DATA SHEET

Pure Storage FlashArray//X

Accelerate core applications and provide a Modern Data Experience™.

Performance

- 150µs to 1ms latency
- NVMe and NVMe-oF (TCP/IP and Fibre Channel)
- Support for SMB and NFS protocols

Efficient and Affordable

- Industry-leading 5:1 data reduction average, 10:1 total efficiency
- 3.3PB effective in 6U
- Includes all array software

Highly Available

- Proven 99.9999% availability
- Always-on, IOPs and bandwidth limits
- Built-in business continuity and disaster recovery

Simplicity

- AI-driven management and predictive support
- REST API for cloud orchestration

Industry Recognition

- Seven-time Gartner Magic Quadrant Leader for storage[1]
- 2019 Medallia Net Promoter Score certified by Owen CX, in the top 1% of B2B companies

Pure Storage® FlashArray//X, the world's first 100% all-flash end-to-end NVMe and NVMe-oF array, delivers significant breakthroughs in speed, simplicity, flexibility, and consolidation. FlashArray is ideal for everything from departmental to large-scale enterprise deployments. It provides high performance, reliability, and availability for mission-critical operations—both block and file.

In a world of fast, pervasive networking, ubiquitous flash memory, and evolving scale-out application architecture, modern approaches to data management have the power to unite both networked and direct-attached storage in a single, shared architecture. Maximize results and flexibility for enterprise and cloud-native, web-scale applications, both on-premises and easily connected to the public cloud. And Pure's Evergreen Storage™ model means performance, capacity, and features improve over time without disruption.

Accelerate Mission-Critical Applications

With latency as low as 150µs, the all-NVME architecture in FlashArray™ brings new levels of performance and extremely low latency to mission-critical business applications and databases. Think faster transactions and decisions and more immersive customer experiences. Optional DirectMemory™ cache modules use Intel Optane SSDs to provide even more extreme performance for the most demanding enterprise applications.

Hyper-Consolidate Your Cloud

NVMe enables the unprecedented performance density required for tier 1, mixed-workload consolidation in a private cloud. FlashArray//X currently offers ultra-dense 18.3TB DirectFlash® modules. Purity's always-on Quality of Service (QoS) means you can consolidate radically diverse applications without fear of bandwidth or I/O contention.

Unify Current and Future Applications

Organizations have evolved to run a mix of classic business applications with new, modern web-scale apps. This mix previously required radically different architectures. With FlashArray//X end-to-end NVMe, and available NVMe-oF (both TCP/IP and Fibre Channel), everything can run on a single shared architecture with the potential to unite storage-area networks (SANs) and direct-attached storage (DAS). This gives you the performance of DAS while enabling the efficiency, reliability, and simplicity of modern shared storage.

In addition to FlashArray//X, which is optimized for performance and latency, FlashArray//C extends FlashArray enterprise data services to capacity-oriented workloads such as dev/test, workload consolidation, data protection, disaster recovery, and user-file shares. Together, FlashArray//X and FlashArray//C provide a consistent experience and set of data services across all workloads in your data center.

DirectFlash: Move Beyond SSD

FlashArray//X moves beyond legacy SSD architectures that are architected to make flash pretend to be a hard disk. DirectFlash within Purity speaks directly to raw NAND with a super-efficient NVMe protocol and leverages NVMe-oF over Fibre Channel or Ethernet for even faster network speeds between the array and application servers. DirectFlash is implemented in four components:

DirectFlash Software: DirectFlash software (DFS) manages array I/O globally for a faster, more efficient architecture. DFS provides detailed I/O scheduling and performance management, making I/Os deterministic and reducing average latency by reducing the number of slow I/Os that often occur in SSD architectures.

DirectFlash Module: DirectFlash Module is a Pure-designed flash module that connects raw flash directly to the FlashArray storage via NVMe. Unlike traditional SSDs that use a flash controller or flash translation layer, DirectFlash Module is primarily raw flash. This design removes performance roadblocks of SSDs used by many legacy storage architectures.

