White Paper

Pure Storage's Next-Generation FlashBlade//S Delivers a Huge Leap Forward for Unstructured Data Storage

Sponsored by: Pure Storage

Eric Burgener
May 2022

IDC OPINION

As enterprises work through digital transformation — the wholesale migration to much more data-centric business models — they are modernizing their information technology (IT) infrastructure. Given the massive amount of data that IT organizations will be dealing with going forward, getting the storage infrastructure upgrades right is critical. Legacy architectures are just not able to cost effectively meet the performance, availability, and scalability objectives of the next-generation workloads being deployed as part of digital transformation.

Roughly four-fifths of the data growth over the next five years will be composed of unstructured data. That means that most of the data used for analytics will be file and/or object based, and that places a spotlight on unstructured data storage solutions. As they deploy these types of solutions that will in most cases need to scale out to easily support tens of petabytes, enterprises are very concerned about infrastructure efficiency. It is becoming increasingly clear from the strategy changes among hyperscalers that large-scale computing environments can be more efficiently built using disaggregated architectures. Disaggregation enables administrators not only to assemble the right balance of IT resources for a given workload to minimize costs but also to perform technology upgrades on different resources independently as needed. For large-scale settings, disaggregation is a major contributor to infrastructure efficiency. Environmental, social, and corporate governance (ESG) considerations are becoming an increasingly important consideration given budget and datacenter power and space constraints. Enterprises are starting to consider cost and power efficiency metrics as part of the purchase process to ensure that their budgets and IT resources get used as efficiently as possible. In fact, major hyperscalers such as Meta have recently announced storage infrastructure deals where ESG considerations figured prominently.

In June 2022, Pure Storage introduced a major upgrade to its FlashBlade all-flash "unified fast file and object" (UFFO) storage platform called the FlashBlade//S. While this platform has already been tremendously successful for Pure Storage (its revenue allowed it to claim to be a storage unicorn [had it been a standalone business] after less than four years of shipments) and for its customers, the vendor has significantly re-architected the platform. The result of these design changes include disaggregating resources (storage compute and capacity can now be upgraded independently); enhancing system flexibility; optimizing the system to use denser, lower-cost quad-level cell (QLC) NAND flash media; increasing performance and capacity by 2.5 times (relative to the current FlashBlade); and further improving the platform's already industry-leading cost and power efficiency. To underline its commitment to efficiency, Pure Storage also just released its first ESG report. Enterprises needing to modernize their unstructured storage strategies should look at the new FlashBlade//S.

May 2022, IDC #US49102422

SITUATION OVERVIEW

As enterprises move through digital transformation, roughly 70% of them will be modernizing their server, storage, and/or data protection infrastructure to better accommodate the evolving mix of workloads. The move to much more data-centric business models has enterprises deploying modern data analytics workloads and leveraging artificial intelligence (AI), machine learning (ML), and/or deep learning (DL) technologies to drive more value out of their data. This is generating new demands on storage infrastructure that legacy designs are challenged to meet cost effectively:

- Modern data analytics workloads directly support day-to-day business operations, often in real time, increasing availability requirements (with downtime issues comprising the top 2 datacenter concerns in IDC's 2021 *Datacenter Operational Survey* of 401 United States–based organizations).
- Enterprises are capturing, storing, protecting, and analyzing more data than ever before, driving concerns around both performance and scalability.
- Budget and energy constraints drive an increasing interest in improving overall IT infrastructure efficiency (IDC's 2021 *Datacenter Operational Survey* cited previously shows that one in four reporting delays in IT deployments are due to power or space constraints).

The average enterprise will experience data growth of 30–40% per year, and over the next five years roughly four-fifths of that data will be unstructured. Storage vendors are introducing new systems to meet this set of requirements, and most of these platforms are software defined and based around scale-out architectures. Software-optimized scale-out systems provide more flexibility than traditionally architected systems to accommodate a wide variety of different workloads with different I/O profiles, support the latest new media types, scale cost effectively across a wide range, and enable nondisruptive technology refresh.

