

Technical Case Study

Deploying Remote Visualization for Geology and Geophysics

Graphics-accelerated FlexPod solution enhances productivity, mobility, and data security for Laredo Petroleum

Laredo Petroleum, Inc.

is an independent energy company with headquarters in Tulsa, Oklahoma. Laredo focuses on the acquisition, exploration, and development of oil and natural gas, primarily in the Permian Basin of West Texas.

The oil and gas industry is a cyclical business with prices subject to many factors, including worldwide economic and political conditions. To be successful, companies such as Laredo have to be able to operate efficiently in both the slow periods and during times of rapid expansion. Current oil market trends provided Laredo an opportunity to invest in improvements in application infrastructure. This helped the company reduce costs and better leverage available resources, while providing a greater ability to expand to support future growth.

Rearchitecting Application Infrastructure for Greater Efficiency and Better Results

Laredo needed to reduce the cost of the infrastructure supporting critical petrotechnical applications—in particular Schlumberger Petrel—while enhancing the company's ability to execute quickly. It previously relied on desktop workstations, which were expensive both to own and to operate. Maintaining workstations in multiple, dispersed locations was a significant challenge.

Workstation performance was often an issue, requiring expensive upgrades. Because datasets continue to grow, data access had also become a bottleneck. Users frequently copied important seismic data from the data center down to their workstations. With the traditional environment, valuable data remained on workstations for long periods, increasing the potential risk of data loss. In addition, Laredo needed a strategy that allowed users to work from any location: the Tulsa headquarters, the Midland office, or in the field.

A Custom FlexPod Solution for Remote Visualization

To solve these challenges, Laredo turned to a remote visualization solution from partners Schlumberger, NetApp, and Cisco. A 3D graphics-accelerated FlexPod® VDI solution (3D-VDI FlexPod) was proposed in the initial meeting that would allow Laredo to host all infrastructure and data in its data center and send graphical output to users wherever they happen to be, simplifying management and reducing capital and operating costs. After Laredo saw a live demo, it was sold on the virtual desktop infrastructure (VDI) approach and moved very quickly to complete the system purchase.

The 3D-VDI FlexPod configuration addresses the critical need for secure, remote 3D access to geology and geophysics applications and data for dispersed, cross-disciplinary teams, improving collaboration and accelerating decision making, without the impact of traditional workstations or the associated performance degradation.

By combining validated, best-in-class technologies—Petrel software from Schlumberger, servers and networking from Cisco, storage from NetApp, and VMware vSphere for virtualization—the team designed a complete virtual desktop solution with proven 3D visualization capabilities and the ability to scale rapidly to address future requirements.

Based on the FlexPod Datacenter design, the 3D-VDI FlexPod configuration meets the demanding requirements of upstream oil and gas workflows. The solution:

- Makes remote visualization available where and when it's needed, including on mobile devices
- Eliminates the infrastructure challenges created by ever-growing datasets
- Improves collaboration by allowing results of visualization to be shared across geographic and organizational boundaries
- Keeps datasets secure in the data center

NetApp All Flash FAS Accelerates I/O

A NetApp® AFF8040 configured with 24 400GB flash solid-state disks (SSDs) provides Laredo with the necessary I/O performance for remote visualization in conjunction with Petrel and other demanding geology and geophysics applications.

Advanced data reduction features, including inline deduplication and compression, make efficient use of flash storage capacity. Enabling data reduction on Laredo's VM datastore reduces the total storage requirement by 45%. NetApp's integrated data protection software facilitates backup, replication, and other data management functions.

Cisco UCS and Cisco Nexus Support Compute, Networking, and Graphics

Cisco UCS unites computing, networking, storage connectivity, and virtualization in a single cohesive system incorporating advanced security features. The 3D-VDI FlexPod configuration was initially configured with two Cisco UCS C240 M4 rack servers featuring extended memory for faster rendering, bigger datasets, and low latency.

Cisco UCS integrates computing resources with Cisco Nexus 5548 switches and a unified I/O fabric, which identifies and handles different types of network traffic, including storage I/O, streamed virtual desktop traffic, management, and access to geological and geophysical applications. The fabric is designed to scale so that Laredo can add servers and support more users quickly as its business expands.

