KAMINARIO
Simply Faster

1,500,000 IOPS
16 GBs

100,000 IOPS
1.6 GBs

Kaminario® K2 and Dell

Kaminario K2 All Solid-state SAN Storage: Meeting the Performance Demands of Critical Business Applications

Fast and available data is critical for today's dynamic business environments. Organizations must access data at rates that match the competitive nature of the business. Slow data access and processing means slow application responsiveness and possibly lost business.

Lengthy risk and trading analysis, long billing cycles, slow e-commerce websites, inefficient customer service queries, and IT's inability to meet SLAs are common scenarios which challenge businesses today. In the majority of the cases, these performance challenges are the result of storage I/O bottlenecks.

To solve storage I/O bottlenecks, reduce latency and increase throughput, requires changing the way data is accessed. In addition, to meet the needs of the most demanding applications, IT managers must dramatically scale the number of I/O's per second and do it in a way that protects the data. The Kaminario K2 all solid-state SAN storage solutions powered by Dell PowerEdge blade servers are designed to meet these challenges.

Revolutionary Capabilities

Kaminario K2 high performance all solid-state SAN storage eliminates I/O bottlenecks, reduces latency, and increases throughput to accelerate critical business applications, at a lower cost and footprint than legacy SAN storage.

Freedom of Choice

The Kaminario K2 is the first enterprise storage system to allow customers the freedom to choose the right SSD media type, DRAM, Flash or both, for their specific application performance requirements, workload, and budget. Now customers can choose between DRAM, Flash, or a combination of the two, to deliver specific performance levels for each set of application data. The Kaminario K2 represents freedom of choice in a single storage system and all without compromising on enterprise high availability or ease of use.

Revolutionizing SSD Storage with DataProtect™

Kaminario K2 achieves its extreme performance and reliability through its unique Scale-out Performance Storage Architecture™ (SPEAR) that has been designed specifically for SSDs. SPEAR is a clustered SAN architecture for maximum SSD storage performance, high availability, and data protection, as well as easy storage management and performance monitoring. The SPEAR Storage Operating System includes Kaminario's DataProtect technology that provides end-to-end high availability and data protection to SSD storage while delivering extreme performance.

Kaminario and Dell have partnered to change the way data is accessed and to accelerate business-critical applications and databases.

K2 All Solid-state SAN Storage Solutions Are:

Fast – Consistent, blazingly fast performance is achieved by the unique Kaminario SPEAR design which automatically distributes and manages the data over a cluster of modular, high-end blade-based I/O distribution controllers and all solid-state (DRAM and/or Flash) primary

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Kaminario K2 Capabilities:

- Scale-out Performance Storage Architecture™ (SPEAR)
    - Modular, scalable cluster design
    - Open, blade-based enterprise components
    - All solid-state SAN (Flash and DRAM)
- Supports virtualization and cloud storage environments
- Consistent Fast Performance
    - Low latency
    - High throughput
    - Scalable
- DataProtect™
    - Self-healing high availability
    - Fast, high volume data protection
- Fast and Easy Deployment and Automated Management
- Cost-effective — Lower cost and footprint than legacy SAN storage

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Results:

Data Mining/Warehousing
SQL Server® Cluster Queries — 2x faster

Brokerage Reporting
Oracle® DBMS — 7x faster

Private Banking
Batch Processing — 11x faster

Email Marketing
SQL Server® Clusters Reports — 11x faster

Electric Utilities
SAP® Batch Processing — 10x faster

Manufacturing
Oracle® RAC ERP — 18x faster

Business Intelligence
SAS® Supply Chain Inteliigence — 2x faster

storage. As the SPEAR Storage Operating System dynamically balances the load, the Kaminario K2 delivers ultra-low latency and high throughput for any workload over time.

Safe – Self-healing high availability is assured by redundancy of all components and sub-systems. The data resides in solid state drives (SSDs), DRAM and/or Flash, and is automatically backed up onto a mirrored hard disk drive (HDD) or Flash SSD subsystem. The N+1 system redundancy is designed to deliver no single point of failure and is equipped with automated hardware (based on online sparing) and data recovery. The Kaminario K2 is also protected with redundant UPSs.