With IT infrastructure availability becoming critical, enterprises are looking for a number of storage infrastructure capabilities. Systems must not only provide high data durability but also enable transparent recovery from component failures. With storage device sizes getting larger (to help customers build large-scale systems more cost effectively), there are concerns around performance in degraded mode operation as well as data rebuild times. Built-in hardware redundancy, along with easily accessible, hot-pluggable, and highly reliable components, needs to be paired with nondisruptive software and multigenerational technology upgrades to keep downtime (regardless of whether it's planned or unplanned) to a minimum. Software features like host multipathing, erasure coding, snapshots, and replication also play a role in crafting "defense in depth" strategies that ensure data is always available.

High data growth rates mean that most enterprises will be managing multipetabyte unstructured data sets within the next two years, and many are already doing so. Different workloads require different aspects of performance — some require high write ingest, some require low-latency random access, and others require high read bandwidth. With enterprises planning to consolidate more workloads onto modernized storage infrastructure to reduce the number of systems that must be purchased and managed, the ability to handle the requirements of heterogeneous workloads together with predictable performance (an aspect referred to as high concurrency) is becoming increasingly important.

IT managers should also note how the performance curve evolves as systems are scaled out — architectural limitations particularly with more legacy storage might limit realistic capacity utilization. With older designs, performance declines at higher utilization levels and administrators may not want

to utilize a system beyond 60–65% capacity and instead rely on additional systems to achieve overall performance goals. More advanced designs, on the other hand, may allow systems to be effectively expanded to much higher utilization levels while keeping the performance consistently high. When building multipetabyte systems, this difference can have a huge impact on total cost of ownership (TCO).

When it comes to handling larger workloads, most enterprises prefer disaggregated architectures that allow compute and storage resources to be scaled independently. Disaggregation provides more flexibility in creating, maintaining, and scaling more efficient IT infrastructures. That is why most of the world's largest hyperscalers are rapidly adopting disaggregated architectures to enable the much more efficient deployment of compute and storage resources, a factor that at their scale of operation is proving to save tens of millions of dollars a year.

With more enterprises considering denser workload consolidation to squeeze more power, space, and TCO efficiency out of their storage infrastructures, the efficiencies that can be achieved with disaggregation become even more meaningful. It's interesting to note that other alternative architectures are also realizing this and introducing approaches that allow customers to weight resource purchasing and allocation a bit more in the performance-sensitive or capacity-sensitive direction, depending on what is needed. For maximum efficiency and cost savings at scale, however, true disaggregated architectures are required.

Disaggregation is not the only contributor to infrastructure efficiency. Metrics like storage density per rack unit (RU), read/write performance per RU, read/write performance per watt, terabytes (TB) per watt, read/write performance per terabyte, and data reduction ratios, combined with write minimization, space-efficient snapshots and replication, and more efficient storage technologies like NVMe can all contribute to high infrastructure efficiency. For enterprises at multipetabyte scale, these metrics are crucial. And when workloads have any performance sensitivities, all-flash storage platforms can drive a lower TCO not only because of lower overall systems costs but also because of lower administrative costs.

For multipetabyte systems, administrators may at first think that all-flash storage cannot compete on a cost basis. While it is true that hard disk drives (HDDs) are cheaper on a raw capacity basis than solid state disks (SSDs), they are significantly less performant and have less power efficiency, and the cost gap between HDDs and SSDs continues to decrease every year. On large-scale systems, it may require twice the number of HDDs to hit the same throughput or bandwidth as a system built with solid state storage. With all-flash storage, meeting a certain capacity requirement requires far fewer devices, which draws less power and takes up less floorspace. Flash offers much greater burst capabilities, allowing systems built with it to service a much wider range of I/O profiles without requiring manual performance tuning. Flash is also far more reliable, which means storage devices rarely experience a failure. And the lower latencies — generally at least 10 times lower — mean that server-side CPU cycles are used much more efficiently, driving the need for fewer servers and lowering server-side software licensing costs. For many enterprise workloads, regardless of whether they store block-, file-, or object-based data, all-flash storage offers a compellingly better TCO. Newer flash media types like QLC are increasing the per-device density, further dropping the number of flash devices required to meet a certain capacity point and improving the overall dollar-per-gigabyte cost at the system level.

