp.

NetApp creates innovative storage and data management solutions that accelerate business breakthroughs and deliver outstanding cost efficiency. Discover our passion for helping companies around the world go further, faster at www.netapp.com.

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