DirectFlash Shelf: DirectFlash Shelf is external to the FlashArray//X chassis, and lets you add additional NVMe capacity. It's connected to the chassis via NVMe-oF protocol and supports both Fibre Channel and RoCE (RDMA over converged Ethernet). The shelf maintains the ability to support different sizes of DirectFlash Modules as flash density improves and new forms become available, such as SCM, QLC, and others.

DirectFlash Fabric: DirectFlash Fabric delivers performance close to DAS plus enterprise-class reliability and data services. NVMe-oF enables massive optimization between the storage controllers and host over fast networking. DirectFlash Fabric brings both performance and efficiency gains. Internal application-specific testing with NVMe-oF over RoCE, FlashArray//X achieved:

- Up to 50% latency reduction compared to iSCSI
- Up to 50% greater transactions per second and 35% lower latency compared to DAS
- Up to 20% latency reduction compared to FC
- Up to 400% capacity efficiency
- Up to 25% host CPU offload

Purity: The Software-Defined Heart of FlashArray

Purity for FlashArray delivers rich, enterprise data services; DirectFlash global flash management; and Evergreen improvements with every release. Features such as ActiveCluster™ for business continuity and disaster recovery, QoS, vVols, NVMe-oF, Snap to NFS, Purity CloudSnap™, and EncryptReduce™ are all examples of new features provided over time with non-disruptive Purity upgrades. All Purity storage services, APIs, and advanced data services are built-in and included with every array.

Purity Optimize: Purity Optimize with QoS and DirectMemory Cache features effortlessly delivers consistent application service level agreements and improved database, analytics, and reporting performance. Always-on QoS provides IOP and bandwidth limits to ensure applications get the resources they need. Consolidate radically diverse applications without fear of I/O contention. DirectMemory Cache software automatically refers reads from the array's flash media to onboard DirectMemory Modules with Intel Optane storage-class memory.

Once you non-disruptively add DirectMemory Modules to a new or existing FlashArray//X70 or //X90[2], DirectMemory Cache begins working without the hassle of configurations or tuning. You can expect the array to start lowering latency by up to 50% and enhancements of up to 5GB to 6GB of additional throughput for FlashArray workloads, notably online transaction processing (OLTP) and in-memory databases such as SAP HANA.

Purity Reduce: FlashArray leverages five forms of inline and post-process data reduction, including compression and deduplication. Data reduction is always on and operates at a variable block size. This enables effective reduction across mixed workloads without tuning. Because different kinds of data compress differently, it applies multiple compression algorithms over time and uses machine learning to identify the best compression for your workloads. Data reduction averages an industry-leading 5:1 with a total efficiency of 10:1 (including thin provisioning).

Purity REST APIs: The REST APIs leverage Purity's open platform, cloud connections, and integrations to drive automation with VMware, Microsoft, Amazon Web Services (AWS), and open-source tools such as OpenStack.

Purity Secure: FlashArray meets the ultra-high security standard FIPS 140-2 with validated always-on encryption and provides Pure Rapid Data Locking for added external security protection. It's well-equipped to help with compliance with new data regulations such as GDPR. EncryptReduce extends encryption beyond the array to the host and includes data reduction to preserve efficiency while providing an end-to-end encryption solution.
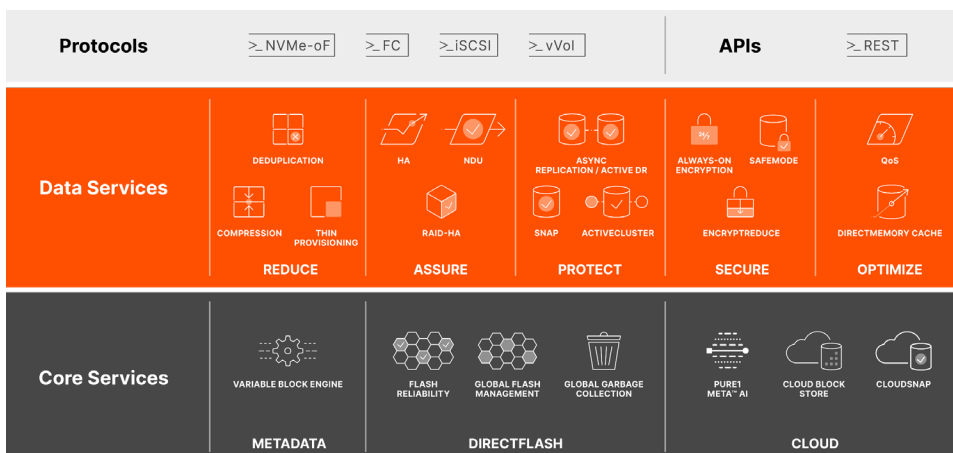
Purity//FlashArray Features[3]