How efficiently the flash media is managed to address media endurance also has an effect on cost, performance, and a range of essential factors such as reliability, density, and efficiency. With off-the-

shelf SSD devices, an internal controller manages the flash media on each drive, and that controller only knows what is happening on that one device. Each SSD in a system in effect manages its own media without any knowledge of what is happening at the systems level. There are vendors, however, that manage the flash media across all storage devices in a system with the storage operating system (not using individual device-specific controllers). This approach requires proprietary solid state storage devices (not off-the-shelf SSDs) but can manage the media with a knowledge of what is happening at the system level, handling reads and writes globally to produce better reliability and media endurance and more consistent and improved performance. The improved media endurance means less flash overprovisioning is required, further reducing the costs and improving the efficiency of storage devices.

Managing the flash media globally at the system level results in more efficient resource utilization, a fact that can significantly improve the cost efficiency, performance efficiency, and power efficiency at the system level. Part of the problem with judging an HDD-based storage system "lower cost" based on dollar-per-gigabyte media costs alone is that there are costs generated by all of the hardware in a system (not just the drives), and HDD-based systems need a lot more drives and other hardware (which draws more power and requires more floorspace) to meet a given performance and/or capacity requirement. That's why the TCO is the right comparison when looking at solid state storage systems and why systems that manage the flash media globally instead of at the device level can provide additional cost savings.

PURE STORAGE'S NEXT-GENERATION FLASHBLADE FOR UNSTRUCTURED DATA

Pure Storage is a multibillion-dollar enterprise storage vendor with a broad portfolio of offerings that cover primary and secondary as well as structured, unstructured, and cloud-native workloads. The vendor changed the enterprise storage industry back in 2012 when it introduced the scale-up FlashArray, the first enterprise-class all-flash array (AFA), for structured data workloads. Within three years, the success of that platform had encouraged all of the major enterprise storage players to introduce their own AFA offerings (despite initially disparaging flash as too expensive for mainstream usage). FlashArray originally used multilevel cell (MLC) NAND flash media but has made nondisruptive transitions to new media types as it became available (the system now uses QLC NAND flash media). The multigenerational nondisruptive upgrade path for FlashArray has provided support for new, denser device types with more powerful storage processors over the years and enabled the use of storage-class memory (SCM) technology (e.g., Intel Optane media) in the systems as well.

In 2016, Pure Storage introduced FlashBlade, a scale-out, all-flash platform targeted for use with unstructured data workloads in the enterprise. Since then, the vendor has also introduced public cloud support for its enterprise-class storage operating system software (Purity), a fully integrated solution that delivers enterprise-class persistent storage in Kubernetes environments (Portworx), and comprehensive subscription-based pricing and managed services offerings that leverage its enterprise storage intellectual property (IP).

In addition to the performance and efficiency benefits of solid state storage, the vendor's storage platforms deliver differentiating ease of use and a customer experience (CX) that makes for extremely loyal customers that have one of the industry's highest repurchase rates. In 2015, Pure Storage delivered the industry's first CX program that combined program elements and guarantees with architectural support in its storage platforms, called Evergreen Storage. Evergreen Storage delivered a head-turning set of guarantees that changed the whole tenor of the enterprise storage ownership experience and has been a major contributor to the level of customer satisfaction (as measured by the

industry-standard Net Promoter Score [NPS]) with Pure Storage's offerings. Since Pure Storage first released it publicly in 2015, the vendor's NPS has stayed in the mid-80s, the leading independently audited score (by Medallia) for an enterprise storage vendor for the past eight years. None of the other major storage vendors that publish an NPS have it independently audited by a third party to ensure that the score generation process meets the objective criteria for data collection and score calculation.

