



# Intel® Provides the Building Blocks for an Energy Saving Storage Appliance

## Intel® Server Products enable an efficient storage device for the New York Stock Exchange\*

### Case Study Energy Efficient Storage

<b>Partner</b>	FMS is an Ireland-owned systems integrator, supplying and supporting a broad range of products and services. Independent and profitable since inception in 1999, the company is the preferred supplier of IT products and service solutions to a large number of educational, local and central governments, emergency services and corporate organizations worldwide.
<b>Challenge</b>	The New York Stock Exchange* (NYSE) needed a server solution that would accommodate the storage requirements of an ongoing expansion program while lowering their data center's overall energy consumption. Their ideal solution would: <ul style="list-style-type: none"> <li>▪ Increase capacity for expansion program while lowering overall energy costs</li> <li>▪ Offer flexible connectivity options to integrate with existing architecture</li> <li>▪ Increase storage capacity without sacrificing rack space</li> <li>▪ Support a large number of physical drives to maximize storage capacity</li> </ul>
<b>Solution</b>	The Colossus* is an innovative storage appliance developed by FMS that gives industry leading performance per watt and a total of 60 terabytes of storage capacity.
<b>Value</b>	The Colossus is environmentally and fiscally friendly. FMS says that the Colossus will greatly reduce data center energy costs for the NYSE once it is implemented!
<b>Hardware</b>	<ul style="list-style-type: none"> <li>▪ Intel® Server Board S5000PAL with Infiniband* I/O Expansion Module</li> <li>▪ Two Intel® Xeon® processors 5400 series<sup>2</sup></li> <li>▪ Intel® PRO/1000 PT Server Adapter</li> <li>▪ Intel® RAID Controller SRCASPH16I</li> </ul>
<b>Software</b>	NexentaStor* is a software-based NAS and iSCSI solution with features that include unlimited incremental backups or 'snapshots', snapshot mirroring (replication), block level mirroring (CDP), integrated search, and the inherent virtualization, performance, thin provisioning and ease of use of the ZFS file system.



## Challenge

### Rising Energy Costs Hit the NYSE\*

The New York Stock Exchange\* is the world's largest cash equity market and lists more than 2,700 securities. Increased trading volume coupled with recent efforts to expand electronic buying and selling through the NYSE Hybrid Market has forced the organization to explore innovative solutions for data processing, management, and storage.

One of the key challenges has been building data centers that meet storage requirements while maintaining efficiency in light of rising energy costs, especially as the NYSE is quickly outgrowing its existing infrastructure.

The NYSE faces a challenge familiar to many companies also dealing with burgeoning data centers. According to the EPA's latest report to the United States Congress, about 61 billion kilowatt hours of electricity are consumed by servers and data centers in the country, at a cost of \$4.5 billion and rising<sup>3</sup>. This exceeds the energy used by every television set in the country. More than half of this is dedicated solely to maintaining consistent cooling in dense computing environments. It is a tremendous burden on both the environment and corporate finances.

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With an expansion program in place, the NYSE was facing the same problem of rising data center expenses as a result of high energy prices. Their facility had reached its upper limit of acceptable power consumption and needed a storage server solution that would streamline their data center operations and simultaneously increase storage capacity. They identified cooling as a primary energy expenditure and prioritized storage solutions that would feature not only greater performance per watt, but would also reduce cooling demands on the data center.

In addition to the challenges presented by the need for greater capacity in less space and using less power, NYSE also needed a customized network technology based on 10 gigabit or Infiniband\* connections. Their ideal solution would easily swap in without reinventing the current infrastructure. NYSE had explored other options on the market,

but found that these solutions did not offer adequate capacity and they often had “set-in-stone” configurations that did not integrate easily with the architecture already in place.

It was an unenviable task: finding a solution that would maximize storage capacity, minimize power consumption, and offer flexibility for easy integration.

### FMS

The NYSE went to FMS, an Intel® Premier Channel Partner for a solution.

FMS, based in Northern Ireland, offers a range of PCs, server, storage, networking, and telecommunications solutions for customers in the private and public sector. The company has won significant contracts with a large number of education, central government, and corporate organizations, despite facing competition from larger players in both local and international markets.

FMS differentiates itself by offering its customers solutions backed with inspired service. “Companies reach to us when they don't want the average service technician,” says Sam Gaw, Director of Server and Networking Technologies at FMS. “They don't want someone with a script or someone that will say ‘that's not our problem.’”

### The Colossus

By building a close relationship with their customer, FMS would come to understand the challenges presented by this case. They would need to do more with less. More storage, less energy. More drives, less space.

In the end, FMS built a storage appliance that supported up to 60 terabytes of network storage. It could lower energy costs for the NYSE data center. It could fit seamlessly in the existing architecture. They called it the Colossus.

### Solution

The Colossus features 60 one-terabyte hard drives, two Intel® Xeon® processors, and is among the leaders in density for storage servers on the market. It has flexible connectivity options for simpler integration in any existing architecture and reduces energy consumption by 40 percent over other solutions.<sup>4</sup> The Colossus is housed in a custom chassis designed to support 60 hard drives and occupy only 5U of rack space.

### Intel Provides the Building Blocks for Innovative Storage Appliance

When Gaw and his team at FMS set out to create a solution for the NYSE, they looked to Intel to supply technology that could meet the unique requirements for performance and efficiency.

