Accelerate Exploration and Production With Enhanced Analysis Workflows

Hitachi Storage Adapter for Petrel™

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WHITE PAPER

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Executive Summary

At the heart of today's energy exploration and production efforts is information-rich data from new seismic and imaging systems deployed in the field. Fast and accurate analysis of that data is the key to success. To accomplish this, many organizations use the Schlumberger Petrel platform.

Increasingly, however, the volumes of data are expanding due to higher resolutions and fidelity of data collected in the field. At the same time, turning that data into actionable decision-making information requires sharing the data and analysis results among a team with expertise in multiple disciplines. These factors place new demands on the performance, management and data protection features associated with the underlying IT infrastructure.

The Hitachi Storage Adapter for Petrel solution addresses these issues and lets organizations use Petrel in new ways. Collaboration is easier and workers can easily checkpoint their projects, quickly create versions of their work, move between versions and restore past work projects. They can effortlessly conduct what-if analysis, evaluating many varied scenarios.

Introduction

As demand for energy grows globally, there are increasing demands to discover new resources. New seismic and imaging technologies help. However, the vast volumes of data that such technologies generate require intelligent management of data. They demand fast interpretation to support timely decisions to advance or abandon work on a particular asset.

Figure 1. Petrel Screen Capture
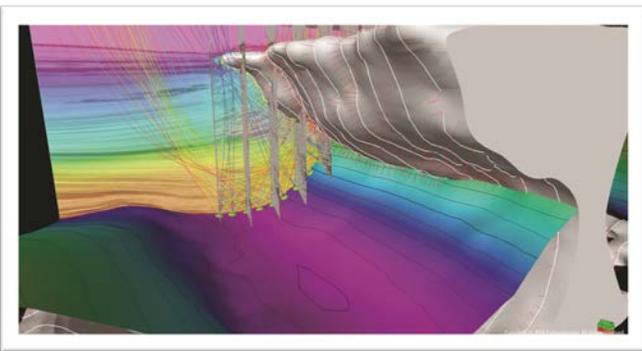
Simply put: The oil and gas industry is data-driven. The industry depends on information technology to increase the speed and success rate of finding new energy sources and in enhancing oil and gas production. As such, there is a need to accelerate and sustain energy exploration and production analytic workflows in order to keep pace in today's competitive and fast-moving marketplace.

As a result, exploration and production success typically depends on the iterative analysis and interpretation of large datasets by a collaborative team of different subject matter experts. Efforts by such multidisciplinary teams require timely access to those datasets and an assurance that the business-critical data and its analyses are protected and well managed.

Today, many companies use the Schlumberger Petrel platform to drive exploration and production efforts. With Petrel, workers with expertise in geophysics, geology, geological modeling, reservoir engineering and drilling can conduct work in a Microsoft® Windows® desktop environment. There, individually, or together, they can analyze and model data from the field to make more informed decisions with a clear understanding of both opportunities and risks (see Figure 1). The results make the software one of the most widely used in the industry.

Enhance Your Petrel Experience With Hitachi Storage Adapter for Petrel

Advances in seismic imaging and analysis tools are helping organizations reduce interpretation times and increase the number of potential new hydrocarbon discoveries. However, there are challenges.

Increased compute processing power has enabled organizations to handle increased data complexity and more sophisticated geophysical algorithms. Additionally, thanks to high definition changes in field geometries such as Wide Azimuth (WAZ) and Circular Shooting, seismic datasets have grown exponentially and will continue to grow well beyond the exabyte range.

These factors taken together place new demands on the performance, management and data protection features associated with storage systems. Additionally, the way exploration and production work is carried out today has undergone a change that can compound potential problems. Much more of the work done to support exploration and production is now team-driven, requiring the shared knowledge of individuals with expertise in different disciplines. The work must be done in a faster time frame to offset growing costs. And the ever-growing array of regulatory requirements makes the process more complex and requires the preservation of more information. Thus, adding to the increased volumes of data that must be accommodated.

A solution that addresses these issues will improve the end-user experience and help ensure analysis workflows run efficiently, hastening the time to results, and optimizing the derivation of decision-making information.

This desired scenario is an area where the Hitachi Storage Adapter for Petrel solution helps.

Enhance Your Petrel Platform Use

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Those familiar with the Schlumberger Petrel platform know that Schlumberger is committed to providing open, extensible software platforms. Its Ocean development framework provides extensibility (see Figure 2). Using this framework, partners can develop plug-ins to the platform.