Easy – Implementing Kaminario K2 takes less than a day. Once deployed, it requires no tuning whatsoever and delivers consistent performance regardless of workload, random or sequential. It supports any application and database with no data modeling or program changes.
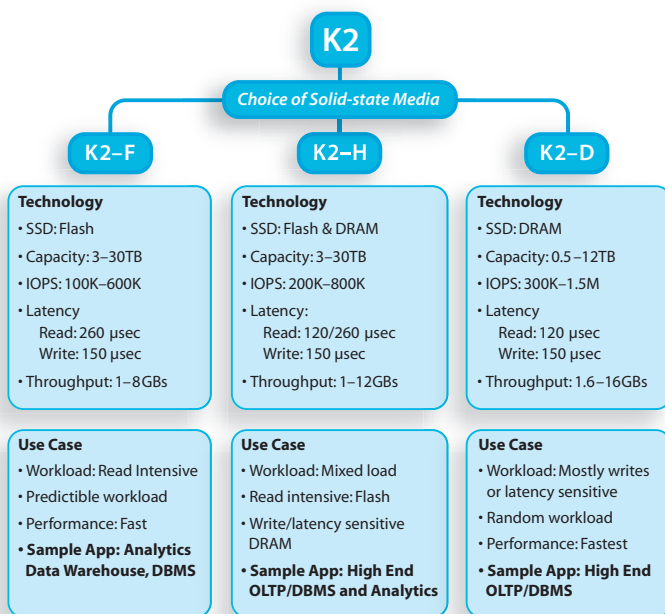
Low-cost and Efficient – The Kaminario K2 also has a lower cost and footprint than legacy SAN storage. It is compatible with Green initiatives by enabling IT managers to consolidate storage from multiple systems to a single high performance, efficient, and scalable Kaminario K2 that also conserves on space and power.

The Dell PowerEdge blade server architecture enables Kaminario K2 all solid-state storage solutions to scale to meet the most demanding business needs and budgets.

Kaminario K2 Models

The Kaminario K2 comes in three models: the K2-F which is Flash only, the K2-H which is a hybrid of DRAM and Flash, and the K2-D which is DRAM only. K2 models come standard with Kaminario's DataProtect high availability and data protection. Features of each model are described below.

Kaminario K2 Models – Specifications and Application Use Cases

K2

Choice of Solid-state Media

K2–F	**K2–H**	**K2–D**
Technology	**Technology**	**Technology**
• SSD: Flash	• SSD: Flash & DRAM	• SSD: DRAM
• Capacity: 3–30TB	• Capacity: 3–30TB	• Capacity: 0.5–12TB
• IOPS: 100K–600K	• IOPS: 200K–800K	• IOPS: 300K–1.5M
• Latency: Read: 260 μsec Write: 150 μsec	• Latency: Read: 120/260 μsec Write: 150 μsec	• Latency: Read: 120 μsec Write: 150 μsec
• Throughput: 1–8GBs	• Throughput: 1–12GBs	• Throughput: 1.6–16GBs
Use Case	**Use Case**	**Use Case**
• Workload: Read Intensive	• Workload: Mixed load	• Workload: Mostly writes or latency sensitive
• Predictible workload	• Read intensive: Flash	• Random workload
• Performance: Fast	• Write/latency sensitive DRAM	• Performance: Fastest
• **Sample App: Analytics Data Warehouse, DBMS**	• **Sample App: High End OLTP/DBMS and Analytics**	• **Sample App: High End OLTP/DBMS**

Features	
Primay Data Media Choices	DDR3 SDRAM (8 GB or 16 GB) Flash (MLC)
Data Protection Media Choices	HDD or Flash SSD
Connectivity	2, 4 & 8 Gb/sec Fibre Channel
Fibre Channel Ports	At least 16

Physical Specifications	
Rack	42U rack

Power	**K2-F**	**K2-H**	**K2-D**
Power Consumption*	1.5Kwatt (typical)	1.75Kwatt (typical)	1.75Kwatt (typical)
Power Source	Two Single Phase 32 A 208/220/230 or 240 V outlets		
Power Protection	Redundant UPS in all Kaminario K2 models		

*Actual power consumption will be dependent on the individual configuration.

Kaminario is a registered trademark in IL, US, Europe.

Fast
- Eliminates I/O bottlenecks
- Millions of IOPS with ultra-low latency
- Dramatic application performance improvement
- Consistent performance under any workload and over time

Safe
- DataProtect enterprise-class reliability for SSDs
- Automated, self-healing high availability and fast data protection
- Non-disruptive operation: no single point of failure, hot-swap components
- RAID 10HD mirroring and striping across all SSDs
- Fast, high volume snapshots and asynchronous replication
- Maintains end-to-end data integrity

Easy
- Open blade-based standard enterprise components
- Standard block device
- Fully transparent — no change to applications or data
- Automated self-healing management
- Fast deployment; automated data distribution
- No need for performance tuning
- No performance degradation over time
- Scale performance and capacity

For more information on the Kaminario K2, go to: http://www.kaminario.com/products/K2-Solid-State-SAN-Storage/.

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