White Paper

Oil & Gas Industry Data Storage and Solutions

As anyone involved in the exploration and production of oil and gas knows, computing has become ubiquitous. Virtually every facet of the industry leverages advanced computer technology of one sort or another. Whether it is embedded computers in drill monitoring devices, or the high performance computers used for analyzing seismic data, to the web browser used for retrieving well data, and the accounting software used for keeping track of leases, computers are everywhere. As a result, the amount of data stored and in use by Oil & Gas firms is growing exponentially[1]. To effectively manage, use, and quickly access this data, companies require a proven, enterprise-reliable data storage partner. With its diverse range of products, LSI has the experience, unique storage DNA and technology expertise to be that partner.

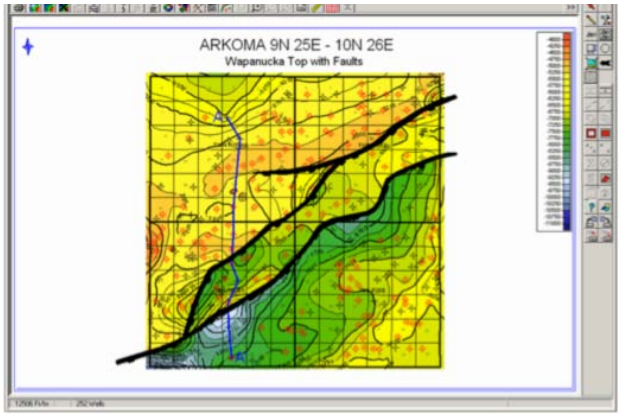
Data Storage Challenges

Starting with exploration, the geologist looks at historic well data, maps, electric logs, and seismic data. The landman needs detailed lease maps and descriptions. The engineer needs historical along with current well and field data. The accountant needs to track cost basis for all of these highly diverse items. Often this data is not in digital format. This can make retrieval difficult and time consuming and result in lost productivity. Because of this, many organizations are converting data into digital formats so it can be more easily manipulated and more quickly accessed. As well, data must be secure and stored safely for long periods of time.

Of course, the necessary geologic data may not be available for a potential field. In this case, the data needs to be generated. Seismic surveys can produce huge amounts of data. Not only must the data be captured at high bandwidth, but it must also be processed into a usable form at high bandwidth. All of that processed data must then be accessible at high bandwidth for 3D displays on computer monitors, where the operator can pan, zoom, rotate, and analyze the data in real time.

Because technology is constantly evolving, there are always new capabilities and new ways to reprocess previously captured seismic data. This will often result in multiple renderings of the same large data set being maintained, and a need for lots (petabytes) of data storage space.

All the computing and storage equipment now required to meet the challenges in the industry are pushing the data center limits for power, cooling, and floor space. It is not unusual for some large data centers to require 3 to 5 megawatts[2]. As you might expect, the need for power and floor space will only increase. The more power necessary, the more cooling required. And the more floor space you have, the greater the volume of air you must keep cooled. Just keeping a data center supplied with power and cooling can be very expensive. Add to that the cost of building and maintaining a data



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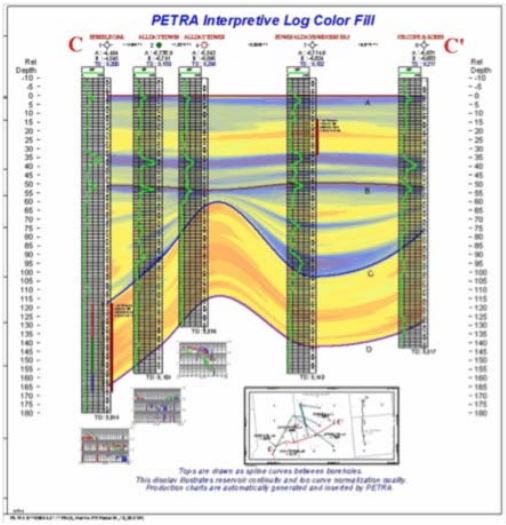
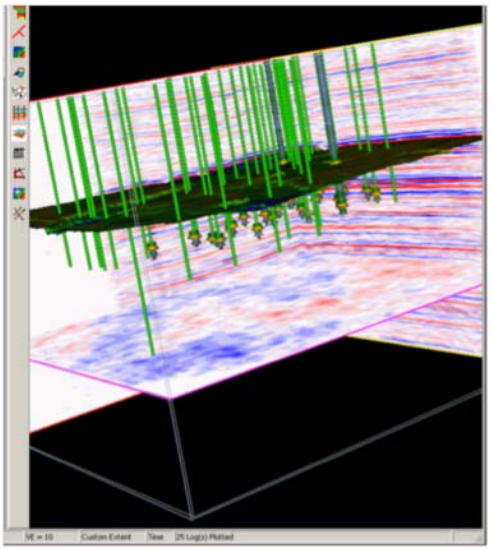
1. (The ROGTEC Team, 2009)
2. (Johnson, 2009)