Figure 2. Ocean-Extensible Architecture
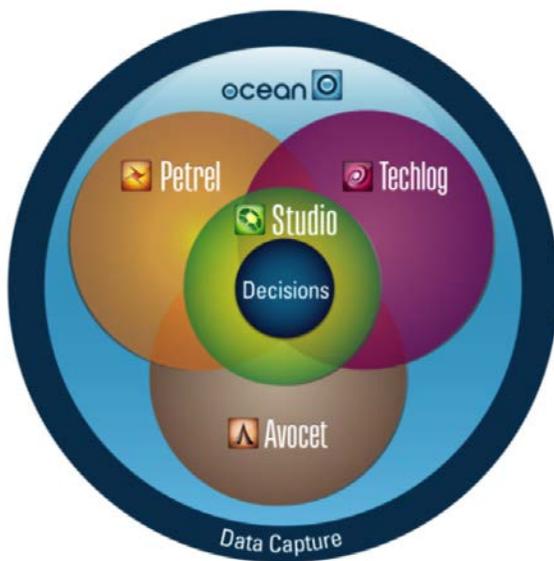
For years, Hitachi Data Systems (HDS) storage solutions have been used with Schlumberger software platforms. Together, they help energy industry companies address storage challenges, improving analysis workflow performance, and helping with data management and protection. The Hitachi Storage Adapter for Petrel builds on the efforts of HDS in the field.

In particular, the plug-in improves the Schlumberger Petrel user experience in several ways.

First, Improve Collaboration

With Schlumberger Petrel, data may reside on each user's desktop. Data locked in applications on the desktop cannot be shared efficiently. The Hitachi Storage Adapter for Petrel transparently synchronizes locally stored data with a central Hitachi NAS Platform HNAS) storage system while providing the performance comparable to that of local disks during the analysis. This strategy allows multiple people, with expertise in different aspects of exploration and production work, to have easy access to the same data. This ability to support a workgroup environment is ideal for today's investigations and explorations.

To that point: The plug-in software enables collaborative computing and secure access to data. These capabilities allow geophysicists, geologists and reservoir engineers to develop collaborative workflows and integrate operations to streamline processes. These achievements, in turn, improve an asset team's productivity, shortening the time required to derive critical decision-making information.

**Second, Make It Easier to Examine More Scenarios**

The adapter allows an end user to quickly make a full working copy, called a version, of his or her current work. That copy can then be used to examine one scenario while a different exploration scenario can be pursued using the original version. Additional versions can be created or nested at any time and stored in a tree structure that intuitively shows the relationship between the different versions (see Figure 3).

Figure 3. Example of the Tree Structure of Versions

While end users can move back and forth between different scenarios without the adapter, the underlying virtualization technology used in the Hitachi Storage Adapter for Petrel offers much greater flexibility. Without the adapter and using standard "snapshot" technology, a step back to a previous work point results in the loss of the newer work. With the adapter, a person can start at any previous point that was saved and then branch off to explore new scenarios using the same data as the initial version.

This capability allows anyone in a group to select a common starting point in an investigation and perform "what-if" analysis from that point without impacting the user's previous work.

From an end user's perspective, the entire versioning process is transparent. With functionality comparable to doing a "save-as" with a project, Hitachi Storage Adapter for Petrel software works in the background handling the required chores. The process is rapid and efficient, ensuring that workers do not lose valuable time or use twice the space while waiting for data to be replicated or saved. Such collaborative and fast what-if capabilities help drive increased efficiencies across a business.
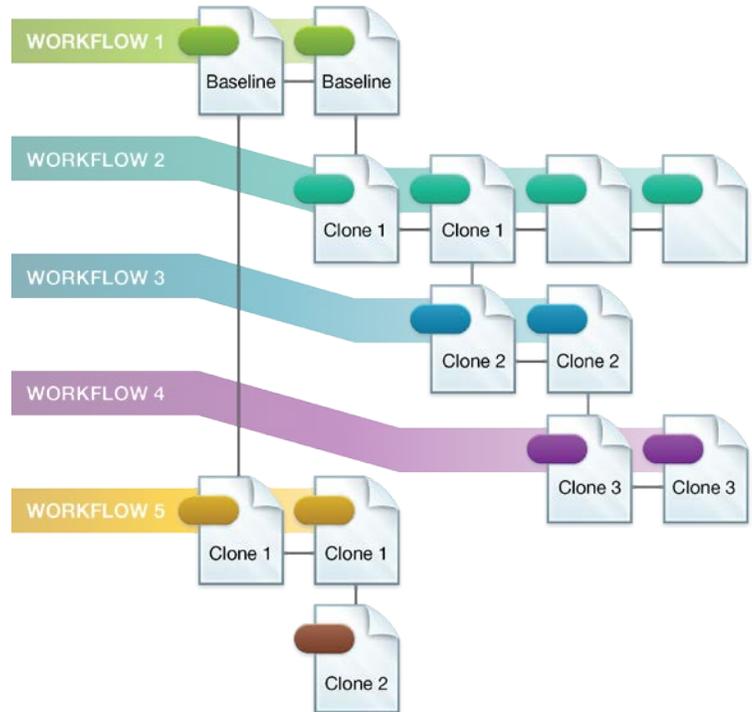
Third, Employ Ideal Capabilities in a Workgroup Environment

As noted earlier, saved work is no longer stored on an end user's desktop when using the adapter and HNAS platform. Instead, work is synchronized to a central storage system.