NVIDIA GRID Provides GPU Power

Each Cisco UCS server is configured with two NVIDIA GRID K2 boards. NVIDIA GRID provides a highly responsive experience for Petrel and other demanding 3D graphics applications on any device, even tablets.

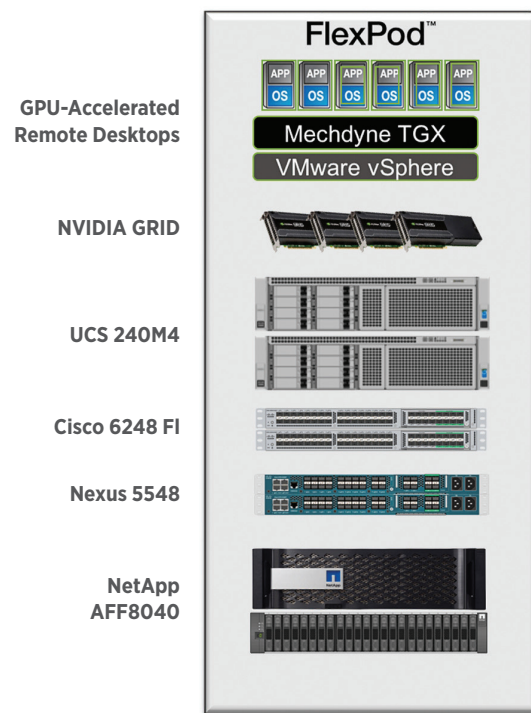


Figure 1) Laredo's 3D-VDI FlexPod configuration combines the I/O performance of all-flash storage with scalable Cisco computing and network technology to deliver remote access to 3D data and applications.

The NVIDIA GRID K2 features two high-end Kepler-based GPUs with a total of 3,072 CUDA cores. Because there are two cards per server and each card provides two GPUs, the two servers initially configured gave Laredo the graphics horsepower to support a total of 8 Petrel seats simultaneously. Each Petrel user is allocated the resources of an entire GPU.

Mechdyne TGX Delivers 4K Graphics Output

TGX software from Mechdyne supports virtual desktops and remote visualization using the latest 4K Ultra HD graphics. TGX redefines the remote desktop experience and unleashes the full potential of VDI for the most demanding users, delivering a like-local end-user experience regardless of location, dataset size, or display configuration.

TGX's intuitive interface provides users an optimal experience without overloading IT networks. This includes support for multiple collaborators with performance optimized to the characteristics of the network connecting each user. A user connected through a slow network does not affect the experience for other users.

TGX uses network bandwidth very efficiently. A 2,560x1,600 display can be supported at a full 24 frames per second with about 14Mbps bandwidth.

Substantial Performance Benefits for Petrel Users

With the new 3D-VDI FlexPod system in place, one of the first orders of business was to assess performance. Geoscientists were surprised to see that centralized infrastructure delivered performance that far exceeded that of their existing workstations.

The time required for various operations to finish had been a big point of frustration. With the FlexPod solution, a small geophysics ant-tracking project opened 48% more quickly, while a large geology project opened in one-third the time, saving a full four minutes. Creation of a 3D window was also 300% faster, reducing wait time from two minutes to just 30 seconds.

Tests of copy performance showed that the AFF8040 could effectively saturate the 10GbE network connection, moving data at almost 1GBps. The AFF8040 has enough bandwidth to saturate several 10GbE networks.

Laredo has an older FAS model with SATA storage in place to store all its existing geology and geophysics datasets. Based on the observed performance of the AFF8040 used in the FlexPod configuration, the team is already contemplating migrating some of the bigger projects to CIFS shares on the new platform to take advantage of its performance.

According to Lars Crotwell, Vice President and CIO at Laredo, "The FlexPod VDI solution has greatly improved access to seismic datasets and geoscience projects, accelerating important workflows and saving valuable time."

Another advantage for Petrel users is a greater ability to multitask. Long-running jobs used to tie up desktop workstations. With the FlexPod configuration, a user can launch a resource-intensive process, minimize the window, and start another session to continue doing productive work, while monitoring the progress of the first process as needed. Users can check the progress of a running session from any location. For instance, they can monitor the progress of jobs kicked off during the day from a laptop when they get home.