For more information about Evergreen Storage and how it drives differentiating value for customers across the entire enterprise storage life cycle, see *Evergreen Storage Continues to Drive Industry-Leading Customer Experience as a Differentiator for Pure Storage* (IDC #US48785022, January 2022). For more information about NPS, see *Net Promoter Score Becoming an Important Metric for Enterprise Storage Managers to Understand* (IDC #US43896818, June 2018).

FlashBlade: Unified Fast File and Object Storage

Traditionally many block-based enterprise workloads were very latency sensitive, so it made sense for Pure Storage to enter the market with its AFA in that space. As flash media costs continued to come down and performance requirements for file- and object-based workloads were heating up due to the needs of digital transformation, it made sense to bring the infrastructure density, device reliability, and ease of use of all-flash storage to unstructured data workloads. While this is what initially prompted the release of FlashBlade, which was targeted at high-performance unstructured data workloads in media and entertainment, healthcare and life sciences, electronic design automation, and real-time analytics in financial services, it became evident very early in the product's life cycle that there was significant interest in the platform in the data protection area as well due to its ability to ingest and recover large data sets very quickly and store a lot of data in very compact, highly efficient systems.

As digital transformation progressed and big data and analytics workloads were deployed in a number of industries, FlashBlade penetration began to grow in those areas as well. With the rise of AI-driven workloads, enterprises that wanted to ingest data at high rates while performing real-time analytics on it found much to like in FlashBlade's ability to support high data concurrency. This latter capability also made FlashBlade an attractive platform for the dense consolidation of unstructured data workloads, prompting Pure Storage to pioneer the "unified fast file and object" category in 2019. Within just four years of its first revenue shipments, the FlashBlade business became a storage unicorn (achieved a $1 billion valuation on its revenue alone) and surpassed $1 billion in lifetime platform revenue.

FlashBlade introduced a proprietary storage device it calls a "blade." Each original 4U FlashBlade chassis could accommodate up to 15 blades, and a fully configured FlashBlade system could have up to 10 chassis (for a total of 150 blades). Pure Storage's approach, which combined proprietary all-flash storage devices along with the management of that media at a global level by the storage operating system, is referred to by the vendor as "DirectFlash." Blades included both storage controllers and flash media that were managed directly by Purity//FB, the storage operating system, at a global level. Because Pure Storage built the storage devices itself, it created higher-density devices than off-the-shelf SSDs and got new devices with denser media types out faster once new media types became available from suppliers. Global media management meant it needed less overprovisioning (as much as 20% less) and could actually deliver more consistent performance, better reliability, and higher media endurance from these devices than its competitors could achieve with off-the-shelf SSDs. The blade design and DirectFlash technology turned out to be so compelling across a number of different metrics that the vendor moved away from off-the-shelf SSDs on FlashArray, its AFA for structured data workloads, and began using DirectFlash technology in new storage devices for that platform called Direct Flash Modules (DFMs) in 2018.

As Pure Storage continued to optimize its storage systems to make better use of flash resources, the cost and power efficiency of DirectFlash began to pay increasingly differentiated dividends to customers. In January 2022, Pure Storage announced that Meta (the parent company of social media giant Facebook) had chosen the vendor to provide storage infrastructure for its new AI Research SuperCluster (RSC). Pure Storage's cost and power efficiency at scale were key factors in this decision for Meta, which is very concerned about infrastructure efficiency. Pure Storage's first ever ESG report, released in March 2022, indicated an up to 80% reduction in direct carbon usage by IT infrastructure that uses technology from the vendor. At the scale at which Meta operates, that means millions of dollars of savings in terms of infrastructure purchases and energy and floorspace consumption over the life of projects.

Despite the fact that FlashBlade uses some proprietary hardware, it provides the flexibility of software-defined storage. As Pure Storage has already demonstrated with its FlashArray product, features in Evergreen Storage have made multigenerational technology upgrades nondisruptive.

The ability to nondisruptively accommodate multigenerational technology transitions without any kind of forklift upgrades is a strong contributor to the overall TCO of Pure Storage arrays. It allows customers to stay current with new storage technologies without having to rebuy storage capacity or relicense software on "new" systems that support the latest technologies. Administrators do not have to incur the time or risk of migrating data en masse between systems to harness upgraded technology. More than 97% of FlashArray storage systems purchased from the vendor six years ago are still in service and operating with technology newer than what was originally shipped on them in terms of both storage devices and controllers.

