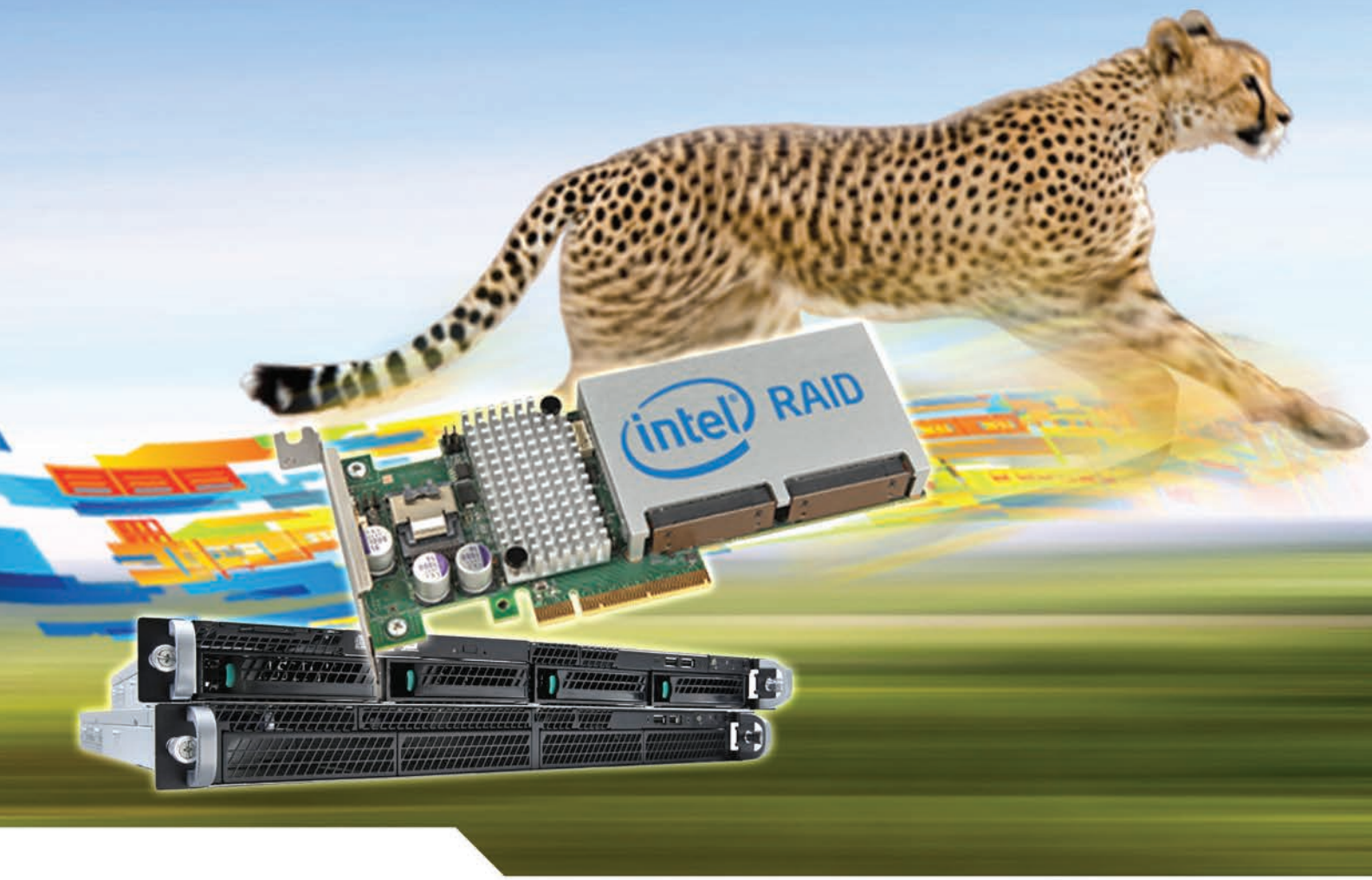
SOLUTION BRIEF

Intel® RAID SSD Cache Controller RCS25ZB040

When Faster Matters



Cost-Effective Intelligent RAID with Embedded High Performance Flash

Intel® RAID SSD Cache Controller RCS25ZB040

When Faster Matters.

