Virident FlashMAX II™

The Platform for Flash Storage and Networking

Virident incorporates specialized software and hardware that combine to implement a Flash Platform on the Server's PCIe bus, as close to the application as possible. Virident's architecture has been designed to tightly integrate different kinds of flash media, hardware and software to deliver memory-class performance with storage-class capacity and persistence. Virident's FlashMAX II devices and associated software provide performance without compromise, with the highest capacity in a low profile, universal form factor.

Virident vFAS™

vFAS stands for Virident Flash-management with Adaptive Scheduling, which is the Virident software layer that delivers the most efficient access to flash media for applications. In addition to providing optimized access for peak performance, vFAS also includes many sophisticated techniques for ensuring that applications get a steady, sustained stream of data at all times. vFAS virtualizes the underlying flash media to present a standard block device interface to applications, without leveraging inefficient storage protocols or interconnects, resulting in unprecedented gains in application performance without any change to the application.

Virident's FlashMAX II presents a traditional block storage volume to the host so that applications can easily access it without realizing that it is a different type of media. But that is where the similarity to a disk drive, and disk drive interfaces, ends. vFAS has been designed to treat flash media much more like an extension of memory, while maintaining a traditional block storage interface for applications. All of this is done without leveraging storage protocols, storage controllers, or storage interconnects. The result is access latencies under 20 µs, which is closer to DRAM performance than storage. The results are clearly demonstrated by the ability of Virident's FlashMAX II with vFAS to deliver over 1.1 Million IOPS in a single low-profile card.

Unconditional Performance

Virident's FlashMAX II with vFAS delivers consistent performance across all application workloads, as well as when the device is fully utilized. FlashMAX II with vFAS delivers application performance whether it is peak small block read performance, where a single low profile card can deliver over 1.1 million IOPS, or sustained mixed read/write performance when the drive is nearly full. No other product on the market today can deliver this.

Simplified Management

Unlike competing solutions, 100% of the capacity available on a FlashMAX II card is available as a single host volume on the server without having to leverage 3rd party software RAID products to stripe across multiple drives. With FlashMAX, II you can have a single volume presented to the operating system up to the formatted capacity, which can be as large as 4.8 TB, when using the FlashMAX Capacity product.

Flash-aware RAID

vFAS supports flash-aware RAID for enhanced reliability and data availability. This feature allows the discrete flash components included on the card to be isolated as separate slices to provide a RAID5, 7+1 protection, implemented in a flash optimized manner. The flash modules on a card are spread across RAID groups, allowing for multiple failures to occur without disrupting an application's access to the data. This delivers continuity of operations in the event that there are failures with the flash media itself.

Global and Local Wear Leveling

Virident FlashMAX II with vFAS offers global wear leveling to maximize the lifetime of the flash media. Also, data is relocated to other parts of flash that are less-used whenever needed. The sophisticated wear leveling of FlashMAX II delivers maximum lifetime of the flash media.

Highest Capacity in Low Profile

FlashMAX Capacity delivers 4.8TB of flash in a single low profile form factor PCIe device. FlashMAX Capacity enables new levels of consolidation in the data center, making it ideal for web scale, enterprise and service provider environments requiring the maximum usable flash capacity. By more than doubling the density of its industry-leading product FlashMAX II, along with the combination of its FlashMAX Connect software suite, Virident is enabling the flash platform transformation.

Viridient FlashMAX II

The Flash Platform

Uncompromised performance across a wide variety of workloads and over the lifetime of the product

Over 2X performance/price as compared to other flash based solutions

Sustained, predictable random IOPS – Best in the Industry

Over 1m IOPs from a single low profile device

Flash-aware RAID

Highest capacity and performance density in the industry for PCIe attached flash storage product

Dynamic, global wear-leveling

Enterprise-grade reliability: end-to-end data-path protection advanced ECC

Performance Specifications

Product Category	Standard	Performance	Capacity
Flash Type	MLC	MLC	MLC
Capacity (GB)	550, 1100	1100, 2200	4800
Read Bandwidth (64KB random)	1.6 GB/s	2.7 GB/s	2.6 GB/s
Write Bandwidth (64KB sequential)	550 MB/s	1 GB/s	900 MB/s
Random Read IOPS (512B)	630,000	1,130,000	850,000
Random Read IOPS (4KB)	175,000	340,000	270,000
Sustained Random Write IOPS (4KB)	50,000	110,000	45,000
Sustained 25% write, 75% read IOPS (4KB)	110,000	220,000	120,000
Read Latency (4KB random)	76 µs	76 µs	78 µs
Write Latency (512B sequential)	16 µs	18 µs	18 µs

Compatibility

Form -factor	Half height, half length PCIe card
Connectivity	PCI Express 2.0 x8
Application Interface	Standard block device
Platform Support	**Linux:** RHEL 5/6, SLES 10/11, CentOS 5/6, Oracle EL 5/6, Debian 4/5/6, Ubuntu 8/9/10/11/12, Fedora Core 12-18, Open SUSE 11, 12 **Windows:** 64-Bit Microsoft Server 2008 R2 SP1, Windows 2K-8 R2 Hyper-V core server, Windows 2012 Server, Windows 2012 Hyper-V core server **VMware:** ESXi 5.X

Environmental Specifications

	Min	Max
Operating Temperature °C*	0	45
Non-operating Temperature °C	-40	70
Airflow (LFM)**	200	
Humidity (%)	5	95
Weight (oz)	5	7

*Temperature derated 1°C per 1000 ft elevation above sea level.

**Airflow specifications with card inlet at 45°C.

Agency Certification

US / Canada	UL 60950 1 & CSA C22.2 FCC Part 15 Subpart B Section 15.109A/ANSI C63.4 (2003) ICES-003 Version 4, Class A Radiated & Conducted Emissions Class A EN 55022, Class A EN 55024 Immunity
Europe	2004/108/EC EMC Directive CE IEC 61000 Class A Mark
Japan	VCCI - V-1/2009.04
	RoHS (DIRECTIVE 2011/65/EU) REACH SVHC