Zappos.com
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CASE STUDY

Zappos Zaps Complexity with the Fusion ioMemory™ Solution

Online Retailer improves database performance and customer experience while slashing system administration overhead with High IOPS Adapter.

Summary of Benefits

- 3x better database performance
- 70% more database connections with half the hardware
- 25% improvement to overall page loading times
- 20x lower latency on pages loaded from the web cache
- 1/2 system maintenance

The Challenge

Zappos considers themselves an online services company that "happens to sell" products, so providing an optimal customer experience on its web-site is a top priority.

To keep up with projected holiday traffic increases, Kris Ongbongan, Systems Administration Manager, knew Zappos would have to upgrade. He contacted Lenovo Premier Business Partner, Sycomp, who knew just how to ensure a positive customer experience with minimal impact on the Zappos IT department's overhead.

The Solution

During his system analysis, Kris identified two areas where Zappos needed to upgrade performance in order to handle increased loads:

- **Product databases.** The databases containing product information would need to be able to handle many more concurrent users.
- **Web cache.** Zappos cached the HTML for many pages to improve load times and by extension the customer experience. It wanted the capacity to store many more of these fast-loading pages.

Amazingly, the High IOPS Adapter powered by Fusion ioMemory technology allowed Zappos to surpass its projected performance capacity while actually reducing maintenance.

Tripling Database Performance with Half the Hardware

Before implementing the High IOPS Adapter, Zappos maintained seven MySQL database instances across seven x3550 blade servers. Adding a single 80GB High IOPS adapter to each of its database servers tripled each server's performance.

This allowed Zappos to host up to four MySQL instances per server. Zappos installed three instances per server and repurposed four of the servers. Doing this increased its database connection capacity by two thousand connections, increased its storage capacity and reduced the number of servers Kris' team had to maintain.

Kris remarked, "The High IOPS adapters allowed us to run three times the traffic per server and cut the number of servers we need by more than half, while improving performance."

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"The High IOPS Adapters allowed us to improve database and web site performance to support the increased traffic as we approach the holiday peak. And the best part is that we did it while reducing our workload."

Kris Ongbongan,
Systems Administration Manager,
Zappos

Accelerating the Web Cache

In addition to improving its database capabilities, Zappos also used High IOPS Adapters to greatly improve its customer experience. Two 160GB adapters added 320GB of RAM-like memory to its web cache. This meant many more pages loaded from cache rather than disk—and the latency for pages loaded from cache (cache "hits") dropped from 100ms to 5ms.

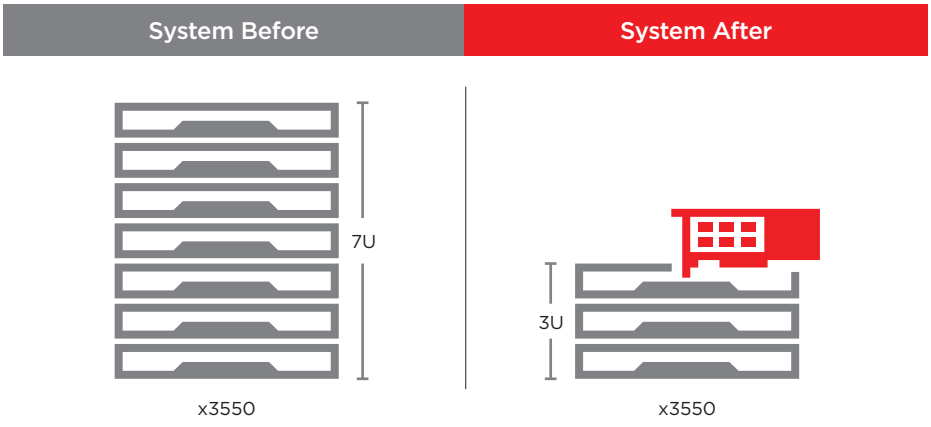
"The High IOPS card allows us to keep many more product and search pages in the cache," said Kris. "This triples our cache-hit ratio and gives us a 20x reduction in cache-hit latency. Our average page-load times improved 25%."

Reducing Maintenance Overhead and Operating Costs

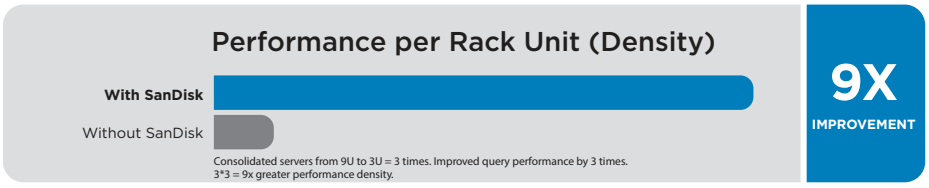
The reduction in the number of database servers from seven to three meant four fewer database servers to maintain and a more reliable system with far fewer mechanical components to fail.

Kris told us, "The adapter has helped my group by reducing the number of servers we are expected to manage from nine to twelve servers down to three."

Database System



- Eliminated four servers
- Put three database instances on each server



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The Results

Implementing the High IOPS Adapters into its x3550 servers gave Zappos the following benefits:

- 3x better database performance
- 70% more database connections with half the hardware
- 25% improvement to overall page loading times, improving customer experience and conversion rates
- 20x lower latency on pages loaded from the web cache
- 1/2 system maintenance

Needless to say, Kris is thrilled, "The High IOPS Adapter allowed us to improve database and web-site performance to support the increased traffic as we approach the holiday peak. And the best part is that we did it while reducing our workload."

About the Company

Established in 1999, Zappos.com has quickly become a leader in online apparel and footwear sales by striving to provide shoppers with the best possible service and selection. In 2008, the company's gross merchandise sales exceeded $1 billion. Zappos.com currently stocks millions of products from over 1000 clothing and shoe brands. Zappos.com was recognized in 2009 by FORTUNE MAGAZINE as one of the "100 BEST COMPANIES TO WORK FOR," debuting as the highest-ranking newcomer to FORTUNE's 2009 list.

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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.

The performance results discussed herein are based on internal Zappos.com testing and use of the above described products. Results and performance may vary according to configurations and systems, including drive capacity, system architecture and applications.

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