ActiveCluster: Make Business Continuity Effortless

Make recovery a thing of the past with Purity ActiveCluster, Pure's ultra-simple solution for running applications active-active between two data centers. ActiveCluster's innovative design, including the cloud-based Pure1® Cloud Mediator, enables all data center applications to take advantage of metro-area clustering. ActiveCluster initially was available only for TCP/IP but now supports Fibre Channel as well, making the reliability, security, and performance advantages of Fibre Channel available for ActiveCluster replication. Plus, ActiveCluster takes just minutes to set up, requires no third site, and is included in the Evergreen subscription at no additional cost.

ActiveCluster has use cases within and between data centers:

- Within a data center, it can enable rack-level high-availability clustering of four controllers for maximum resiliency.
- Between data centers, ActiveCluster "stretches" a running volume between two sites, separated by as much as 11ms round-trip latency, without additional configuration. With it, you can read and/or write from both sites at the same time.

Active-active async to third site: Purity also can take volume(s) that are part of an ActiveCluster relationship and provide asynchronous replication to a third site. The target array makes intelligent and resilient use of asynchronous replication links from both source arrays. The loss of either a source array or a replication link is transparent to asynchronous replication and requires no re-baseline: Automatic failover, load balancing, and recovery are built-in.

Simple setup: Purity ActiveCluster uses the same simple storage management model as the rest of FlashArray. Enabling ActiveCluster involves only one command and four short steps: connect the arrays, create a stretched pod, create or add a volume, and connect the hosts.

Comprehensive On-Premises and Cloud Backup Options

Get flexible backup and recovery. Pure portable snapshots provide simple, built-in, local and cloud protection for FlashArray. Together, Purity Snapshots, Snap-to-FlashBlade, Snap-to-NFS, and CloudSnap enable free movement of space-efficient copies between FlashArrays, to FlashBlade®, to third-party NFS storage, or to the cloud, respectively. Portable snapshots are cost-efficient: They encapsulate metadata, making them incremental, space-efficient, and self-describing.

Pure Cloud Block Store™

Deliver consistent data services, resiliency, and APIs with Pure Cloud Block Store for AWS and FlashArray so you can run applications seamlessly across your on-premises, hybrid-cloud, and cloud environments. Make cloud storage better by leveraging Pure's leading data efficiency, instant space-saving snapshots, and always-on encryption, in the cloud. Pure Cloud Block Store provides greater agility and enterprise reliability with its dual-controller architecture and high availability across availability zones for mission-critical applications running in the cloud.

Simple Cloud-Based Management

Pure1 provides simple cloud-based management and effortless predictive support with full-stack analytics and the AI-driven power of Pure1 Meta®. Pure1 provides a snapshot catalog of all your backups in one place, whether the target is another FlashArray, FlashBlade, NFS target, or a public cloud like Amazon S3.

Simplicity by Design, from Day One

FlashArray//X has the power to simplify everything in your storage environment. The hardware, software, and cloud management experience are co-designed to make everything just work. Just a few examples of this simplicity include:

- One box, six cables, no manual required
- Typical 30-minute install (with available professional installation)
- Inclusion of all array software
- Data-reduced end-to-end encryption
- No performance tuning
- APIs for automation
- AI-driven cloud management
- Proactive support

Evergreen Storage

FlashArray operates like SaaS and the cloud. Deploy it once and enjoy a subscription to continuous innovation as you expand and improve performance, capacity, density, and/or features for 10 years or more—all without downtime, performance impact, or data migrations. Pure has engineered compatibility for future technologies directly into the product via the modular, stateless architecture of FlashArray.

