Purity //FA

Powering Next-Gen Shared Accelerated Storage

SUMMARY

If data is now an organization's most valuable asset, then the means to store and analyze that data effectively, and derive full value from it, are among an organization's most important tools. FlashArray//X is such a tool, and at its core, driving all of its speed, agility, and intelligence, is the Purity Operating Environment.

ENTERPRISE DATA SERVICES
for all workloads

PROVEN 99.9999% AVAILABILITY
inclusive of maintenance and generational upgrades

NON-DISRUPTIVE EVERYTHING
inclusive of maintenance, upgrades, and generational refreshes

10:1 TOTAL EFFICIENCY
significantly reduces storage required, no performance impact

DIRECTFLASH™ ARCHITECTURE ENABLES 100% NATIVE NVME & NVME-OF global flash management

MULTI-SITE ACTIVE/ACTIVE STRETCH CLUSTER with Purity ActiveCluster

VARIABLE BLOCK METADATA
means better data reduction and faster mixed workload performance

HIGHEST SECURITY STANDARDS
including always-on encryption of data-at-rest

SOFTWARE-DEFINED, NEXT-GENERATION

Purity is the software-defined engine of FlashArray™//X — it's the driver that enables //X to deliver comprehensive data services to power all of your traditional and modern data center applications. Purity's core technologies provide the speed, agility, and intelligence needed to simplify everything in your production environment.
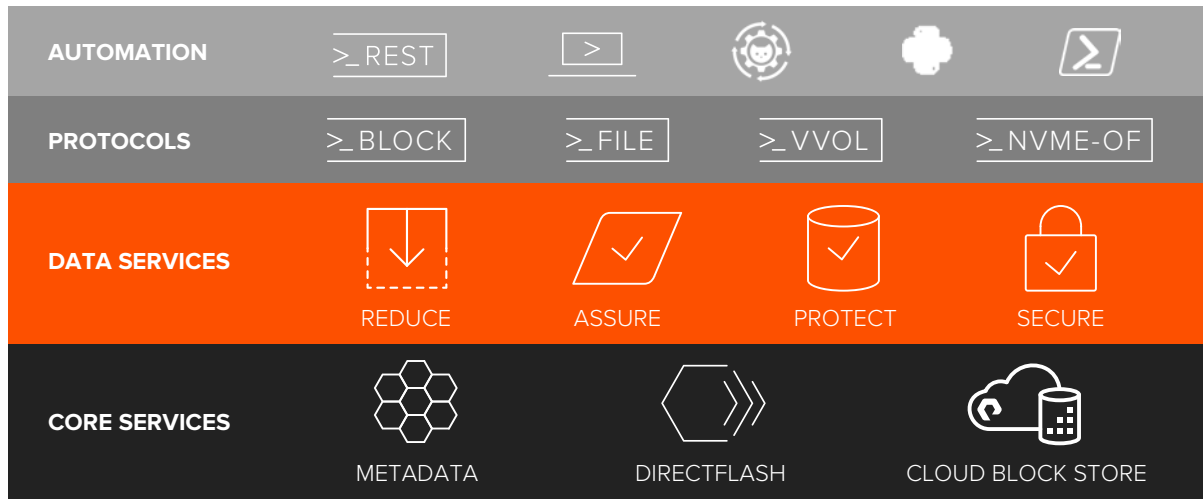
Purity's features set the pace for next-generation shared accelerated storage — from enterprise data services for all workloads, to industry-leading FlashArray 99.9999% availability, to 10:1 total efficiency. In the pages that follow, we'll explore many of Purity's critical components, from DirectFlash™ global flash management via 100% NVMe, to fast networking with NVMe-oF, to business continuity via ActiveCluster™, and on to completely non-disruptive operations and integrated data security.

All new array features, by the way, are included: there's nothing extra to license or install. And thanks to Pure's Evergreen™ Storage ownership model, new array features and improvements to Purity are just a non-disruptive upgrade away — included with your Evergreen subscription.

PURESTORAGE®

PURITY CORE SERVICES

Across all Pure Storage® arrays, Purity implements communication protocols and delivers rich data services that are founded upon four core services. These are the technologies that drive the next generation performance and industry-leading resiliency of Pure's Data-Centric Architecture.

AUTOMATION	>_ REST	>			>_
PROTOCOLS	>_ BLOCK	>_ FILE	>_ VVOL	>_ NVME-OF
DATA SERVICES	REDUCE	ASSURE	PROTECT	SECURE
CORE SERVICES	METADATA	DIRECTFLASH	CLOUD BLOCK STORE

METADATA
Purity leverages a variable block metadata engine across all layers of every array — powering built-in, always-on compression, thin provisioning, encryption, and rapid data locking, as well as HA and NDU. The metadata engine provides faster mixed workload performance while ensuring that data services have no performance impact.

CLOUD BLOCK STORE
Pure Storage® Cloud Block Store for AWS is industrial-strength block storage delivered natively in the cloud. Powered by Purity software, Cloud Block Store enables mission critical applications to run in the cloud seamlessly — while also making public cloud storage more powerful for webscale applications. Cloud Block Store drives true hybrid operations with consistent data services, resiliency, and APIs, and bi-directional mobility and seamless management and orchestration. You gain the ultimate agility: faster application development and the ability to free applications from specific infrastructure.

DIRECTFLASH
Purity implements global flash management (allocation, I/O optimization, garbage collection, and error correction) at the system level, driving 100% NVMe-connected raw flash within DirectFlash™ Modules, and eliminating the performance density limitations and unpredictable latency of large SSDs. DirectFlash exploits the full potential of flash — delivering predictable, consistent, microsecond latency alongside higher throughput and reliability, better efficiency, and ultra-high density.

