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Adaptec 2820SA vs. LSI 300-8X:
SATA RAID Controller Performance Comparison

Summary

- The Adaptec Serial ATA II RAID 2820SA handles more file serving requests faster
- Adaptec RAID is optimized for faster media serving
- Adaptec RAID is optimized to deliver the lowest response time for transactional processing
- With a dynamic caching policy that reduces controller overhead, Adaptec provides the highest performance for web servers

Adaptec Real-World Performance

Adaptec controllers are designed to perform in the conditions in which you really use them. While other RAID vendors advertise unrealistic workload performance, these measurements don't demonstrate how your RAID controller will hold up under a real-world usage workload.

Adaptec has characterized the most common workloads generated by today's applications and optimized our advanced data protection RAID to give the best overall performance, from the top video streaming throughput in the industry, to the lowest response times for transactional servers.

File Servers

File servers present a special challenge since user requests tend to be scattered across the span of the disks, with distinct hot spots. These hot spots, which typically contain file information structures, open-file updates, page swapping regions, and other frequently accessed data, benefit from effective array caching. The busiest file servers need to service hundreds of requests each second.

A comparison of the Adaptec 2820SA SATA II RAID controller against the LSI 300-8X (see Fig. 1) demonstrates the Adaptec 2820SA's exceptional ability to handle a greater number of user requests, which translates to lower response times on even your busiest servers.
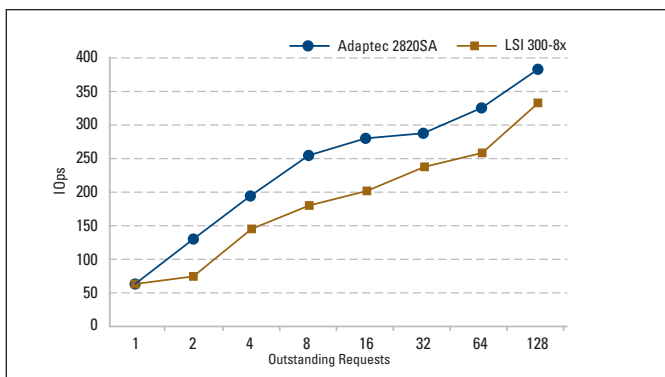

Figure 1:   File server performance of the Adaptec 2820SA versus the LSI 300-8X RAID controller on an eight-drive RAID 5.

Web Servers

Today's high-speed world of e-commerce requires storage that can service multiple customer web requests with the lowest possible latency. Both static and dynamic workloads are comprised almost exclusively of read requests with almost entirely random I/O distributions. Studies* have shown that approximately 84% of web server request sizes fall below 16KB, while the remaining 16% is evenly distributed from 32KB to 1MB (consisting primarily of video, audio, and images).

Adaptec controllers are designed with a dynamic caching policy that reduces the controller overhead when dealing with overlapping read and write requests. RAID enhances web server performance by distributing the requests across all the participating drives, significantly increasing performance while also improving availability and reliability (see Fig 2).
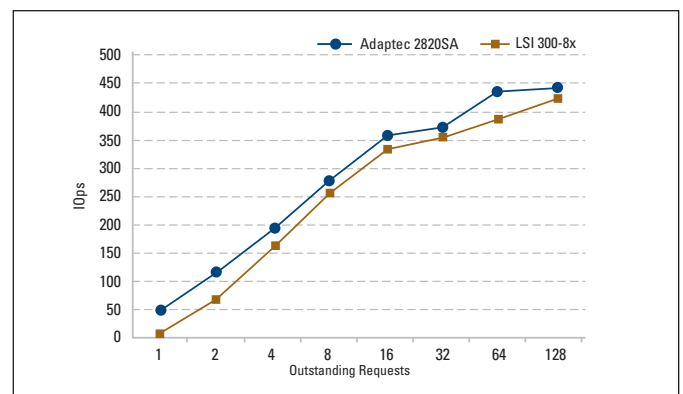

Figure 2: Web server performance of the Adaptec 2820SA versus the LSI 300-8X RAID controller on an eight-drive RAID 5.

* Arlitt, M. F. and Williamson, C. L. Web server workload characterization: the search for invariants. In Proceedings of the 1996 ACM SIGMETRICS international Conference on Measurement and Modeling of Computer System).