The New FlashBlade//S

FlashBlade's first-generation architecture provided compute, storage, and networking interconnections within a single appliance. This approach remains very successful and continues to be trusted by thousands of customers. The simplicity of the design has allowed FlashBlade to scale from small to large capacities with minimal cabling complexity and customers need to only manage one system. In evaluating evolving customer requirements, Pure Storage wanted to preserve the simplicity and effectiveness of a blade-based architecture and re-architect its system to provide disaggregation of compute and storage within its chassis and blades.

In addition to improving performance and storage density, the new modular disaggregated architecture enables customers to configure a system that meets the specific capacity and performance requirement of their current workloads and nondisruptively upgrade storage compute and capacity resources independently to adapt to their growing performance and capacity requirements in the future. The blade design on the prior FlashBlade required that compute and capacity resources be upgraded together. By introducing a more disaggregated approach, customers can achieve a more efficient allocation of resources based on actual requirements as well as support the full upgrade flexibility of the Evergreen subscription. The result is a scale-out, all-flash system that delivers 2.5 times the performance, density, and capacity of the existing high-end FlashBlade.

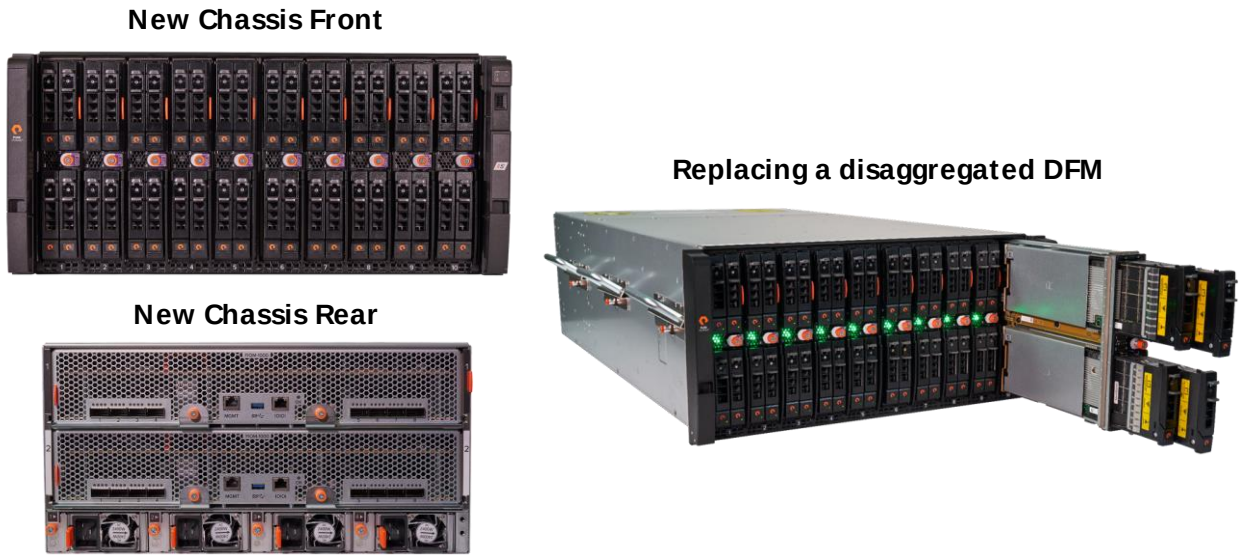
To create a more disaggregated architecture, Pure Storage has re-architected both the blades and the chassis while staying with NVMe as the storage protocol. Before, each blade included an Intel Xeon system on a chip and additional programmable processors running the Purity//FB storage operating system (this software runs distributed on all blades), onboard DRAM memory, integrated NVRAM, NAND flash media (of either 17TB or 52TB capacity), and PCIe connectivity. The new blade includes the latest-generation Intel Xeon Scalable Processor CPUs, DDR4 DIMMs, four times the backplane

bandwidth, and up to four times the flash capacity. A blade can now include up to four DFMs, each of which can be either 24TB or 48TB, and compute and capacity can now be upgraded nondisruptively and independently at the blade level.