As the volume of data continues to increase in size and complexity, today's data centers need a cost-effective way to increase the performance of existing applications and processes. This is especially true for data centers who work with Big Data/Hadoop, Gluster and Virtual Desktop Infrastructure (VDI) environments that can include Web 2.0, HyperScale, cloud, OLTP, virtualization, data warehousing and data analytics.

Now with the Intel® SSD Cache Controller RCS25ZB040, powered by LSI* Nytro Technology, organizations get smarter and faster storage that reduces total cost of ownership. It's the industry's only all-in-one solution integrating hardware RAID protection with onboard PCIe flash for data storage and/or intelligent read/write caching. The free integrated intelligent caching software removes I/O bottlenecks and increases performance in many applications including databases, indexing, Big Data/Hadoop, Gluster and VDI. It identifies frequently accessed data, or "hot spots", and promotes them to the fast on-board flash. Also, since it allows the CPU to be highly efficient and focus on the application, rather than flash management, it provides the most dollar per IOPS and dollar per gigabyte of existing drive investment. The flexibility of the onboard flash allows data storage, including the boot volume, to free up server drive bays for increased server capacity and density. Overall it delivers up to 1TB of onboard flash-based cache and two 800MHz RAID-on-Chip processor cores to help accelerate business applications.

With integrated boot, the Intel RCS25ZB040 frees up two drive slots to generate higher system efficiencies, with reboots that take seconds rather than hours. Plus, it significantly reduces degraded RAID array rebuild time during degraded states for these applications by fulfilling I/O requests from flash, allowing hard drive resources to focus on rebuild operations. The high level of data protection and availability makes storage solutions much safer. It replaces a RAID card or HBA in an existing configuration, delivering flash performance in all environments without adding server components. It's a simple option to add flash performance without investing in or qualifying SSDs.

Since all Intel RAID solutions are validated across multiple platforms with Intel® boards, chassis, and systems, when working together they provide a significant boost in performance and efficiency. Customized training, as well as service and support, make Intel the one source for customers seeking data protection, increased productivity, and simplified IT.

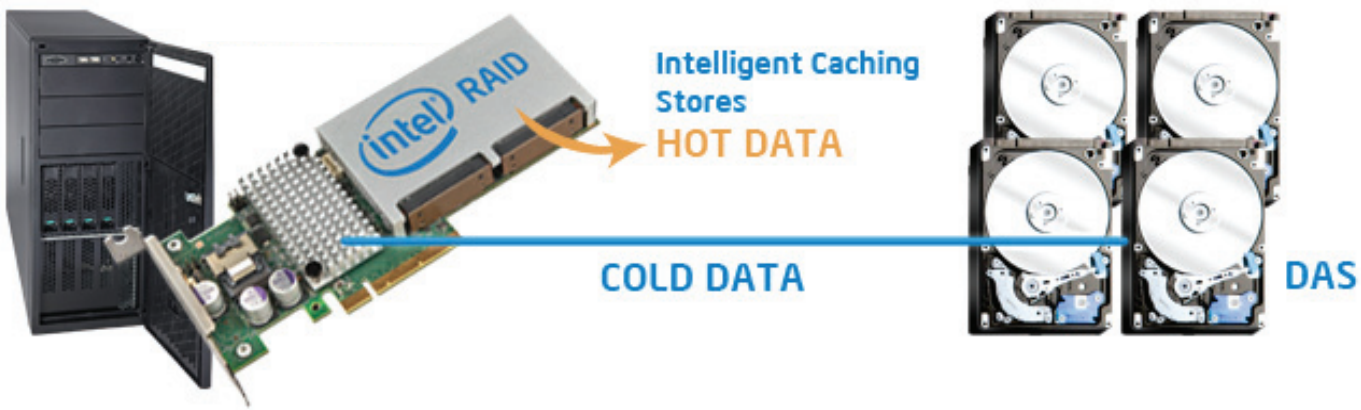
Did you know that SSD Caching RAID acceleration can be more cost-effective than direct attach solid-state drive (SSD)-only arrays or short stroked hard disk drive (HDD) environments?

