BrainPad

CASE STUDY

BrainPad Accelerates Multiple Web Analytics Systems with Fusion ioMemory™ Solutions

Web analytics provider dramatically cuts pay-per-click (PPC) and product recommendation analysis times while slashing server footprint.

Solution Focus

- PostgreSQL
- SaaS (Software-as-a-Service)
- Web Analytics

Summary of Benefits

- Ensures pay-per-click customers get timely business intelligence:
  - 2x faster data intensive pay-per-click analysis
  - 29x faster aggregate data calculation
  - 10x faster summary reporting
  - 4x faster data modeling
- Ensures rapid and accurate product recommendation service with 30x faster batch jobs
- Consolidation and cost reduction:
  - 50% smaller pay-per-click intelligence database system
  - 33% smaller product recommendation system
- Eases maintenance:
  - Elimination of weekly tuning jobs on pay-per-click intelligence database
  - 6x faster product recommendation PostgreSQL vacuum jobs
- Enables simpler, more reliable, and available architectures

The Challenge

BrainPad, Inc. provides Web-based data mining, business analytics, operational research, and mathematical solutions for businesses. BrainPad's L2Mixer™ service provides business intelligence on end-user, pay-per-click behavior, allowing companies to optimize product pricing. Its Rtoaster™ service, used by various global companies, provides end-users product recommendations based on a behavioral analysis of their browsing patterns as well as targeted pricing recommendations based on geo-specific, behavioral, and attributes-based data from imported ERP databases.

As BrainPad's customer base and product line expanded, so did the load on both systems' databases, which in turn slowed the performance of its services.

BrainPad's innovative engineering teams wasted no time researching solutions that would demonstrate why BrainPad is a leader in Web analytics and research. BrainPad needed systems that overcame the following challenges:

1. Increase processing speeds of its L2Mixer™ Solution. Chief Engineering Architect Tsuyoshi Inoue described the challenge:

   "I/O wait time on our disk-based system was averaging 18%, meaning the database spent 18% of its processing time just waiting on I/O. The result was slow analysis and batch job processing that made it difficult to meet customer Service Level Agreements, especially when the system was under peak load."
2. Speed analysis times of its Rtoaster™ recommendation system. Chief Architect Satoshi Shinohara related the challenge presented by the ever-growing data sets:

   "Site access has grown over 100 times from the year 2007 until today. Our rule-based Rtoaster™ application processes data sets that are too large to hold in memory, and the slow disk processing left us struggling to meet our Service Level Agreements."
3. Cut costs and reduce maintenance. BrainPad's engineering teams found themselves spending a great deal of time working just to maintain acceptable system performance. They needed a solution that simplified rather than complicated the systems.
4. Implement reliable technology that BrainPad could trust with its mission-critical data.

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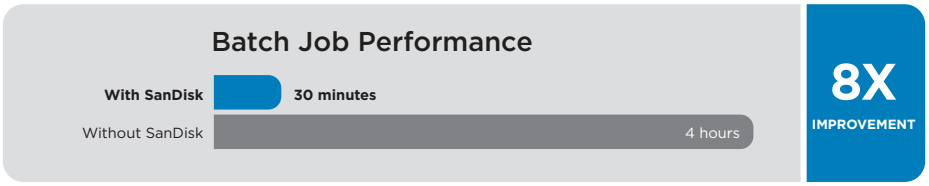
The SanDisk® Solution

Powering Pay-Per-Click intelligence

Batch Job Benchmarking

Having heard about SanDisk's industry-leading performance from its OEM vendor, Tsuyoshi decided to give Fusion ioMemory™ products a try. To benchmark performance, Tsuyoshi installed a 160GB Fusion ioMemory ioDrive® card on one of BrainPad's PostgreSQL databases and ran some of its heavier reporting jobs. The results spoke for themselves.

Tsuyoshi said, "One batch job, which used to take over four hours to complete, ran in less than 30 minutes. The ioDrive cards also doubled the number of threads we could run in parallel—from three to four threads up to eight to 10 threads, which meant we could run more jobs at the same time. We were genuinely impressed."



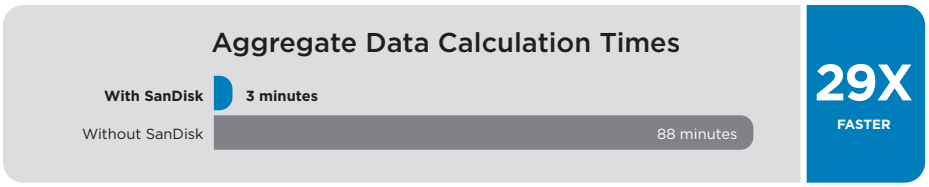
Raising the Roof on L2Mixer™ Reporting

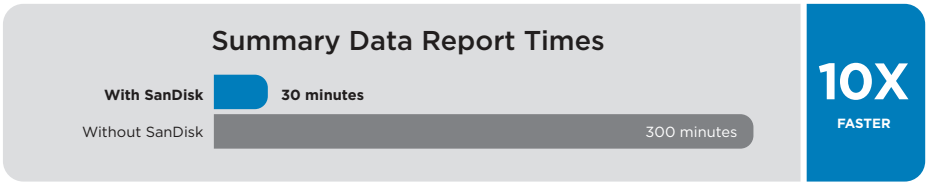
Speeding performance in a benchmark environment is one thing, but the ioDrive cards demonstrated they were more than capable of handling BrainPad's heaviest, real-world workloads.