With this disaggregation, processing power can be upgraded on a schedule that conforms more closely to the release of new compute technologies, and the same is true of media types for increased performance and storage density as well as lower cost. On each blade, the DFMs can be accessed and replaced independently (see the right-hand side of Figure 1). Internal backplane connectivity ensures that each DFM is accessible by all blades in the system, while redundancy in the architecture ensures no single point of failure in the system.

FIGURE 1

New FlashBlade//S Disaggregated Hardware Design



Source: Pure Storage, 2022

To accommodate the anticipated need for ever higher storage densities, the 4U chassis was replaced with a new 5U chassis, which accommodates up to 10 blades. The chassis has been redesigned to provide much better airflow to handle the significantly higher storage densities. As the vendor already demonstrated with its FlashArray products, Pure Storage expects the FlashBlade//S system to support the customer requirements in the file and object storage market over the next decade. The redesign has also increased component-level serviceability – the two internal fabric modules (which connect the blades in each chassis as well as multiple chassis in a cluster), the four power distribution units, and the eight fans are accessible without sliding the chassis out of the rack. All are field replaceable units that can be upgraded (or replaced) nondisruptively. The field-replaceable units also include the DFMs and blades, and it is possible to remove and replace DFMs without removing their running blades.

Other enabling technologies have been introduced to support much higher concurrency and efficiency in accessing the denser resources of the new FlashBlade//S:

- The FlashBlade//S DFMs support component-level resource disaggregation, better serviceability, more capable cooling, and better resource utilization for the compute, DRAM, NVRAM, and flash capacity.
- FlashBlade//S DFMs use QLC NAND flash media to improve power and space efficiencies, and Purity//FB includes media endurance-saving enhancements like two-pass programming and optimized write coalescing.
- There is more efficient use of expensive NVRAM resources by providing each DFM with its own smaller but dedicated NVRAM cache and large write optimizations that bypass NVRAM and write directly to the NAND flash media.
- A new class of deep compression algorithms can store more data per terabyte of raw flash capacity for better data reduction ratios on unstructured data storage workloads.

A fully populated FlashBlade//S chassis delivers up to 55GBps of bandwidth (while the vendor plans to enable still higher bandwidth in the near term), hosts roughly 2PB of raw capacity in a single namespace, and draws <2,500W of power. While maintaining the single namespace, FlashBlade//S systems can continue to scale out nondisruptively in both capacity and performance by adding more chassis in a simple building block approach. The new systems support the same four access methods as the original FlashBlade: NFS (versions 3 and 4), SMB, and S3. They use the same general unified storage approach, with all data stored in an underlying key value store and data written and accessed natively through the same access method.

The Purity storage operating system release that supports the new FlashBlade//S includes the same comprehensive set of storage management features that were already shipping on FlashBlade before (i.e., compression, fast copy, global erasure coding, nondisruptive upgrades, high availability, separate file- and object-level replication, snapshots [including immutable SafeMode snapshots], file versioning [for rapid rollback], always-on 256-bit FIPS 140-3-certified encryption, Kerberos support, audit logs, and support for AD, LDAP, NIS, and SNMP). And it includes other capabilities necessary to support the new hardware and related capabilities (higher performance, disaggregated resources, an evolution of the distributed metadata architecture, etc.).

IDC Commentary

The changes with the new FlashBlade//S have several implications of note for customers considering how to most cost effectively meet their need for unstructured data storage going forward:

- **Impressive bump in both performance and capacity.** With upgraded processor and media technology, the new system boasts compelling infrastructure density. When moving between technology generations, many storage systems target some improvements in performance, density, and overall capacity. FlashBlade//S delivers a 2.5 times improvement over the original FlashBlade in all of those areas.
- **Resource allocation flexibility.** Disaggregating the storage compute and capacity resources on each blade is an important change that enables a number of attractive capabilities. Customers can now choose from different system configurations in terms of processing power and storage capacity and enhance those independently as workload requirements demand it. The ability to more granularly adjust each of these resources at the blade level means that customers have more ability to dial in the resource amounts they actually need.