Why Intel RAID SSD Cache Solutions?

- Integrated boot frees up two server drive slots with mirrored boot segments on the integrated NAND.
- RAID array rebuilds are accelerated with the possibility of time to optimal reduced from hours to minutes.
- Accelerate applications by up to 10X with caching hardware and software.
- Allows for highest performance without the need for "write back cache" (use of the DDR3 on the RAID card), which offers a significant TCO savings as cache backup units are not necessary.
- Near Plug and Play configuration with auto optimizing

How it Works

The Intel RCS25ZB040 uses intelligent caching algorithms to identify frequently accessed data, or "hot spots", and promote them to the fast on-board flash. It frees up the CPU and allows it to be highly efficient and focus on the application, rather than flash management.



- **Exceptional ROC performance augmented with high speed flash –** The dual core LSI* SAS2208 ROC and up to 1TB of flash significantly enhances the performance of mainstream applications.
- **Advanced capabilities that don't require you to be an expert –** Built-in caching algorithms manage data transfer to and from the flash pool without the need for special code, application data structure knowledge or time spent understanding configuration complexities.
- **Outstanding data protection and availability –** Supports data redundancy using SAS or SATA hard disk drives through mirroring, parity, and double parity (RAID levels 1, 5, and 6). Plus, it offers striping capability for spans (RAID levels 10, 50, and 60).
- **Optimized flash use for both Reads and Writes –** Many competing flash caching technologies only feature Read use and do not allow Write capabilities. Writes can be mirrored to protect against data loss prior to the date being written to the designated RAID array.
- **Faster rebuild during degraded states –** In a degraded array scenario, the time to optimal performance can be reduced by up to 75 percent.

By partitioning space on the embedded NAND of Intel RCS25ZB040 for an OS (mirroring optional), 4 x 3.5" disk drives can be dedicated to storing data.

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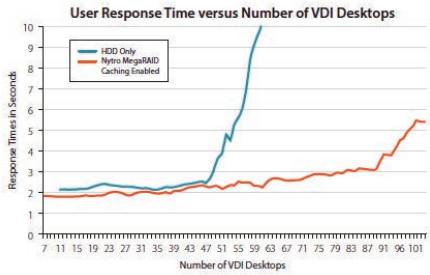
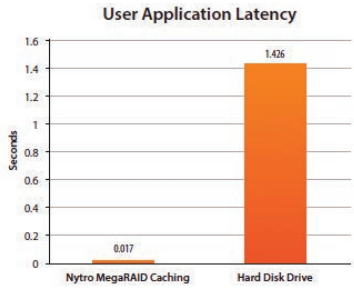
When Faster Matters.

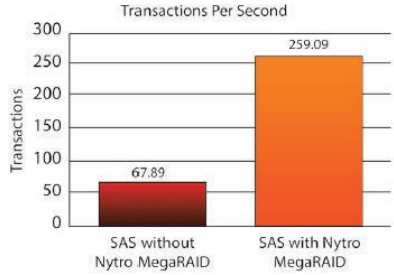
For organizations that work with Hadoop, VDI, SQL Server, MySQL and Oracle Databases, the Intel RCS25ZB040 PCIe, powered by LSI Nytro Technology, provides substantial value. It offers significant performance increases, removes I/O bottlenecks, identifies frequently accessed data and promotes them to the fast on-board flash, improves latency and more.



