Fusion-io: Driving Database Performance

THE CHALLENGE

Today, getting database performance means adding disks, RAM, servers, and engineering resources, each of which unbalances already inefficient systems and increases both capital and operating costs. Today's Enterprise SSDs imitate disk drive technology, slightly improving raw storage performance without resolving the core inefficiencies that impact database performance.

Poorly performing databases cause many problems including:

- Slow applications, resulting in customer and staff complaints or even lost sales
- Slow reporting and business intelligence queries, resulting in lost productivity, poor market awareness, or slow time-to-market
- DBA frustration rerunning overnight maintenance tasks that didn't complete on time or that stopped during the night.

THE FUSION-IO SOLUTION

Fusion's ioMemory is a revolutionary NAND Flash-based memory tier that restores balance and efficiency to resources like DRAM, CPU, network bandwidth, and disk storage. It delivers unmatched performance to database servers, along with enterprise-grade reliability, all while dramatically reducing infrastructure needs.

Benefits of ioMemory products include:

- Highest IOPS and bandwidth with the lowest latency from a single device. Customer can easily expect:
 - 3-10x faster query processing
 - 3-10x faster replication
- Performance that scales linearly with more devices
- Ability to architect simple, elegant systems that dramatically reduce latency between data media, database applications, and applications using databases
- Times for batch jobs, including business intelligence, backup, and recovery processes reduced from hours to minutes, with the ability to run them during business hours
- Database integrity checks in a fraction of the time

SUPPORTED DATABASES

ioMemory products can be used for any database platform on supported operating systems, including the following.

- MS SQL SERVER 2005/2008
- MYSQL
- ORACLE
- SYBASE
- POSTGRES

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- Strong data protection, with advanced error correction, non-volatile memory, onboard chip-level parity, and power-cut
- Eliminate wasted capacity and server real estate of disk arrays
- Eliminate mechanical failures and disk maintenance tasks with memory that lasts longer than its host server
- Slash power and cooling costs
- Best price/performance value on the market¹

WHAT MAKES IOMEMORY DIFFERENT?

ioMemory is about much more than improving raw interface performance for archival storage. Its architecture is unique from all other solid-state technology offerings on the market today. Its NAND Flash acts like memory rather than disk, eliminating the complexity of traditional storage architecture that creates unnecessary context switching, deep queuing, and I/O storms. The end result is that Fusion-io products dramatically improve application performance, even dramatically out-performing RAIDed SSD-based storage arrays.

The following test, performed by Tom's Hardware demonstrates this difference. Whereas, the ioMemory-based ioDrive delivers five times the performance of an SSD, it improves application performance 50 times.





Application Performance

1 Fusion-io systems are continually and pervasively used in TPC-Hs top-ranked systems.



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A LOOK AT THE NUMBERS

As the graphs show, ioDrives offer significantly more performance at a much lower cost than even the most cost effective hard disk array.²



FUSION-IO BEST PRACTICES

Moving the entire database to an ioDrive can deliver at least 3-10x improvement for databases with the following characteristics:

- Heavy simultaneous transactions
- Heavy read activity
- Large data-set movement
- Heavy write activity

The following components are good candidates to move to an ioDrive for an easy performance upgrade:

- Tempdb/Temp-file/TEMPFILE
- Indexes
- Frequently accessed tables
- Transaction/Redo logs
- Very large tables

2 Testing performed for Fusion-io by Veritest.



THE GREEN SOLUTION

To date, getting more performance has meant increasing power and cooling yearafter-year.

Fusion-io reduces each server's power costs by 40%³ and cooling costs by double the power savings.⁴ Add to these savings the server compression that Fusion-io makes possible, and Fusion-io becomes one of the greenest moves any company can make.



IS FUSION-IO RIGHT FOR YOU?

Fusion-io is right for anyone who wants to:

- Improve database performance by at least 3-10x
- Run backups, recoveries, and batch jobs in minutes instead of hours
- Effectively address performance problems, end the cycle of continual performance evaluation and disk purchases
- Improve system reliability by reducing the number of failure points
- Implement unused features with high I/O impact like mirroring and replication to improve availability
- Significantly reduce the size of a scale-out database architecture

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- 3 According to the Information Business Technology Network, at least 40% of the power for a server with a performance disk array is consumed by the disks.
- 4 Cooling costs for servers double a server's power consumption. See Estimating Total Power Consumption by Servers in the U.S. and the World. ioDrives have much lower cooling requirements than disks and also allow organizations to remove the hard drives, opening air flow within the chassis, significantly increasing cooling efficiency.



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