Disaggregation also means that they do not have to pay for resources they don't need. It provides more flexible upgrade options — a particularly attractive feature given that compute and capacity technologies tend to be on different refresh schedules. Also, this upgrade flexibility does not come with an increase in complexity. With the modularity of the new blades, FlashBlade//S maintains its simple, plug-and-play upgradability across technology generations.

- **More efficient NVRAM usage.** Traditional storage writes to NVRAM (which is basically supercap-backed DRAM), coalesces writes for some period, and then efficiently destages them to persistent storage (freeing up DRAM space to accept new writes). The amount of NVRAM needed is generally a percentage of the overall capacity of the entire system, but NVRAM is very expensive. Vendors moving to QLC NAND flash media need to take additional steps during this process to address the write performance and media endurance issues of QLC.

  In optimizing solid state media efficiency on FlashBlade//S, the vendor has taken an innovative approach here that decouples NVRAM capacity requirements from those of the entire system. This approach allows NVRAM to be sized to handle ingest performance and not have to be scaled proportionally to the flash capacity backing it, enabling FlashBlade//S systems that need significantly less expensive NVRAM while still delivering high QLC write performance and media endurance. FlashBlade//S uses a smaller tier of NVRAM that primarily deals with delivering high write performance, but immediately destages writes to a backing but larger tier of much less expensive SLC flash. Writes are persisted in the SLC tier and then coalesced to write to the backing QLC tier much more efficiently. Large serial writes are also flagged up front so that they can be directly written into the SLC tier, bypassing the NVRAM tier. The NVRAM and SLC are all contained within each DFM, and as the system scales, the NVRAM and SLC are distributed and scale with additional DFMs. Given the high price of NVRAM and the lower prices of SLC and QLC NAND flash media, this design can reduce the blended dollar-per-gigabyte media costs in a system by up to 25%.
- **Cost and power efficiency.** With the infrastructure density of the new FlashBlade//S, Pure Storage has gone beyond the compelling cost and power efficiency differentiation that prompted Meta to choose the vendor to support its AI RSC (which was based on the ESG metrics of the vendor's currently shipping products when the decision was made back in CY 2H21). With many enterprises bumping up against datacenter power and floorspace limitations, ESG metrics are becoming an increasingly important factor. The FlashBlade//S timing is excellent as it is delivering up to 80% better cost and power efficiency than traditional storage infrastructure with a simple, nondisruptive growth path to improved performance and capacity over time.
- **New and improved Evergreen support.** While Pure Storage customers loved the ability to upgrade the controllers and storage capacity independently on the FlashArray to next-generation technologies (a feature referred to as Evergreen), FlashBlade did not previously provide that option (since compute and capacity had to be upgraded together with the older blades). With the disaggregation on the new blades, FlashBlade//S now fully supports Evergreen and includes compute blade upgrades every three years (Ever Modern), optional model upgrades with guaranteed trade-in credits at any time (Ever Agile), and capacity consolidation (the ability to upgrade to denser future DFMs to free up DFM slots for additional expansion in the future using guaranteed trade-in credits). For more information about Pure Storage Evergreen subscription services on the FlashBlade//S, see *Pure Storage's Evergreen//Forever Subscription Ushers in New FlashBlade//S as a Premier Platform* (IDC #US49103522, forthcoming).

While the vendor notes that FlashBlade//S will support nondisruptive multigenerational technology upgrades (including an upgrade from the existing several thousand FlashBlades in the current installed base), those upgrades will not be immediately available. Pure Storage will focus on net-new customers in the initial phase after general availability but will enable a seamless migration to the new platform shortly thereafter.

The new system delivers multidimensional performance for small and large file/object sizes through its use of variable block encoding that is optimized for random access yet distributes large files across many blades in the same system (or across blades in a multinode cluster).