The following graph shows that when supporting more than 54 desktop sessions, the response time for the system with Nytro MegaRAID technology is significantly faster.[1]



Using SQL Server with a Intel RCS25ZB040 card lowers SQL Server wait times, improves latency, and transaction throughput.[1]



Sample chart regarding test results from baseline MySQL sysbench benchmark testing.[1]

VDI

The Intel RCS25ZB04 is designed to expedite data across a virtual desktop infrastructure (VDI) while decreasing the cost per desktop.

It accelerates VDI performance through intelligent caching technology, which monitors frequently accessed data and retains it on its enterprise-grade flash for faster access. Plus, it moves data faster across a VDI and reduces the cost per desktop within the infrastructure.

SQL Server

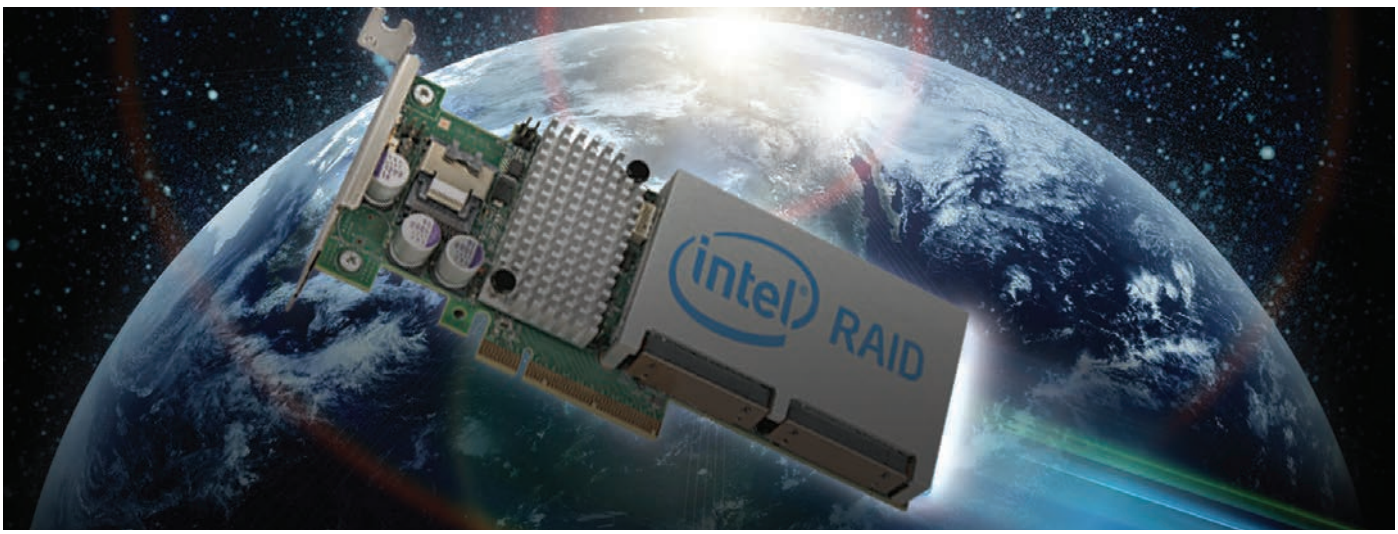
By combining on-board flash technology with RAID-on-Chip (ROC) technology, Intel RCS25ZB04 accelerates key business applications in SQL server databases.

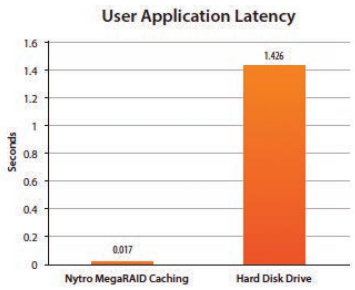
It delivers low latency responses from flash storage and economy by using direct-attached HDD storage. Through intelligent caching algorithms the controller identifies application "hot spots" and stores this data onto its on-card eMLC NAND flash. In a lab test designed to simulate a real world SQL Server, a latency reduction of 80% was observed for online transaction processing.[1]

MySQL

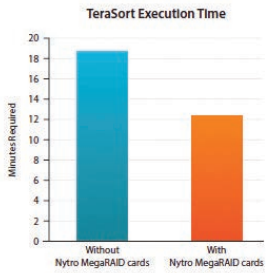
The Intel RCS25ZB04 can significantly reduce Capex and Opex expenses while delivering scalable I/O to critical B2B applications.