The 3D-VDI FlexPod solution also makes life easier for Laredo's technical staff. Because they no longer have to support specialized workstations at every user endpoint, they can focus more attention on data management and adding new services.

Ability to Work from Anywhere

The remote visualization solution gives Laredo's geoscientists more flexibility to access data and see results from wherever they are working. It's even possible to see output on tablet devices.

As Laredo expands its staff of geoscientists, it has the technology in place to better support its team with rapid deployment of remote desktops and easy collaboration. Laredo sees itself becoming a leader with this approach to geoscience applications.

Better Control of Critical Datasets

As important as the performance and mobility gains are for productivity, another big advantage of the 3D-VDI FlexPod solution is that it allows Laredo to gain better control over critical data and eliminate potential risks. Laredo's datasets are growing in size, just as they are throughout the oil and gas industry. Users have grown accustomed to making a local copy of data on their workstations to avoid network bottlenecks. This leads to two negative results: data is widely distributed, and analyses based on the data are stored on workstations without being backed up. Both are substantial risks.

With the 3D-VDI FlexPod solution, data never leaves the data center, allowing Laredo to centralize all data and results in one location, where it's much easier to manage and protect. Laredo is able to enforce IT security standards from end to end, and the physical security of workstations is no longer an issue.

Because the data center has faster networks than the desktops, concerns about network bottlenecks have been eliminated. NetApp SnapMirror® will allow Laredo to replicate VDI data from the FlexPod configuration to its older FAS system for data protection and disaster recovery.

Centralizing data also eliminates the data quality and integrity challenges that result from having too many modified copies and having to search among them to find a single source of truth. Even if a user copies data, that data remains on the FlexPod configuration inside the data center, where it is secure and backed up regularly. Only the graphical output is sent to the user's display device, and nothing is ever cached locally, so valuable and potentially sensitive data remains secure.

In the past, a workstation going offline might mean that important data was unavailable. The 3D-VDI FlexPod solution has no single points of failure and resides in a data center with uninterrupted power, so it's much less likely that critical results will be unavailable when a decision has to be made quickly.

A Partnership for Success

For Laredo it was important to forge a strong relationship with its technology partners. Schlumberger worked closely with NetApp and Cisco on the design and testing of all the components, validating the solution to make sure it met all the requirements of Petrel and other Schlumberger applications to meet the needs of Laredo's geoscientists now and in the future.

Schlumberger provides direct support to Laredo on the entire solution stack, both hardware and software, so if any questions or problems arise, the Laredo team has a single point of contact for support. A cooperative support agreement gives Schlumberger direct lines of communication with NetApp, Cisco, and other partners to facilitate speedy problem resolution.

Product List

3D-VDI FlexPod Datacenter with:

- Cisco UCS C240 M4 rack servers
- NVIDIA GRID K2 dual-GPU boards
- Cisco Nexus 5548 switch
- Cisco 6248 Fabric Interconnect
- Cisco UCS Manager
- NetApp AFF8040 with 24 400GB SSDs
- NetApp deduplication and compression
- NetApp OnCommand® Unified Manager
- VMware vSphere
- Mechdyne TGX

FlexPod Advantage

With the FlexPod Advantage initiative, NetApp and Cisco are helping customers accelerate the journey to a modern data center. The featured solution is FlexPod with NetApp All Flash FAS storage, Cisco UCS servers with the latest M4 processors, and Cisco Nexus 9K switches with Application Centric Infrastructure (ACI).

About Cisco

Cisco is the worldwide leader in IT that helps companies seize the opportunities of tomorrow by proving that amazing things can happen when you connect the previously unconnected. For ongoing news, please go to <http://thenetwork.cisco.com>.

Cisco UCS, which unifies computing, networking, solid-state application acceleration technology and systems management into a single integrated architecture, has received strong support from customers since entering the server market five years ago.

About Schlumberger

Schlumberger is the world's leading supplier of technology, integrated project management, and information solutions to customers working in the oil and gas industry worldwide. Employing approximately 105,000 people representing over 140 nationalities and working in more than 85 countries, Schlumberger provides the industry's widest range of products and services from exploration through production.

About NetApp

Leading organizations worldwide count on NetApp for software, systems and services to manage and store their data. Customers value our teamwork, expertise and passion for helping them succeed now and into the future.

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