This approach allows anyone in a workgroup with the right permissions to view, use and access the work underway or any one of the versions of a project.

Organizational and IT Benefits Abound

Hitachi Storage Adapter for Petrel helps workers easily collaborate, and its versioning capability makes it easier to explore and move between different what-if scenarios. Beyond these benefits for those using the Schlumberger Petrel Platform, the HDS solution can help with organizational and IT issues.

Hitachi
Storage
Adapter
for Petrel
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Increased Agility

The ability to work with more versions, easily moving back and forth between different scenarios, all while having centralized data backup and recovery handled automatically, enables a different way of using Petrel. Organizations can examine more what-if scenarios in shorter time frames, all with the assurance that the data and project work is safely retained for further examination and analysis. As a result, organizations can make faster and better decisions, which aids in improving the success rate of finding oil and gas.

With data and projects synchronized to a central storage solution, more people with different areas of expertise can have access to critical data in their joint exploration area. In contrast to a single end user retaining his or her work on their desktop, this shared access capability lets organizations leverage expertise across an entire organization. Again, this approach can help improve the decision-making process, leading to more intelligent choices in where to drill or cease operations.

Lower Costs

From an IT resource perspective, Hitachi Storage Adapter for Petrel offers several extraordinary benefits. To start, when making clones of work, a traditional storage solution would simply save the entire data volume for each clone. This will greatly increase the amount of storage needed, as an extra copy of each dataset would be saved every time a clone was created.

Hitachi Storage Adapter for Petrel instead uses a virtual disk technology to reduce the amount of data that must be saved. When cloning, each project that is created results in a virtual disk being generated (see Figure 4). The container file does not include the entire file system, only the specific project the end user is working on.

Figure 4. Space-Efficient Clones

VHD = Virtual Hard Disk.
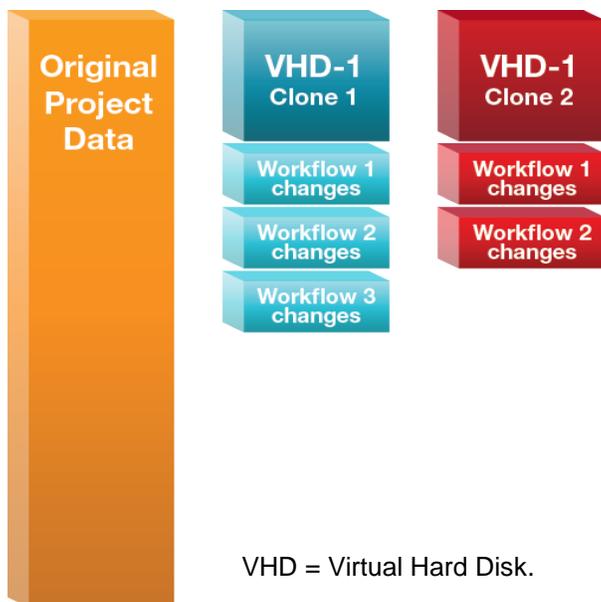
Specifically, each container (1 for each project) only has pointers to the shared blocks of data from the original version. As an end user works on a particular version, only unique data to that version is added to the respective virtual disk.

This approach greatly reduces the amount of storage required when working with multiple versions and scenarios. In fact, a single file system can hold thousands of container files, which would not be possible if a separate set of the original data were saved with each version. As a result, an organization can undertake more projects with existing resources.

Time Savings

An additional advantage of using the cloning approach is that workers can rapidly checkpoint a project and create a new version. They can quickly move between different versions of their work, and rapidly restore any saved version much faster than opening a regularly saved project data set. These quick steps allow teams to carry out more work in a given time, compared to approaches that rely on saving and recalling entire datasets.

The adapter exploits timesaving features of Hitachi NAS platform. HNAS storage solutions use acceleration technologies such as an FPGA offload engine to speed data transfer from the storage device to a user's workstation. The solution also uses high-performance object-based replication technology to speed other processes.

Built-in Data Protection

Given the competitive differentiation organizations derive from their analyses and interpretations using the Schlumberger Petrel platform, data associated with projects must be backed up and capable of being quickly restored. Hitachi Storage Adapter for Petrel working with an HNAS solution provides advanced data protection features, including data tiering, as well as backup and recovery.

To this point, integrated data management features such as policy-defined tiering and data deduplication offload the performance of common tasks from the user or IT department. Workers performing analyses or those interpreting the results can focus on their areas of expertise. IT shores like data migration for sharing, backup and recovery, and other data management tasks are handled in the background.