Tsuyoshi said, "Moving the L2Mixer databases from hard disks to ioDrive cards cut the I/O wait time for our pay-per-click processing by more than half—from 18% to just 8%."

This reduction in I/O wait time resulted in the following performance benefits:

- 2x faster average reporting on pay-per-click activity over massive data volumes ingested from Google and Yahoo! Japan—job time reduced from over 12 hours to around five to six hours
- 29x faster aggregate data calculation—from 88 minutes to just over three minutes
- 10x faster summary data reports—job time reduced from five to six hours to less than 30 minutes
- 4x faster data modeling—job times reduced from three to four hours to less than one hour





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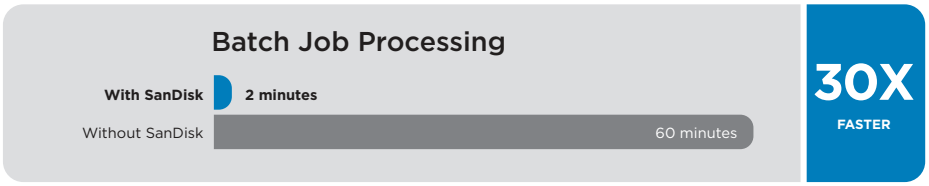
Tsuyoshi said, “Performance is high enough that we can now meet the most demanding customer SLAs. This ensures our customers always get reports quickly so they can make timely business decisions on factors like pricing to maximize their profitability.”

Real-time Rtoaster™ Recommendations

Satoshi Shinohara had heard about the phenomenal results Tsuyoshi’s team had with BrainPad’s L2Mixer system. After consulting with Tsuyoshi, Satoshi decided to add some ioDrive cards to Rtoaster’s PostgreSQL database—and achieved similarly impressive results.

Satoshi said, “The ioDrive cards improved our analysis times tremendously. We reduced batch job processing times from 60 minutes on a system with a 24 x 15k RPM SAS disk array in a RAID 10 to just over two minutes.”



“The ioDrive cards improved performance so much that we can now meet the most demanding customer SLAs.”

Tsuyoshi Inoue,
Chief Engineering Architect
BrainPad, Inc.

Satoshi said, “The ioDrive cards have improved performance so much that we can meet all customers SLAs with plenty of headroom for future growth. When we do need to scale out, we can do so easily, and with far less hardware.”

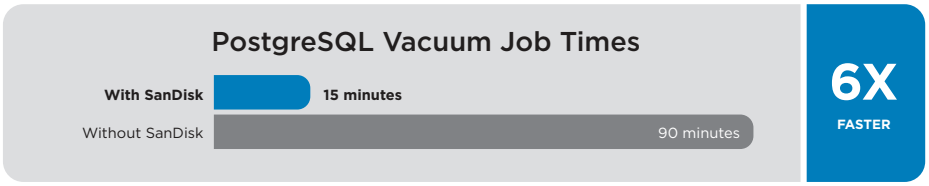
Simpler Systems that are Easier to Maintain

In addition to eliminating performance problems, the ioDrive cards also reduced BrainPad’s maintenance workload.

Tsuyoshi noted the Fusion ioMemory solution’s cost benefits to the L2Mixer system: “The L2Mixer database now uses 50% less rack space and has no disks or enclosures for us to monitor and maintain. It also lowers our energy costs.”

Tsuyoshi added that the database’s high performance makes the system much easier to maintain: “Before implementing SanDisk, we had to run database maintenance tasks once a week or more just to avoid a serious performance degradation. Now, we can eliminate these tasks altogether, which is quite significant.”

The Rtoaster system realized similar benefits. “The Rtoaster database now uses 33% less rack space, and we’ve eliminated the disk enclosures,” said Satoshi. “Our system is smaller and more flexible, which makes tuning and maintenance easier. The ioDrive Duo card even reduced the time of our daily PostgreSQL vacuum job from one and a half hours to just 15 minutes.”



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Enabling More Reliable and Available Architectures

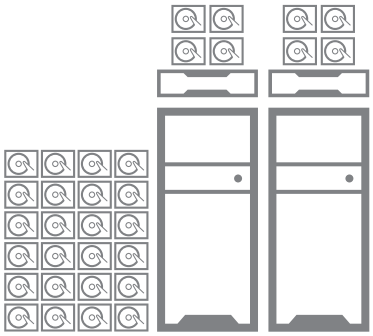
Tsuyoshi told us, "Our procurement group initially had some reservations about how we could create a highly available and reliable system with the Fusion ioMemory solution's server-based memory."

