WHITE PAPER

IBM FLASHSYSTEM 900: *VALUE AT THE CORE*

The latest IBM FlashSystem™ all-flash storage array delivers unprecedented performance, reliability, and efficiency—thanks to the IBM FlashCore™ technology within.

Few decision makers have trouble recognizing

the value of real-time analytics these days. To the contrary, rising hunger for on-demand market insights will drive global spending on big data solutions to a whopping $125 billion in 2015, according to Framingham, Mass.-based analyst firm IDC.[1]

For IT executives, the upshot will be an even greater need for high-performance storage. Processing enormous volumes of information at the speed of business is I/O-intensive work, notes Mark Peters, a senior analyst at Enterprise Strategy Group Inc., of Milford, Mass. "That just puts a lot of strain on the storage," he says. The same goes for virtual desktop infrastructure (VDI) solutions. "The very point of VDI is to put lots of desktops on a few servers," Peters notes. If the performance that results is slower than what users get from physical PCs, IT managers will never hear the end of it.

In fact, most of today's rapidly growing mission-critical workloads—from real-time analytics and VDI to streaming media and software as a service—demand extreme performance, as well as enterprise-grade availability and outstanding efficiency.

Not coincidentally, the IBM FlashSystem 900 all-flash storage array excels in all three categories. To understand why, though, one must look past that powerful new device's glossy exterior to the hardware and software foundation inside. Called IBM FlashCore™ technology, that underlying suite of unique innovations is the key to why the FlashSystem 900—and the rest of the IBM FlashSystem family—run faster, more reliably, and more efficient than other all-flash solutions.

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[1] "IDC Predictions 2015: Accelerating Innovation — and Growth — on the 3rd Platform," December 2014.

INNOVATIVE DESIGN

Several factors differentiate IBM FlashCore technology from the flash storage pack, beginning with its engineering focus. Unlike flash platforms adapted from disk storage architectures, FlashCore technology was optimized for flash from the chip up by engineers who know every trick in the book for maximizing storage performance. For example, most flash storage solutions rely heavily on software when processing data. "The more software you use along the data path, the slower it runs," observes Woody Hutsell, a business development manager in the IBM FlashSystem product unit. The data path and RAID controller in FlashCore storage arrays, by contrast, are exclusively hardware-based, and thus significantly faster.

To further accelerate performance, FlashCore-based arrays offload storage management tasks to a special, dedicated CPU. "The idea is to make sure you're using your main processors where they can do the most good, which is reading and writing data," Hutsell says. Giving management chores a processor of their own increases reliability too, he adds, by enabling administrators to perform code updates and other maintenance procedures without taking the array offline.

IBM FlashSystem 900

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And that's just one of FlashCore technology's many sophisticated, reliability-enhancing features. Others include redundant hardware components, parallel data paths that keep data flowing even when one path becomes unavailable, and IBM Variable Stripe RAID™, an IBM technology that allows flash storage modules to automatically recover from potentially disabling problems.

FlashCore-based arrays deliver consistently high efficiency too, thanks to an innovative architecture that enables the use of denser-capacity flash chips. "That allows us to offer higher capacity per rack unit, which means you get greater density and less consumption of floor space," Hutsell says. And since solid-state hardware inherently uses less electricity than systems with moving parts, solutions based on IBM FlashCore technology consume less power than disk-based storage systems too, he adds.

Of course, performance, reliability, and efficiency aren't the only qualities companies look for in a storage solution, so IBM FlashCore technology also offers unsurpassed scalability and robust inline data encryption powered by its own coprocessors. "Businesses increasingly want to secure their data not just in transit but at rest, and FlashCore technology has built-in encryption that lets them do that without slowing anything down," Hutsell says.

MEETING EXPECTATIONS

While such features have been FlashCore technology mainstays for years, others are making their debut in the FlashSystem 900, including new multilevel cell (MLC) flash chips. Successfully integrated into the FlashCore architecture, thanks to a collaboration between IBM and Boise, Idaho-based Micron Technology Inc., they combine the density of standard MLC memory with the write endurance of more expensive enterprise MLC (eMLC) products. "The result is 40 percent more capacity than the earlier IBM FlashSystem 840™ in the same 2U form factor, without any compromise in endurance or availability," Hutsell says. Or performance, he continues. "Our close collaboration with Micron allowed us to get deep inside the new chip and fine-tune everything about it for maximum speed," Hutsell says.