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Media Server

Media streaming is a popular application for RAID controllers because array striping allows parallel operations across all participating disks. While other RAID codes can keep up with one read thread, keeping up with numerous streams requires special RAID tuning. Intelligent Adaptec RAID code can detect these threads and keep the disk reading contiguously, effectively taking advantage of the disk's track buffer and read-ahead capabilities (see Fig. 3)
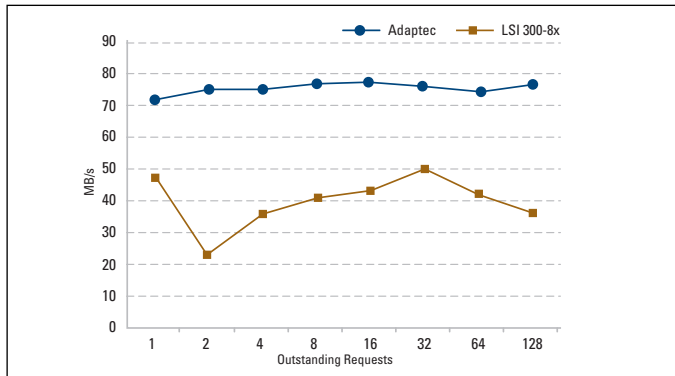
Figure 3: Video server performance of the Adaptec 2820SA versus the LSI 300-8X on an eight-drive RAID 5.

Online Transaction Processing (OLYP) Servers

Today's digital economy has become more reliant on storage systems for archiving online transactions and vital records — such as from database applications including decision support/data warehousing, web-based e-commerce, and business reporting.

Because transaction servers are highly sensitive to response times, the ability to preserve data integrity by maintaining in-order execution of commands for a mixed read/write workload, is key (see Fig. 4).
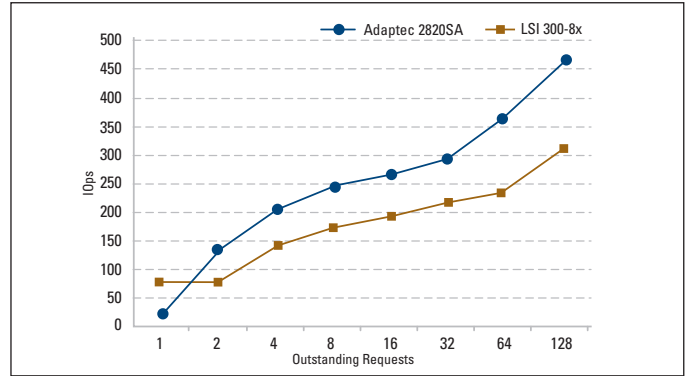

Figure 4: 4KB OLTP performance of the Adaptec 2820SA versus the LSI 300-8X RAID controller on an eight-drive RAID 5.

Test Environment

The following test environment was used:

- CPU: Dual Intel P4 Xeon 3.60 GHz (hyperthreading enabled)
- Motherboard: Supermicro X6DH8-G2
- Memory: 4GB PC2-3200 Registered ECC
- HDD: Eight Samsung HD040GJ SATA II (disk write cache enabled)
- OS: Windows 2003 Enterprise Server SP1
  - Testing Utility: IOmeter version 2005.30.07

- Adaptec RAID adapter information:
  - Adaptec Serial ATA II RAID 2820SA with 128MB cache; Device driver: Release Windows driver version 5.1.8360; Firmware 5.1.8375.
  - Eight-drive RAID 5, default stripe size [256KB], array caching enabled, clear initialization.
- LSI RAID adapter information
  - LSI MegaRAID SATA 300-8X with 128MB cache; Device driver 6.45.2.32; Firmware 814G.
  - Eight-drive RAID 5, default stripe size [64KB], write back, normal, direct I/O; full initialization.

Comparison Matrix

	Adaptec Serial ATA II RAID 2820A	LSI MegaRAID SATA 300-8X
General Description	8-port SATA II RAID controller (PCI-X, 133MHz)	8-port SATA II RAID controller (PCI-X, 133MHz)
Processor	Adaptec AIC-8210	Intel 80331
Array Types Supported	RAID 0, 1, 1E, 5, 5EE, 6, 10, 50, 60	RAID 0, 1, 5, 10, 50
Highlights	Copyback Hot Spare, Optional Battery Module, Online Capacity Expansion (OCE), RAID Level Migration, Optimized Disk Utilization	Online Capacity Expansion (OCE), RAID level migration, Optional Battery backup support
Form Factor	3.1"H x 6.6"L	4.2"H x 6.6"L

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