When a major online Internet retailer tested the impact of the Intel RCS25ZB04 on server performance, specifically transactions per second, it found it improved server performance by nearly four times. Also, the controller is anticipated to contribute to a savings of nearly $3.7 million in CAPEX and OPEX over three years attributable to lower total hardware costs and reduced power consumption.





The benchmark results showed substantial performance gains in the average response times by utilizing the Intel RCS25ZB040 card to cache DAS-based HDD data.[1]



TeraSort was run on eight servers to measure the time required to complete the benchmark. This shows the same TeraSort job executed 33% faster. With Nytro technology.[1]

Oracle Database

The Intel RCS25ZB04 significantly accelerates applications in an Oracle® database by caching frequently accessed data and significantly reducing the latency required to access it.

Through testing of a specific Oracle database simulating a real-world online transaction application, the latency of the DAS-based HDD array was nine times higher than the same array with Intel RCS25ZB040 installed. On the basis of this test, it is believed that the transaction response time for most Oracle databases with HDD array-based installations can be dramatically improved by adding an Intel RCS25ZB040. Since this add-in card has a low profile, MD2 profile form factor, it can be easily integrated into an existing DAS storage system. Furthermore, near Plug and Play set-up means that it can be installed without involvement from the database or application administrator.

Apache Hadoop

The Intel RCS25ZB04 can cut Hadoop execution times significantly and help IT teams reduce or redeploy up to a third of their servers in Hadoop environments.

When the embedded flash and intelligent caching software of the Intel RCS25ZB04 drives Hadoop-based datasets, they can cut execution times by as much as 33 percent.[1] Plus, these cards can spread Hadoop jobs over fewer machines, which results in lower capital costs and decreased data center cooling and power costs. In a typical data center installation of 1,000 servers, an estimated savings of nearly $7.4 million over three years, may be possible.

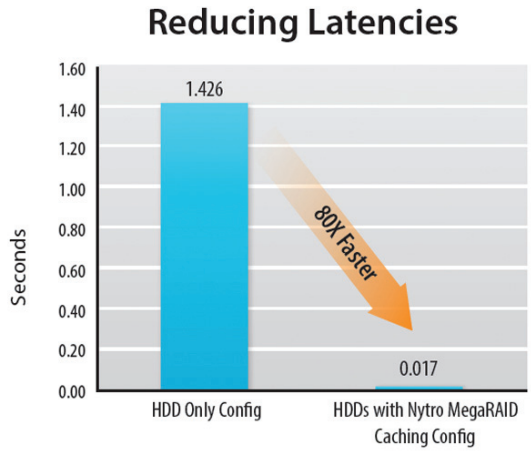
Intel® RAID SSD Cache Controller RCS25ZB040

Faster, Smarter, and More Efficient Storage Acceleration

Intel RCS25ZB040, powered by LSI Nytro Technology, provides smarter and faster flash-based storage that can be used in numerous ways to help improve performance and server storage density. See real world examples of how the MegaRAID data protection and flexible onboard flash technology of LSI Nytro Technology has helped improve storage infrastructures.

Performance Benefits and More

Data requests served from flash can significantly reduce application latency, which leads to improved user response times and quality-of-service. The graph below compares the performance of a SQL Server® database used in an online transaction processing (OLTP) workload with a hardware configuration with only HDDs, against an Intel RCS25ZB040-based configuration. A test found that the Nytro MegaRAID technology with intelligent caching and integrated flash storage yielded an 80 times faster response. Applications that benefit from caching can also benefit from reduced rebuild time for degraded RAID arrays, even when using high-capacity HDDs. With the Intel RCS25ZB040 servicing I/O from the onboard flash, the backend HDDs are less burdened and can dedicate more resources to the rebuild operation.