Gaw formed the backbone of the appliance with the Intel® Server Board S5000PAL and two Intel Xeon processor 5400 series. The Intel Xeon processors allowed FMS to create a storage solution that would operate in the NYSE's dense computing environment. For FMS, the 45nm technology and 820 million transistors in the Intel Xeon processor 5400 series meant greater performance and energy efficiency.

Gaw said that the Intel Xeon processor 5400 series presented fewer challenges than other processors at higher levels of performance. For FMS, it was an obvious choice.

"It's cooler than the competition," says Gaw. "You can get away with smaller form factors without worrying about cooling. You can consolidate space with the same performance; for us this was very important."

The compelling performance per watt capabilities of the Intel Xeon processor 5400 series gave the Colossus the requisite energy efficiency to consolidate server storage platforms, minimizing the power and cost requirements that had previously strained the NYSE's storage server environment.

The Intel Xeon processor 5400 series was the key component for creating a storage server solution that would reduce the total cost of ownership with high efficiency performance.

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*– Sam Gaw, Director of Server and Networking Technologies, FMS*

### Managing Storage Intensive Environments

The next challenge that Gaw and his team at FMS addressed was making the Colossus compatible with a large number of drives, each with 1terabyte capacity. They needed a RAID controller that could handle 60 hard drives in a storage intensive environment.

The solution was the Intel® RAID Controller SRCASPH161, which they found to be ideal for addressing the data availability concerns that arise when large numbers of drives are deployed in mission critical environments.

This gave FMS maximum drive flexibility with 16 internal 3Gb/s SAS/ SATA ports and support for up to 122 physical devices. The PCI Express\* x8 interface allowed for fast communication with the server board.

"We needed something that could support 60 drives and there wasn't anything that we found that could do it," says Gaw. "This RAID controller was a good fit."

### Connectivity and Flexibility

One of the biggest challenges beyond increasing capacity and performance while mitigating energy costs was integrating the Colossus into the existing architecture at NYSE.

The NYSE wanted to avoid a solution that would require extensive work to the NYSE's existing data center infrastructure and therefore needed the Colossus to have a range of connectivity options to ensure easy integration.

"We use the Intel® PRO/1000 PT Server Adapter or we can swap that out and we can use any of their 10 gigabit network cards. It's flexible. We can interchange with any of those," says Gaw.

"In most cases companies have already invested in a particular type of network architecture, be it fiber channel, Infiniband, or Ethernet, and it's costly and difficult to upgrade," says Gaw. "Because of the number of options offered by Intel, we can implement this solution on a wide range of connections that are already in place and our customers don't need to reinvest – we can work with what they have in place."

"It gives a better return on the investment they already have in place. In a way, it is providing ROI on both past and future architecture investments."

"Just the network connectivity alone is more than would be available from the competition. This allows us to target 99 percent of the potential customer base for this type of solution – financial institutions, ISPs, and other large organizations."

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*– Sam Gaw, Director of Server and Networking Technologies, FMS*

### NexentaStor\* Software Solution

FMS chose to integrate the 64-bit release of NexentaStor\* to deliver native ZFS support. The software-based solution from Nexenta Systems is open-source and optimized for use in NAS and iSCSI applications that require flexible, high-performance storage and simplified provisioning.

The open standards can also facilitate faster feature integration and custom solutions. Gaw and his team at FMS felt it was the best software for matching the flexibility of the Colossus. The result, he says, is a storage server solution that offers great performance and energy savings alongside flexible software and connectivity.

### Intel Solutions

FMS will soon integrate the Colossus at the NYSE and Gaw sees a bright future for other organizations. Because of the flexibility and ease of integration, the Colossus could be a useful solution for a variety of companies, from storage intensive financial services firms to media-heavy social networking web sites, according to Gaw.

The dense consolidation of server storage and energy efficiency of this solution is an innovative response to the rising energy costs that are plaguing data centers and storage solutions.

For FMS, the development of the Colossus storage server highlights the value of Intel-based solutions. According to Gaw, only Intel provided the combination of energy efficiency, performance, flexibility, and connectivity to create this ground-breaking storage solution.

"If something has the Intel brand name on it, it's going to be top notch," says Gaw. "That's one of the reasons why we only use Intel."

Intel works with the world's largest community of technology leaders and solution providers – from software and hardware to systems integration and services companies – that are all working with Intel products, technologies and services with a common goal of providing better, more agile, cost-effective business solutions for you.

For more information on Intel® Server Products, visit: [www.intel.com/go/serverproducts](http://www.intel.com/go/serverproducts)

<sup>1</sup>Gaw, Sam. FMS Ltd. Telephone Interview. June 12, 2008.

<sup>2</sup>Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See [www.intel.com/products/processor\\_number](http://www.intel.com/products/processor_number) for details.

<sup>3</sup>United States Environmental Protection Agency. *Report to Congress on Server and Data Center Efficiency*. 110th Cong. 1st sess., 2007

<sup>4</sup>Intel does not control or audit the design or implementation of third party benchmarks or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Websites or others where similar performance benchmarks are reported and confirm whether the referenced benchmarks are accurate and reflect performance of systems available for purchase.

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