Total Accelerates New Energy Field Exploration and Development

SGI Produces 3D Images of Oil & Gas Below Earth's Surface to Enhance Research with Lower Energy Costs

Key Facts

Organisation: Total

Location: France

Industry: Oil & Gas

Business Overview

Total S.A. is the fifth largest publicly-traded integrated international oil and gas company in the world. The company operates in more than 130 countries with exploration and production capability in over 50 countries. Total has both upstream operations (oil and gas exploration, development and production, LNG) and downstream operations of refining, marketing and the trading and shipping of crude oil and petroleum products.

Total has a retail network of nearly 14,725 service stations through which it sells approximately 3.4 million barrels of petroleum products per day. Its international brands include TOTAL, Elf, Elan and AS 24.

Total E&P (Exploration & Production) is an expert at bringing on stream highly complex oil and gas fields which can require multiple sites to be operated over many years. Technological innovation – wells drilled several kilometres deep to reach geological layers a few meters thick, production equipment installed on the ocean floor and operated remotely by onboard electronics – is pushing back the boundaries and countering the natural decline in production from mature fields.

Challenges

The era of 'easy oil' is over. The challenge is to identify more complex prospects and optimize their development to build profitable projects.

Total E&P is constantly increasing its understanding of how oil and gas reservoirs are formed. Seismic imaging technology is enabling its geophysicists to locate new targets deep within the Earth's crust.

The available data comes from seismic campaigns, in which seismic vibrations are generated. These waves are then reflected back to the surface by the geological layers they encounter. The vibrations are then caught by sensors producing millions of pieces of data. The challenge is to turn this raw data into useful information within workflow analysis by ensuring it is rapidly processed and transformed into 3D images of the subsurface.

Identifying prospects is just the beginning. Numerous questions then arise as to how to manage and optimize the production; these are addressed with reservoir simulation to help predict likely production volumes and challenges.

The SGI Solution

To provide the high data processing power needed to identify oil and gas reserves beneath the Earth's surface, Total has acquired a new supercomputer named 'Pangea.'

The platform chosen for Pangea is the SGI® ICE™ X High Performance Computing (HPC) System. It includes an innovative water-cooled SGI ICE X solution based on its M-Cell design. The massive amount of data generated by the system is managed by the SGI® InfiniteStorage™ ecosystem and the SGI® DMF™ tiered storage virtualization solution.

Results

It was the unique combination of SGI technology, expertise and professional services resources that enabled Total to install Pangea – the largest commercial HPC system in the world. The ICE X and its supporting solutions:

- Enable 3D visualization of underground rock formations
- Accelerate the identification of oil and gas deposits in challenging geological conditions
- Provide insight to optimize reservoir extraction methods
- Increase system efficiency by lowering cooling and reducing energy requirements

Benefits

Total's engineers and geologists now have an extremely powerful tool. It enables analytical and numerical models that support the development of three dimensional visualizations of underground geological formations, key to identifying potential oil and gas prospects and to determining optimal extraction methods.

Total's investment in Pangea will enable research scientists to develop more complete visualizations of seismic acquisitions, while concurrently running simulations with a much higher resolution than the existing oil and gas reservoir models.

As part of its commitment to environmentally sustainable development, Total was concerned with ensuring maximum energy efficiency. A supercomputer of this scale requires leading-edge innovation. Total has selected a water-cooled SGI ICE X solution based on the SGI M-Cell design. M-Cells utilize closed-loop airflow and warm-water cooling to create embedded hot-aisle containment, thereby lowering overall cooling requirements and significantly reducing overall energy consumption compared to traditional HPC designs.

To further increase efficiency, the SGI professional services team integrated the SGI ICE X solution with a multi-tiered storage environment using SGI storage software and hardware.

Ultimately this new research should provide a clearer picture of what is happening beneath the Earth's surface, allowing for more efficient upstream oil and gas exploration, as well as the discovery of reserves in more challenging geological conditions.

Total's and SGI's Partnership

The challenge for oil and gas companies is to balance the need to meet ever growing demand with environmentally sustainable development. Today, hydrocarbons are much more difficult to extract and expensive to produce.

SGI is working closely with Total to enable the use of sophisticated data acquisition methods and ever more powerful computers with the capability to transform huge quantities of data into information and images that provide real insight into conditions below ground. This can help reduce the time needed to identify and then develop new fields with an increased certainty of the likely results. It also aligns with Total's commitment to minimize the environmental impact of its industrial activities, especially on air and water and 'to meeting growing energy demand while consistently acting as a responsible corporate citizen.'

"Total is committed to leveraging technological innovation and high performance computing to provide the best response to growing global energy demand.

The efficiency of the SGI ICE X system, which represents high computational power using a minimal amount of energy, gives Total the smallest footprint and lowest TCO possible. This was a key factor in our selection of SGI ICE X for the Pangea system."

Philippe Malzac
CIO, Exploration and Production
Total

About SGI

SGI, the trusted leader in high performance computing (HPC), is focused on helping customers solve their most demanding business and technology challenges by delivering technical computing, Big Data analytics, cloud computing, and petascale storage solutions that accelerate time to discovery, innovation, and profitability.

For more information plese contct an SGI sales representative at 1-800-800-7441 or visit www.sgi.com/contactus.

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