



## SanDisk® Assists Santos in Finding Needed Energy for Southeast Asia Markets

### Solution Focus

- Oil & Gas Exploration
- Big Data/Data Analytics

### Summary of Benefits

- 3:1 server consolidation
- Reduction in I/O wait on the server from 25% to zero
- Established consistent Quality of Service (QoS)

### Products

- Fusion ioMemory™ SX300 PCIe Application Accelerator
- Dell™ PowerEdge™ R730 server

*“The users are happy and acknowledging that change has happened. Everything is a lot better. If you make my users happy, you are heroes.”*

**Claudia Fintina, Applications Geoscientist Specialist, Paradigm**

### Summary

Santos, a leading Australian oil and gas exploration company, has been an energy pioneer since 1954. The company's 3,500 employees are committed to meeting the growing regional demands for energy and to supplying the energy needs of homes, businesses, and major industries across Southeast Asia and Australia. A key part of that effort is to find new reserves of oil and gas in the ground—an effort that requires the sharing of seismic data among geoscientists. When user frustration heightened due to poor system performance, Santos looked to SanDisk to ease I/O bandwidth restrictions and put smiles back on users' faces.

### Background

With one of the largest exploration and production acreages in Australia, Santos is committed to supplying domestic markets and unlocking new reserves of resources. The \$4 billion company is growing in its geography—with programs in countries such as New Guinea, Vietnam, and Indonesia— and in its resource portfolio, such as exploring for Liquefied Natural Gas (LNG). Natural gas will continue to play an important role in meeting the growing regional and global demand for energy, and Santos is striving to meet these growing global demands.

### The Challenge

The principal customers for the Santos IT team are exploration geoscientists, who are also internal to Santos. They spend a great deal of time analyzing seismic data to identify underground oil and gas reserves.

The main application from Paradigm—the largest independent developer of software-enabled solutions for the oil and gas industry—has a back-end server that enables users to share seismic projects among users. In a way, the Paradigm Naming Service (PNS) behaves as a “traffic cop” that authenticates users and discerns which projects and tasks they are permitted to access. The back end of the PNS server is a proprietary database that needs to be common among all the PNS servers. Typically, this would require the storage to be on a network-attached server (NAS) in the network. Because the NAS was now remote from the server, this resulted in both performance and latency issues.

“We needed to figure out how to have multiple servers all share a single lump of storage, but make that lump of storage as local and as fast as possible,” commented Darren Stanton, Server Platform Team Leader, Santos.

Historically, the IT team had been detecting I/O bandwidth restriction issues on the PNS server. As she worked directly alongside the geoscientist users, Claudia Fintina, Paradigm Applications Geoscientist Specialist could see frustration building among user geoscientists with respect to the PNS server performance. “There were very big delays, and the PNS server would sometimes crash or freeze. We were at a breaking point. We wanted to do something, but in a big company, it was a difficult decision and a big responsibility. We had many discussions about the latest and greatest technologies that would help us move forward and perform better,” said Fintina.

To address the issues, Santos tested a number of solutions. “We tried other vendors’ products on the back end and threw huge amounts of RAM at the servers to try to cache up the database as much as possible and accelerate the assets, rather than move them to separate storage,” Stanton said. “We had some small wins along the way, but the move to the Fusion ioMemory™ PCIe cards has been a complete game-changer.”

Based on a recommendation from their Dell partners, the Santos team decided to try Fusion ioMemory PCIe cards and began conducting performance baseline testing prior to implementation. The Fusion ioMemory PCIe cards were the first solid-state storage that Santos had attempted to use with their Paradigm servers.

### The Solution

The Santos team needed to keep the PNS servers as virtual machines for disaster recovery purposes, but needed a way to have multiple PNS servers accessing a single local database with zero latency. They built a KVM host with enough power to run all PNS servers on a single Dell™ PowerEdge™ R730 server.

Two 6.4TB\* Fusion ioMemory SX300 PCIe application Accelerator cards were deployed in the server, operating as the storage repository for the database. They were mirrored to protect any possible card failure and then shared via NFS to the locally hosted virtual PNS servers. The team currently has three individual PNS servers as virtual machines, which are all accessing the same storage via NFS locally on the server. Santos maintains data for its three regional operations—Asia, Western Australia, and Eastern Australia—on the three discrete PNS servers. However, as the organization grows, additional PNS servers will be needed to service all ongoing projects. If a new region is added, the technology team can easily spin up another server to handle the new workload. Having the back-end database on one virtual host allows them the flexibility to balance the workload across the business.