The key value store in FlashBlade//S uses a metadata architecture that is actually a massively distributed transactional database where everything (inodes, files, NVRAM records, other metadata, etc.) is sharded and widely distributed across blades within a chassis (or across chassis). Distributing data in this way allows operations (protocol handling, metadata lookups, fault handling, garbage collection, etc.) to be highly parallelized and provides excellent protection against "hot spots" that may develop depending on access patterns. The extreme degree of parallelization helps significantly as the vendor moves to ever denser storage infrastructure, and the distributed transactional database is becoming a more important contributor to the high degree of concurrency and the difference in the cost and power efficiency gaps between FlashBlade//S and competitive unstructured storage platforms. The vendor stresses that its metadata architecture is the foundational technology of FlashBlade//S that sets the vendor up for continued innovation going forward.

The FlashBlade//S announcement is a major one for the company and reflects a set of major enhancements to that platform that make it very adept at handling the key trends in enterprise storage going forward: explosive data growth (most of which will be unstructured data); customer concerns about ease of use of their file and object storage platform; increased performance, availability, and capacity requirements; consolidation of workloads onto fewer storage platforms; and an intensifying focus on infrastructure efficiency for both cost and ESG reasons. The new FlashBlade//S reflects an intelligent mix of mature foundation technologies with well-targeted enhancements that are focused on evolving customer needs.

CHALLENGES AND OPPORTUNITIES

The traditional approach for scale-out file and object storage infrastructure emphasizes storage software platforms that run on commodity server-based storage hardware. With its FlashBlade//S platform, Pure Storage has departed from that approach, using proprietary hardware and managing the media (in its case, all-flash media) directly rather than leveraging separate internal controllers in every storage device. The vendor makes a strong argument that this approach gives the company performance, scalability, reliability, infrastructure efficiency, and cost advantages over competitors that are particularly differentiating at scale.

With more and more enterprises surpassing the petabyte threshold for the amount of data they are managing, operation at scale is an increasingly important consideration. And it is notable that a major hyperscaler (Meta) proved out Pure Storage's ESG claims extensively before announcing a massive purchase of Pure Storage products to use in its AI RSC — irrefutable proof that it found Pure Storage's cost and power efficiency advantages compelling. Still there are enterprises that want to stay away from proprietary hardware, and Pure Storage will need to ensure that it can quickly and easily highlight this differentiation from more traditional scale-out storage offerings in an effort to sway these customers.

CONCLUSION

Many of the infrastructure challenges associated with digital transformation are about more efficiently handling unstructured data at multipetabyte scale. Pure Storage has established a rapidly growing business catering to these needs with the original FlashBlade but identified some key areas that it wanted to specifically enhance with a major new system upgrade. Strong capabilities in scalability, reliability, and simplicity/ease of use would be retained even as the company focused on a major performance and capacity jump, optimizing for denser flash media types, improving what is arguably already industry-leading storage infrastructure efficiency, and re-architecting the platform to accommodate more granular technology upgrades nondisruptively over the next decade. These changes put FlashBlade//S on par with FlashArray in terms of its ability to fully support Evergreen Storage — a program that, by the way, continues to differentiate the vendor from its competitors and drives Pure Storage's impressive audited NPS numbers.

Enterprises challenged with handling explosive unstructured data growth will want to consider the FlashBlade//S. With this release, Pure Storage is treading the same path that it successfully navigated with its original FlashArray: moving an industry that was concerned about the cost of all-flash platforms on a given set of workloads to the point where all-flash is in mainstream usage with those workloads. FlashBlade//S enhancements, along with its support for less expensive QLC media and Pure Storage's DirectFlash approach, provide a compelling TCO-based economic option that dispenses with all the performance density, manual tuning, energy and floorspace consumption, CPU utilization, server software licensing, and reliability challenges associated with the use of HDDs with unstructured data storage workloads.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

Global Headquarters

140 Kendrick Street
Building B
Needham, MA 02494
USA
508.872.8200
Twitter: @IDC
blogs.idc.com
www.idc.com