center facility, and it is easy to see why data center managers keep a watchful eye out for ways to make the most efficient use of their resources.

Included in the challenge of faster results facing the oil and gas industry is meta-data… essentially, data about the data. Meta-data are bits of information such as the type of data (e.g. is it an image, a map, 2D seismic, 3D seismic, lease information, etc.?), the amount of data (e.g. the size of the file or files containing the data), the date the data was obtained, the location for which the data has information (e.g. East Texas Oil Field), etc. It is the meta-data that is reviewed in order to find the data of interest. Meta-data presents an interesting challenge to storage arrays because it is contained in files that are much smaller than the files containing the actual data. Many storage arrays perform better with either small files or large files, but usually not both.

Data centers change and evolve to gain competitive advantage and typically companies do not buy all of their computer equipment at one time and of one type. Computers are usually bought in bundles to service the needs at the time of purchase. Each of these bundles is often of different makes and models creating a challenge of interoperability and manageability. Some storage arrays only work with certain operating systems and certain brands of equipment. So, storage arrays that are compatible with many different types of computing equipment protect investments, simplify, and save money.

All data isn't accessed with the same frequency. For example, when a geophysicist is in the process of analyzing a field for production, he will access the data related to that field, while data related to other fields is not used. All data storage doesn't perform and cost the same. The higher performing storage will cost more. In light of this situation, it makes sense to put frequently used data on the higher performing storage and the least frequently used data on the lower performing storage. This is called storage tiering.

The oil and gas industry requires data storage for a complex and diverse group of professionals. This industry must have quick and consistent access to data for geologists, geophysicists, engineers, landmen, accountants, lawyers, and field personnel. Additionally, each of these professions has more specific working categories, such as, reservoir engineers, drilling engineers, operations engineers, and environmental engineers. All of whom need seamless access to a myriad of data formats. LSI excels by providing storage solutions that are ideal for this dynamic industry.

Solutions

Computing can't happen without data. With the speed of today's computers and the large number of processors in today's computers, lots of data needs to be available very quickly in order to make the most efficient use of the equipment.

At LSI, we are proud of our long-standing reputation for superior high-performance storage technology for data-intensive, multi-vendor environments. Our storage systems are the culmination of a deep storage heritage combining mature architectures, intelligent designs, and feature-rich software into solutions designed specifically for open systems.

LSI arrays are all capable of "real-world" performance that is equally adept at satisfying transaction-heavy and bandwidth-intensive applications. LSI engineers understand that most customers' data does not consist of just one type of data. We design our arrays from the ground up to service demands for meta-data as well as the large files used in applications like 3D seismic analysis. A single LSI flagship array is capable of providing meta-data-size files at 700,000 I/O's per second and large files at 6.4 GB/s. To interpret those numbers for the non-technical readers: that is blink of an eye fast.

