



Storage. Networking. Accelerated.™

Financial Applications

Solution Brief

Accelerating Financial Applications Using Solid State Storage

DESIGNED TO:

- Enable low latency for quick customer responses
- Allow databases to provide faster business intelligence reports
- Help lower total cost of ownership (TCO) by leveraging existing hardware

SOLUTION COMPONENTS

MegaRAID® Fast Path Software for MegaRAID 6Gb/s SAS Controllers

WarpDrive™ Application Acceleration Card with PCI Express® 2.0 Host Interface

MegaRAID CacheCade™ Software for MegaRAID 6Gb/s SAS Controllers

As today's financial services organizations strive to retain existing customers and attract new ones, many are introducing new, enhanced products and services over the Web. For such offerings to be successful, companies must structure new applications to provide optimal performance and service - while closely managing the total cost of ownership (TCO). Financial companies are more than ever at the forefront of cutting-edge services that require storage acceleration to deliver dramatic improvements to application performance, while greatly reducing hardware infrastructure, maintenance, and power and cooling costs.

For example, many trading firms have chosen to implement optional premier services such as value added online research or even enhanced trading execution speed for premier customers. Residential mortgage companies are offering online credit management and underwriting applications and insurance firms are giving brokers access to online risk management and processing applications to help them manage client applications.

At the same time as financial institutions are offering these new services they face strong pressures to boost shareholder value and the overall bottom line through the aggressive management of operational costs. Adding new products and services can require substantial capital investment. Will an existing computing infrastructure be able to handle these new initiatives?

LSI is focused on offering products to help accelerate financial services. Using the speed of flash technology can minimize application latency to deliver dramatic improvements to computing performance, while greatly reducing hardware infrastructure, maintenance, and power and cooling costs.

WHERE IS THE BOTTLENECK?

Financial service providers are faced with a growing amount of data to manage combined with an ever increasing demand for better performance. This problem is further compounded by the ever-widening gap between compute processing and storage processing. This gap, as illustrated in Figure 1 below, has increased over time due to dramatic improvements in CPU processing capabilities and the advent of multicore CPUs compared with only minimal improvements in hard disk drive (HDD) performance, resulting in poorly performing databases. This poor performance is a direct result

In many direct attached storage deployments, customers have used LSI® MegaRAID controller cards to provide high performance access to their HDDs. By supplementing or replacing HDDs with SSDs, applications can be significantly accelerated.

of the amount of time CPUs spend waiting for data, with typical CPU utilization rates commonly trapped at less than 25%. This problem is exacerbated each time theoretical CPU performance is increased.

Quite simply, traditional storage has not been able to supply data quickly enough to keep up with server CPUs.

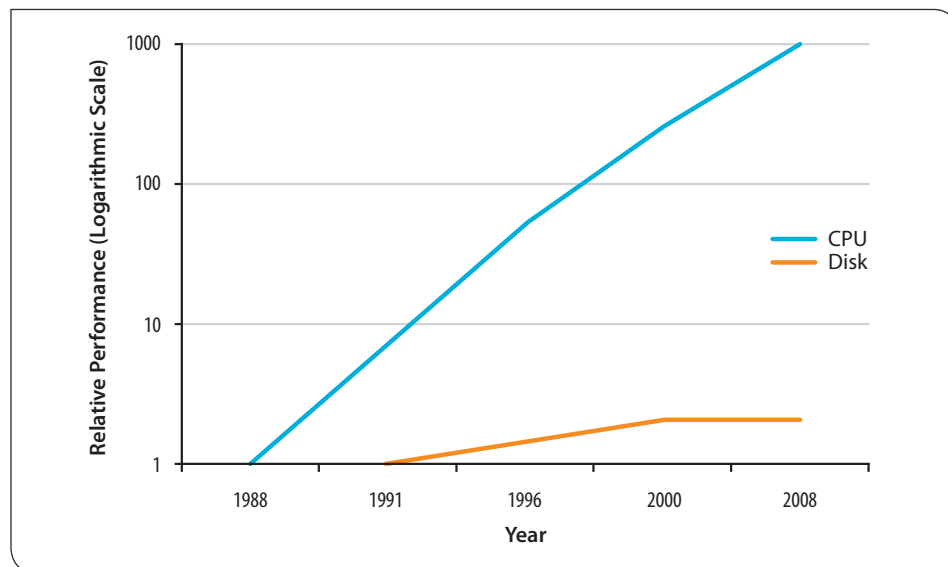


Figure 1 Disk Performance Significantly Below CPU Performance¹

FLASH STORAGE ACCELERATES ENTERPRISE APPLICATIONS

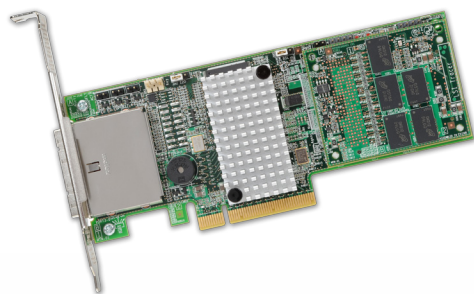
Flash is a chip technology that provides large amounts of non-volatile memory. With no moving parts that slow access to data, flash greatly reduces latency. To meet the demanding environment of enterprise applications, elaborate algorithms have been implemented to allow flash to provide consistent performance, reliability and scalability. As an alternative to hard drives, solid state disks (SSDs) incorporate flash using the same physical enclosure and interface as hard disk drives, thus easily replacing them in most applications. Mounting flash modules on PCIe cards provides further latency reduction by eliminating the storage interface. On-card processors supervise all the enterprise aspects of flash management to minimize these maintenance chores from the sapping performance from customer applications.