However, after speaking with some experts at SanDisk, Tsuyoshi learned that reliability is built into SanDisk's enterprise technology and that the ioDrive card's performance enables simpler, more powerful systems, with fewer failure points.

"Our new system is simpler, more flexible, and easier to modify and improve," explained Tsuyoshi. "Our engineers decided to push the purchase through. We have been deployed for some time now, and we all agree it was a sound investment."

System Overview

L2Mixer System Before	L2Mixer System After



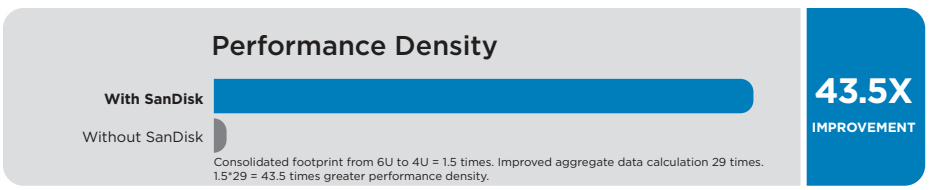
Database Servers

- 2 x 1U Dell PowerEdge R610 servers, 2 x Intel Xeon E5630 quad-core 2.53GHz processors, 2.53GHz, 64GB RAM
- OS: CentOS 5
- Application: PostgreSQL 9.0.4
- Hard disks: 4 x 15k SAS disks

Storage

- 2 x 2U Dell PowerVault MD1220
- Hard disks: 24 x 10K SAS disks

- 1 x 4U Dell PowerEdge R910 server, 2 x Intel Xeon E7-4870 deca-core 2.40GHz processors, 128GB
- Upgraded OS and PostgreSQL to CentOS 5.7 and PostgreSQL 9.1.1
- Hard disks: 7 x 15k SAS disks
- Fusion ioMemory: 3 x ioDrive Duo 1.28TB card



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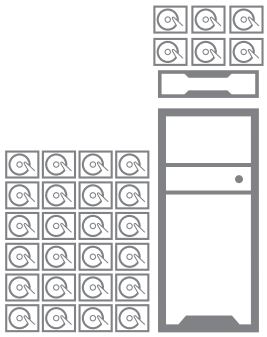
Rtoaster System Before	Rtoaster System After
	ioDrive Duo 1.28TB card 

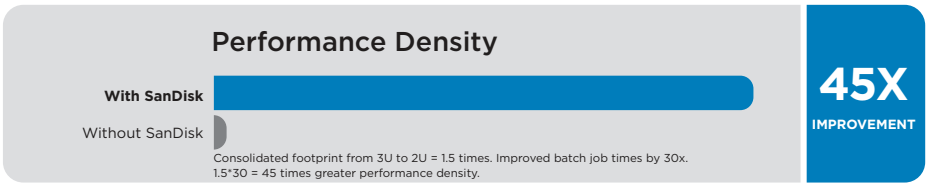
Database Servers

- 1 x 1U Dell PowerEdge R610 server, 2 x Intel Xeon X5650 hex-core, 2.66GHz processors, 192GB RAM
- OS: CentOS 5
- Application: PostgreSQL 8.4
- Hard disks: 6 x 15k SAS disks

Storage

- 1 x 2U Dell PowerVault MD1220
- Hard disks: 24 x 15K SAS disks

- 1 x 2U Dell PowerEdge R810 server, 4 x Intel Xeon E7-4870 deca-core, 2.40GHz processors, 512GB RAM
- Upgraded OS and PostgreSQL to CentOS 6 and PostgreSQL 9.1
- Fusion ioMemory: 1 x ioDrive Duo 1.28TB card



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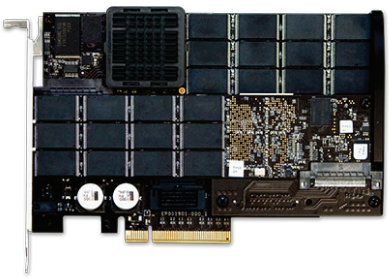

Fusion ioMemory™ - ioDrive® Duo

Summary

Implementing ioDrive cards gave BrainPad the following benefits:

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- Eases maintenance:
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  - 6x faster product recommendation PostgreSQL vacuum jobs
- Enables simpler, more reliable, and available architectures

Tsuyoshi is thrilled with the performance and consolidation SanDisk has enabled and told us, “We are very happy and are actively deploying ioDrive cards in several other systems.”

About BrainPad

BrainPad helps improve enterprises’ productivity and profitability by rationalization and optimization of the marketing activities utilizing data mining and constraints-optimization technologies. BrainPad provides comprehensive support to companies who intend to improve their business activities with data analysis, system building and SaaS services provision.

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Western Digital Technologies, Inc. is the seller of record and licensee in the Americas of SanDisk® products.

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For more information, please visit:
www.sandisk.com/dell

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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 BrainPad testing and use of Fusion ioMemory products. Results and performance may vary according to configurations and systems, including drive capacity, system architecture and applications.