Use Case: Leading Computer Solutions Company

A leading provider of innovative computer solutions wanted to create a fast, robust, easily evaluated, installed and managed VDI solution designed to give its customers the performance they expected with a lower TCO.

The Challenge: Typical VDI use cases can call for read/write ratios of 1:1, placing a strain on the I/O subsystem. To achieve densities of 50-100 virtual desktops per server appliance, the company needed to solve the disk I/O problem.

The Solution: The company developed a server appliance with flash-based application acceleration powered by Intel RCS25ZB040. This enabled them to have better control over performance, component quality and a higher level of integration to make VDI functionality a "drop-in" for most IT departments.

Use Case: University

A major university wanted to find out if it should upgrade its Gluster configuration, an open source distributed file system, with the high-performance parallel file system FraunhoferFS (FhGFS).

The Challenge: Since the university had already implemented Gluster, FhGFS would have to provide a number of compelling benefits to consider a move to the new architecture.

The Solution: A newer FhGFS hardware configuration produced a 5 to 10 times performance increase compared to the older system used by the university. It achieved the upper range of improvement with 10 times the I/O when handling the large volumes of tested data. The RAID combination with embedded NAND and LSI* Nytro MegaRAID technology helped to decrease the query time from a half to a third compared to the previous RAID solution.

Intel® RAID SSD Cache Controller RCS25ZB040
Powered by LSI MegaRAID* Technology

Intel® RAID SSD Cache Controller RCS25ZB040 Technical Specifications

Order Codes	RAID Card with 256GB SSD Cache[2]: RCS25ZB040 RAID Card with 1TB SSD Cache[2]: RCS25ZB040LX Maintenance Free Backup Unit: AXXRMFBU3 Cable Kit: AXXCBL650MSMS or AXXCBL740MS7P
RAID Levels and Spans	RAID Levels 0, 1, 5, 10, 50, 60
Data Protection Feature Highlights	Online Capacity Expansion Hot-Spare Support – Global & Dedicated Single Controller Multipathing (Failover) Enclosure Management Background Consistency Checking Patrol Read for Media Functionality S.M.A.R.T. Support
Intel® RAID Software	Intel® RAID Web Console 2 Intel® RAID Command Line Tool Intel® RAID Flash Utilities
I/O Processor	LSI SAS2208 ROC running at 800 MHz
Drive Types	SAS 6Gb/s or SATA 6Gb/s, SAS 3Gb/s or SATA 3Gb/s
Maximum Drives	Up to 128 physical devices supported
Connectors	One SAS SFF8087 x4 SAS internal connectors
Cache Memory	Embedded 1GB at 800MHz
PCI Interface	x8 PCI Express* 2.0
Cache Backup	Optional Intel® RAID Maintenance Free Backup Unit AXXRMFBU3
Form Factor	Low profile, MD2 (6.6" X 2.536")
Data Transfer Rates	Up to 6Gb/s per port
Operating Temperature	Maximum ambient: 65°C (55°C with optional MFBU)
Operating Voltage	+3.3 V
Operating Systems	Extensive support includes Microsoft* Windows* Vista/2008/Server, 2003/2000/XP, Linux*, Solaris*(x86), Netware*, FreeBSD*, VMware* and more. * Visit intel.com for the most complete list of supported operating systems

For more information on the Intel® RAID Cache Controller RCS25ZB040, visit: www.intel.com/go/RAID

For more information on how to make the Intel® RAID Cache Controller RCS25ZB040 part of your server environment, please contact an Intel® Channel Partner Program participant.

1 - Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing.

2 - The amount of NAND available for storage use is approximately 200GB for the card with 256GB of total NAND and 800GB for the card with 1TB of total NAND.

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