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—Woody Hutsell, business development manager, IBM

The new edition of IBM FlashCore technology includes additional latency-reducing innovations as well. For example, before a flash storage array performs a write it must first erase cells in one or more of its solid-state chips. "FlashCore technology now uses the overprovisioning space that most flash storage solutions come with to essentially pre-erase cells, so when a write comes in the only thing the system has to do is the write itself," Hutsell says. That allows the FlashSystem 900 to run even faster than earlier arrays.

To further boost reliability, meanwhile, IBM has added new state-of-the-art error-correction and wear-leveling functionality to FlashCore technology. The former preserves data integrity by automatically detecting and compensating for the faulty cells found in even the best flash memory, while the latter extends a FlashCore-based array's life span by distributing data evenly across its storage modules. Both are far more rigorous than anything found in most flash solutions. "They help the FlashSystem 900 provide the durability and dependability enterprise data centers need," Hutsell says.

Those demands are sure to increase in the years ahead, as is the need for speed by business leaders, IT executives, and consumers alike. "In a general sense, user [performance] expectations rise every day," Peters notes. In response, IBM continuously pushes IBM FlashCore technology and FlashCore-based arrays like the FlashSystem 900 to ever-greater heights of performance, reliability, and efficiency. ■

For more information, visit
ibm.com/storage/flash/900

EXECUTIVE VIEWPOINT

The IBM FlashCore Technology Advantage

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Jan Janick brings over 30 years of design, management, and innovation leadership experience in technologies ranging from personal computing to leading edge flash storage systems.

IBM FlashCore technology lies at the heart of IBM FlashSystem storage, making the new FlashSystem 900 the fastest, most dependable, and most cost-effective edition of FlashSystem yet. In this executive Q&A, IBM's Jan Janick discusses the innovative capabilities that differentiate IBM FlashCore technology from competing flash platforms, as well as the new FlashCore technology features that distinguish the IBM FlashSystem 900 from other all-flash storage arrays.

Q: What makes IBM FlashCore technology unique?

A: IBM FlashCore technology is both hardware-based and purpose-engineered to provide extreme performance, reliably and cost-effectively. That's something no other flash storage manufacturer can say. Our competitors all cobble together SSDs and other components that weren't originally designed for use in all-flash arrays, so their products offer weaker performance without truly reducing CAPEX, and certainly without reducing OPEX.

Also, other flash systems focus on software, which introduces latency. IBM FlashCore technology reduces latency by utilizing hardware-based engineering whenever possible. That's important, because the lower latency of flash storage is what drives much of its value to enterprises. FlashSystem is purpose-built to offer the lowest latency in the market.

"While our competitors are fixing bugs in the first generations of their solutions, our engineers are adding cutting-edge features to a mature flash storage platform with years of successful deployments in the most mission-critical environments."

Q: How do IBM FlashCore technology's unique advantages translate into business value?

A: The microsecond latency enabled by IBM FlashCore technology empowers businesses to achieve competitive advantage by analyzing trends and driving innovation faster. Also, purpose-built technologies like FlashCore lower operating costs by consuming less power, less HVAC, and less floor space without sacrificing performance; and they lower hardware and software costs too by increasing server utilization. Finally, FlashCore technology's hardware-based architecture includes enterprise-grade reliability features that allow concurrent code loading and maintenance with no performance impacts. Your business isn't up and running these days unless your IT infrastructure is as well, so functionality like that translates directly into more revenue and higher profits.

Q: What makes the new FlashSystem 900 the most powerful and efficient implementation of IBM FlashCore technology yet?

A: Think of it as evolution rather than revolution. To make the FlashSystem 900 the most powerful and efficient FlashCore-based storage array ever we simply continued along the engineering trajectory we've been following for years. While our competitors are fixing bugs in the first generations of their solutions, our engineers are adding cutting-edge features to a mature flash storage platform with years of successful deployments in the most mission-critical environments.

Q: How does IBM's collaboration with Micron benefit its customers?

A: The engineering in IBM FlashCore technology is not only powerful but flexible as well. That gave us the freedom to equip the FlashSystem 900 and future FlashSystem solutions with engineering innovations optimized to the flash chip from Micron, resulting in extremely attractive density and cost benefits with absolutely no compromise in system performance or reliability. The upshot is we can now deliver FlashSystem products that are even more efficient and cost competitive than earlier IBM all-flash arrays. ■

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