MegaRAID SAS Controllers with Fast Path Software Provide Fast Access to SSDs

In many direct attached storage deployments, customers have used LSI® MegaRAID controller cards to provide high performance access to their HDDs. By supplementing or replacing HDDs with SSDs, applications can be significantly accelerated. Data stored by latency sensitive applications are simply moved to SSDs. A better TCO may be to have a mix of SSDs and HDDs. SSDs have a higher cost per gigabyte than HDDs so it's more economical to keep infrequently accessed data on HDDs.

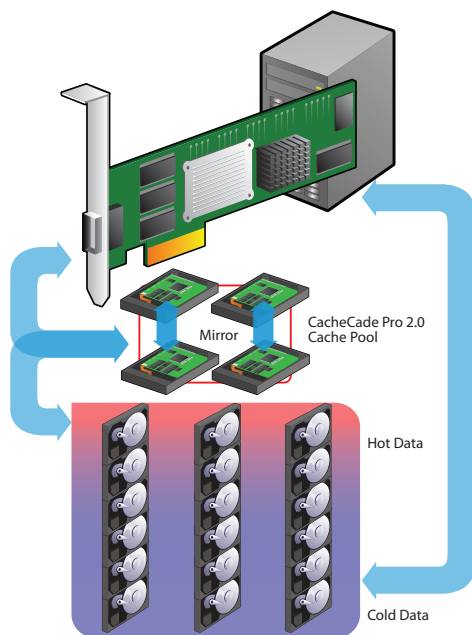
Fast Path software is an innovative algorithm designed to reap the most performance from SSDs. With Fast Path software enabled, SSD configurations tuned for small, random block-size IO activity — typical of transactional database applications — can sustain over 150,000 IO reads per second in RAID 0 configurations. This is two times the transactional performance of identical configurations when Fast Path software is disabled. This is particularly evident in 4K random reads and random writes; as well as 4KB and 8KB OLTP transaction-oriented benchmarks.

The LSI SSD Guard™ technology helps increase the reliability of SSDs by automatically copying data from a drive with potential to fail to a designated hot spare or newly inserted drive. A predictive failure



LSI MegaRAID SAS 9285-8e

Copying the most accessed data to flash cache relieves the primary HDD array from time-consuming transactions which allows for more efficient hard disk operation, reduced latency, and accelerated read and write speeds.



CacheCade Pro 2.0 software intelligently copies hot data to low latency, redundant SSD cache.

event notification, or S.M.A.R.T command, automatically initiates this rebuild to preserve the data on an SSD whose health or performance falls below par. If a hot spare is not present or not assigned, MegaRAID Storage Manager™ (MSM) will recommend that the user insert a hot spare drive into an available slot.

Because SSDs are very reliable, non-redundant RAID 0 configurations are much more common than in the past. SSD Guard technology offers added data protection for RAID 0 configurations by actively monitoring the status of the SSDs. SSD Guard technology, together with Fast Path software, helps users to take full advantage of the reliability and performance attributes of SSDs.

WarpDrive Application Acceleration Card with a PCI Express 2.0 Host Interface

Offering enterprise applications high performance access to flash storage using multiple embedded processors to reduce CPU burden, the PCIe small form factor WarpDrive acceleration card is designed to maximize transactional I/O performance for Web serving, data warehousing, data mining, online transaction processing and high-performance computing. This enterprise-class acceleration card performs consistently across reads and writes regardless of workload. This solid state storage solution utilizes industry-standard and widely deployed LSI SAS software for easier system integration and management and deployment. The low-profile, half-length WarpDrive card plugs into a standard 8 lane PCIe Gen 2.0 server slot and consumes less than 25 watts of power.

ACCELERATE ENTERPRISE APPLICATIONS WITH INTELLIGENT CACHING

As mentioned before, judicious placement of data on flash greatly helps TCO. Not all applications need low latency access so the most cost effective solution is to use HDDs for less frequently accessed data. By automatically identifying data “hot spots”, frequently accessed regions of data can be serviced by SSDs for low latency.

MegaRAID SAS Controllers with CacheCade Software Implement Caching on SSDs

CacheCade software with MegaRAID controllers allow SSDs to be used for cache storage. CacheCade software will monitor storage transactions and automatically direct “hot spots” to SSDs. This reduces the need to short-stroke a large number of HDDs to obtain high performance, yielding a lower total cost of ownership.

Copying frequently accessed data to flash cache relieves the primary HDD array from time-consuming transactions which allows for more efficient hard disk operation, reduced latency, and accelerated read and write speeds. This provides significant improvements to overall system performance -- two to twelve times that of HDD-only configurations -- for a wide variety of server applications including web, file, online transaction processing (OLTP) database, data mining and other transaction-intensive applications. For enterprise data protection, the same data is retained on RAID-protected HDDs.

CONCLUSION

More than ever, financial customers need solutions to accelerate their applications. Data latency from HDDs is a bottleneck for application performance which flash storage technology can help address. No single storage solution will solve every requirement. Having the capability to explore a range of flash solutions offers choice on performance, footprint, cost and power challenges.

For more information and sales office locations, please visit the LSI web sites at:
lsi.com lsi.com/channel

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1. Chart created using data from these sources: http://en.wikipedia.org/wiki/Seagate_Technology and <http://cs.wheatonma.edu/~mgousie/comp220/f01-16-P374493.pdf>

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November 2011