### Results

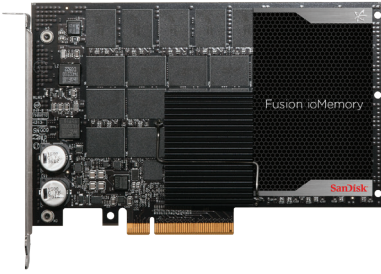
Because Santos is the first Paradigm customer to implement Fusion ioMemory PCIe cards, Fintina and her Paradigm colleague were keen to hear feedback from the application users. The geophysicists are now very happy with the improved speed and performance of their applications.

In addition, Santos has been able to reduce its data center footprint. “Previously, we would have required multiple pieces of hardware—three PNS servers at 2U each. That would have required six rack units worth of space for the servers, plus additional space for the disk storage in the background,” explained Stanton. However, by deploying the Fusion ioMemory PCIe cards, the Santos team has been able to put all three servers on one 2U box. Santos has reduced the footprint from 6U to 2U with no external storage requirement, because all the storage is now internal to the server.

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*“The one metric that shows [how much faster it is] in my mind is the I/O wait on the actual server. When things were busy with our users, I/O wait on the server would get to 25 to 30%, which is pretty horrendous. We do not see any I/O wait any more. There is no latency to these cards. All I am hearing from users is that it has dramatically improved the performance.”*

**Kevin Gutierrez, Customer Support  
Manager for Australia, Paradigm**



Fusion ioMemory™ SX300 PCIe Application Accelerator

The Santos and Paradigm teams are also very pleased with the performance. “Speed and performance have been greatly improved. The one metric that shows [how much faster it is] in my mind is the I/O wait on the actual server. When things were busy with our users, I/O wait on the server would get to 25 to 30%. We do not see any I/O wait any more. There is no latency to these cards. There is no waiting done by the server. There is no waiting for database access. The only thing that is taking any time now, is the server processing what is coming in. All I am hearing from users is that it has dramatically improved the performance,” commented Kevin Gutierrez, Paradigm Customer Support Manager for Australia.

However, the best benchmark for the Santos IT team is the smiles on users’ faces. “It is a much nicer environment to work in for the users. When I recently spoke to our users, the issues with freezing and crashing were fixed,” said Fintina. “The users are happy and acknowledging that a positive change has happened. Everything is a lot better. If you make my users happy, you are heroes.”

## Partnership

Although the Santos team had heard of Fusion ioMemory cards, their first contact with SanDisk was through a Dell representative. After the team had designed the new architecture, they asked for Dell’s help to identify an appropriate flash drive, and Dell recommended Fusion ioMemory cards. Santos ordered the SanDisk Fusion ioMemory SX300 PCIe application accelerator, while Dell provided support during the proof of concept phase. “Overall the experience with the support from SanDisk and Dell has been excellent. The difference here is somewhere between incredibly fast and unbelievably fast; even with just incredibly fast, it was a breath of fresh air,” remarked Stanton.

With the 12.8TB of capacity that Santos currently enjoys with their Fusion ioMemory cards, it will be some time before they require additional capacity. “However, we have a significant investment in multiple instances of Microsoft SQL Server, and licensing is a big-ticket item in our budgeting process,” explained Stanton. Going forward, Santos is exploring further benefits, such as using Fusion ioMemory cards to accelerate access and limit the number SQL Server licenses they need. Just as partnerships are a large part of the Santos business model, both Dell and SanDisk look forward to supporting Santos and building the partnership well into the future.

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At SanDisk, we’re expanding the possibilities of data storage. For more than 25 years, SanDisk’s ideas have helped transform the industry, delivering next generation storage solutions for consumers and businesses around the globe.

\* 1 GB = 1,000,000,000 bytes. Actual user capacity less.

The performance results discussed herein are based on internal Santos testing and use of Fusion ioMemory products. Results and performance may vary according to configurations and systems, including drive capacity, system architecture and applications.

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