The Power of Hitachi NAS Platform

Hitachi Storage Adapter for Petrel solution for Schlumberger Petrel used with HNAS solutions offers several benefits when working with today's large energy exploration datasets.

HNAS systems (see Figure 5) are scale-out storage solutions that let organizations quickly and cost-effectively add storage capacity without impacting performance. The HNAS cloning technology allows workers to create many versions of their Petrel projects, enabling thousands of what-if scenarios to be hosted on a single system. This approach reduces data management tasks, as end users will be able to access different versions over time without the need for IT intervention.

Figure 5. HNAS Systems

HNAS solutions help optimize storage, enabling organizations to get more out of existing resources. In particular, built-in storage virtualization and dynamic provisioning make more efficient use of

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storage resources. This efficiency allows end users to save more versions of their work in a smaller space. For example, without dynamic provisioning, a large volume of disk space would be associated with each new version of work. If the particular project did not use the entire allocated capacity, it would still not be available for other uses. Therefore, raw storage disk space is used inefficiently. Dynamic provisioning lets administrators use data volumes as needed.

Built-in deduplication in an HNAS solution again helps make more efficient use of installed storage capacity. In particular, HNAS offers fast, nondisruptive deduplication that supports up to 4 high-speed deduplication engines. The solution eliminates redundant data, reducing the need to purchase more capacity (see Figure 6). Bottom line: With deduplication, an HNAS solution can accommodate even more Petrel project versions.

Intelligent tiering enables policy-based data migration within the system to different drives. This capability allows more efficient use of resources, ensuring the right data is on the highest performance drives for optimized analytics workflows. At the same time, it allows other data to be moved to more cost-effective storage.

Figure 6. Deduplication
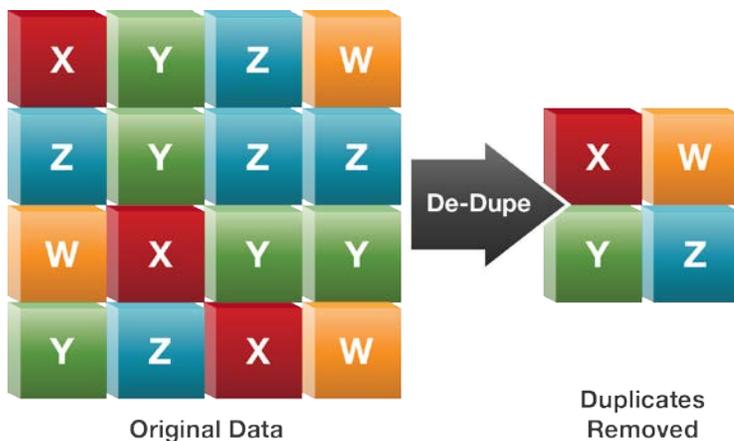
Additionally, HNAS solutions offer the sustained, high I/O and throughput needed in the analysis and interpretation work, using Petrel. By using an FPGA-based offload engine that accelerates data transfer speeds, end users will see their versions saved or opened and loaded quickly. Thus, more work can be done in a day.

The combined features of HNAS make the solution ideal for oil and gas exploration and production organizations. The solutions are backed by the Hitachi Data Systems global support capabilities. Worldwide support is delivered locally, and is offered anywhere across the globe. Furthermore, HDS is part of Hitachi Limited. As such, organizations can get full systems solutions, including storage, servers, infrastructure and more, in a tightly integrated offering from 1 provider.

Summary

The widespread use of the Schlumberger Petrel platform in oil and gas exploration and production environments means that organizations need a differentiator to stay ahead of the competition.

Hitachi Storage Adapter for Petrel solution lets organizations use Petrel in new ways. Collaboration is easier. Workers can easily checkpoint their projects, quickly create versions of their work, move between versions and restore past work projects without eliminating current workflows. They can effortlessly conduct what-if analyses to evaluate many varied scenarios.

Much of the technology that helps accelerate analyses and interpretations is transparent to the user. At the same time, the solution uses cloning and virtualization techniques to efficiently save work, while preserving storage capacity. The result is more work can be done in a given time using existing resources.

This improvement is essential as new seismic and imaging technologies are producing ever-growing volumes of data that must be analyzed and interpreted. Oil and gas exploration and production organizations seek to take advantage of such data to gain a competitive edge and lower risks. To do so, they need robust and efficient solutions optimized for handling the large volumes of precious data involved.

Naturally, choosing a technology partner to handle the data used in oil and gas exploration and production is a critical decision. Hitachi Data Systems has a long history working in the energy exploration field. We offer storage solutions for the oil and gas industry designed to address the industry's performance and I/O storage challenges. Furthermore, our HNAS solutions are designed to deliver increased efficiency with high availability, reliability and higher performance.