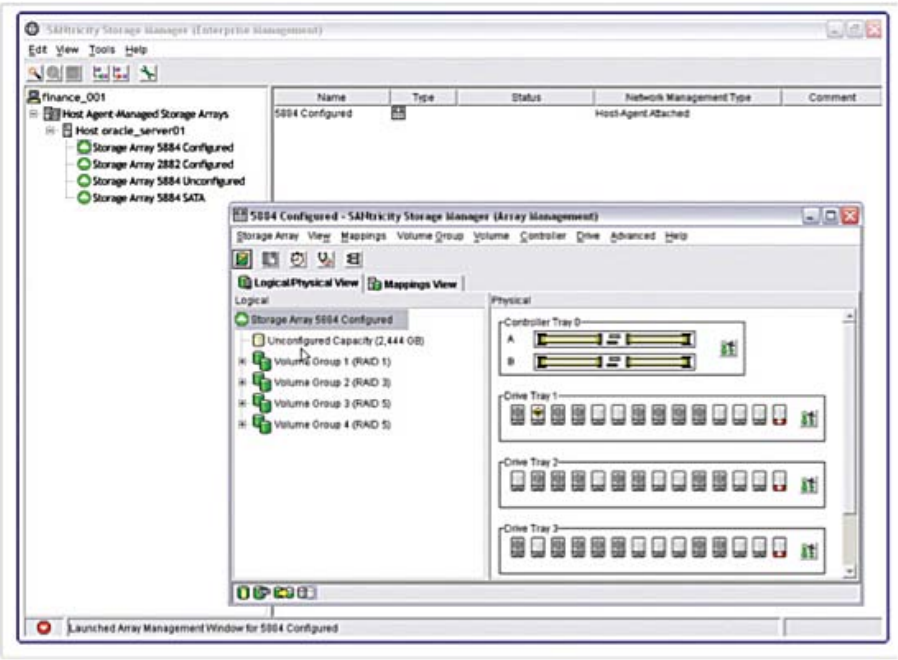
LSI has a broad range of products at a broad range of prices. This will enable the user to set up tiered storage, where the most frequently used data is available on the highest performing and most expensive equipment. Less frequently used data can be placed on lower cost, high-capacity storage where it can still be quickly accessed, but at a somewhat lower performance level. Additionally, LSI supports intermixing high-performance and high-capacity disk drives in the same array to enable a single storage system to satisfy primary and secondary storage requirements.

LSI partners with world-leading OEM computer vendors who resell our storage. Because of that, our arrays are tested and integrated with a wide range of hardware and software. The user can rest assured that our arrays will work well with the widest set of computer equipment in the industry. No matter what computer equipment you have or plan to buy, it is highly likely LSI gear has been tested with it.

If you can't access your data, the most expensive storage array in the world has no value. That is why LSI has built in features on all of its arrays to ensure high availability. Features such as fully-redundant I/O paths, automated failover, hot swappable components, and online administration create "always-on" availability to keep your data accessible.

The key to getting the most out of storage is the software that manages it. LSI SANtricity® Storage Manager software assures complete control over the storage environment with a powerful, yet simple to use management interface for administering LSI storage. This feature-rich software is used to add capacity, configure new volumes, define mappings, tune performance, and handle routine maintenance, all without interrupting user access, so productivity never stops.

In order to reduce the expense of on-going costs in data centers, LSI offers an optional drive enclosure that supports up to 60 drives in a 7" height. These high density enclosures enable the user to reduce the footprint of storage in the data center which in turn enables cost savings. The high efficiency power supplies in the enclosures mean more cost savings due to lower power requirements and less waste heat.



SANtricity® Storage Manager

When a pair of LSI's 2600 controllers is installed into the 60 drive enclosure, it becomes a 2600-HD (High Density). Each 2600-HD is capable of reading data at over 4 GB/s. When 3 TB drives are used, the enclosure can contain 180 TB of data. The DenseStak Solution is ten of these enclosures placed in a standard 40U rack. The rack is capable of 40 GB/s across 1.8 PB of data. This is simply incredible performance with excellent density.

Conclusion

The issues related to data storage in the oil and gas industry can be challenging. However, with the proper equipment, companies in the industry can improve productivity across the many application areas in use today and gain a competitive advantage. LSI can supply the data storage equipment needed to meet the needs of the Oil & Gas industry.

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The ROGTEC Team. (2009, September 1). Oil & Gas News. Retrieved April 27, 2010, from ROGTEC: http://www.rogtecmagazine.com/2009/09/data-storage-and-retrieval-in-russia.html

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lsi.com lsichannelgateway.com

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