- The Right Size Guarantee™ ensures that you start knowing you'll have the effective capacity you need.
- The Capacity Consolidation program keeps your storage modern and dense as you expand.

With Evergreen Storage, you don't have to re-buy terabytes you already own. Keep your storage evergreen, modern, and dense. And always meet your business needs. Pure uniquely offers all of our core solutions either as products (CAPEX) or as services (OPEX[4]) via the Pure as-a-Service™ portfolio.

Technical Specifications

	Capacity	Physical
//X10	Up to 73TB / 66.2TiB effective capacity[4] Up to 22TB / 19.2TiB raw capacity	3U; 640–845 watts (nominal–peak) 95 lbs (43.1 kg) fully loaded; 5.12" x 18.94" x 29.72"
//X20	Up to 314TB / 285.4TiB effective capacity[4] Up to 94TB / 88TiB raw capacity[5]	3U; 741–973 watts (nominal–peak) 95 lbs (43.1 kg) fully loaded; 5.12" x 18.94" x 29.72"
//X50	Up to 663TB / 602.9TiB effective capacity[4] Up to 185TB / 171TiB raw capacity[5]	3U; 868–1114 watts (nominal–peak) 95 lbs (43.1 kg) fully loaded; 5.12" x 18.94" x 29.72"
//X70	Up to 2286TiB / 2078.9TiB effective capacity[4] Up to 622TB / 544.2TiB raw capacity[5]	3U; 1084–1344 watts (nominal–peak) 97 lbs (44.0 kg) fully loaded; 5.12" x 18.94" x 29.72"
//X90	Up to 3.3PB / 3003.1TiB effective capacity[4] Up to 878TB / 768.3TiB raw capacity[5]	3U–6U; 1160–1446 watts (nominal–peak) 97 lbs (44 kg) fully loaded; 5.12" x 18.94" x 29.72"
DIRECT FLASH SHELF	Up to 1.9PB effective capacity[4] Up to 512TB / 448.2TiB raw capacity	3U; 460 - 500 watts (nominal–peak) 87.7 lbs (39.8kg) fully loaded; 5.12" x 18.94" x 29.72"

//X Connectivity

Onboard Ports (per controller)
- 2 x 1/10/25Gb Ethernet
- 2 x 1/10/25Gb Ethernet Replication
- 2 x 1Gb Management Ports

Host I/O Cards (3 slots/controller)
- 2-port 10GBase-T Ethernet
- 2-port 1/10/25Gb Ethernet
- 2-port 40Gb Ethernet

- 2-port 25/50Gb NVMe/RoCE
- 2-port 16/32Gb Fibre Channel (NVMe-oF Ready)
- 4-port 16/32Gb Fibre Channel (NVMe-oF Ready)

Additional Resources

- FlashArray//C Data Sheet

- Purity Data Sheet

- Pure1® Data Sheet

- ActiveCluster Data Sheet

- DirectMemory Cache Data Sheet

[1]Pure FlashArray has been recognized as a Gartner Magic Quadrant leader for the last seven years: Pure was in the leadership quadrant of the Primary Storage Magic Quadrant in 2020 and in the leadership quadrant of the Solid State Arrays Magic Quadrant for the previous five years. Gartner does not endorse any vendor, product, or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings or other designation. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.
[2]DirectMemory Modules are optional for //X70 and //X90 R2 and R3 versions.
[3]Not all Purity features supported on all FlashArray models.
[4]OPEX treatment is subject to the customer's auditor review.
[5]Stated //X specifications are applicable to //X R3 versions.
[6]Effective capacity assumes HA, RAID, and metadata overhead, GB-to-GiB conversion, and includes the benefit of data reduction with always-on inline deduplication, compression, and pattern removal. Average data reduction is calculated at 5-to-1 and does not include thin provisioning.
[7]Array accepts Pure Storage DirectFlash Shelf and/or Pure.