Purity 5.2 extends DirectFlash technologies with DirectFlash Fabric, enabling DAS performance with enterprise class reliability and data services. FlashArray//X is the first enterprise storage array to deliver NVMe-oF RDMA over converged ethernet, delivering massive optimization between the storage controllers and the host over fast networking. DirectFlash Fabric brings both performance and efficiency gains — 50% latency reduction compared to iSCSI, 20% latency reduction compared to FC, 4X capacity efficiency, and up 25% host CPU offload.

PURITY//FA – THE SOFTWARE-DEFINED HEART OF FLASHARRAY

Purity for FlashArray is the core of FlashArray//X, delivering enterprise data services, DirectFlash™ global flash management, and Evergreen improvements with every release. Purity//FA 5.0 delivered ActiveCluster, QoS, File, and VVols – while the latest Purity//FA 5.2 brings NVMe-oF with DirectFlash Fabric and built-in cloud data protection with CloudSnap. All Purity data services are built-in and included with every array as part of the Evergreen subscription.

COMPRESSION IMPROVEMENTS

The industry's best data reduction gets even better. Purity delivers additional data reduction savings of up to 20% via new compression enhancements. With a simple, non-disruptive upgrade, Purity further compresses your data in the background!

PURITY REDUCE implements five forms of inline and post-process data reduction, including compression and deduplication, to offer data reduction that's typically 2x better than the competition. With thin provisioning, total efficiency averages an industry-leading 10:1. Data reduction is always-on and operates at a 512-byte variable block size, enabling effective reduction across mixed workloads without tuning.

PURITY ASSURE provides high availability, dual-parity RAID-HA, non-disruptive Always-On QoS with limits, and encryption – all of which are designed to deliver consistent performance to FlashArray during component failures and maintenance.

PURITY REST APIs leverage Purity's open platform, cloud connections, and integrations to drive automation with VMware, Microsoft, and open-source tools such as OpenStack.

PURITY PROTECT combines Purity ActiveCluster with space-saving snapshots, replication, and protection policies into an end-to-end data protection and recovery solution that protects data against loss locally and globally (to heterogenous NFS targets). All Purity Protect services are fully-integrated in FlashArray and leverage native data reduction capabilities.

PURITY SECURE means FlashArray meets the highest security standards (with FIPS 140-2 validated always-on encryption, NIAP/Common Criteria Certification, and Rapid Data Locking) and is well-equipped to assist with compliance on new data regulations such as GDPR.

PURITY RUN is a platform for running applications on FlashArray ideally suited to lightweight, data services-oriented processes. Purity Run apps include: Windows File Services, CloudSnap™, Snap-to-NFS, VM Analytics, and CAT for SAP.

PURITY ACTIVECLUSTER is multi-site Active/Active stretch cluster that enables enterprises to achieve the highest levels of availability. Get business continuity, RTO zero, and RPO zero across your data center, metro region, or globally across three data centers with asynchronous replication. No additional licenses or hardware required – and set up in a few minutes.

WINDOWS FILE SERVICES

Leveraging the Purity Run platform, Purity now offers native CIFS/SMB and NFS file services via the fully-integrated Windows File Server. Purity's WFS capability enables you to fully consolidate your data center.

PURITY REDUCE

Purity delivers the industry's most granular, comprehensive data reduction — and the industry's best total efficiency, at 10:1 — with savings that are typically 2x better than the competition. Unlike other vendors, our data reduction and thin provisioning are built-in, always-on, and require no tuning. Simple, predictable — even predictive. You'll buy less storage now, and less storage in the future!

HOW PURITY LEADS THE INDUSTRY IN DATA REDUCTION

Always-On – Purity Operating Environment is designed to support high-performance, always-on data reduction. All our performance benchmarks are taken with data reduction on.

Global – Unlike some data reduction solutions which operate within a volume or a pool, thereby partitioning the data and dramatically reducing dedupe savings, Purity Reduce dedupe is inline and global.

Five Reduction Technologies – We've got the data reduction that's necessary for virtually any application, already built-in: pattern removal, deduplication, compression, deep reduction, and copy reduction.

Variable Addressing – Purity employs variable addressing, which finds duplicates that fixed-block implementations miss. Purity Reduce scans for duplicates at 512-byte granularity and auto-aligns with application data layouts without any tuning at any layer. In addition, variable (byte-granular) compression avoids diluting your savings with waste that fixed-bucket granular compression implementations propagate.

Multiple Compression Algorithms – Different kinds of data compress differently. Purity employs multiple compression algorithms for optimal data reduction.

Designed for Mixed Workloads – Purity Reduce delivers optimal data reduction savings for mixed workloads without requiring any tradeoffs and/or tuning. That's unmatched simplicity for the real world of your data.

DON'T BE FOOLED BY DATA REDUCTION GIMMICKS

*Many vendors will include thin provisioning or snap savings in their storage efficiency and **data reduction** (DR) claims to make up for lackluster core DR. Or they'll talk about configuring DR per volume, which is really just a way to mask performance impacts. We don't – we tell you what our inline and always-on DR technologies are delivering, globally across our entire installed base (average of 5:1), and separately what our **total efficiency** is with thin provisioning included (average of 10:1). When comparing with other vendors' claims, use Pure's total efficiency, as that's more of an apples-to-apples comparison.*

View our live data reduction and total efficiency rates.

OUR DATA REDUCTION TECHNOLOGIES

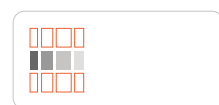| PATTERN REMOVAL | 512B ALIGNED, VARIABLE DEDUPE | INLINE COMPRESSION | DEEP REDUCTION | COPY REDUCTION |

100% THIN PROVISIONED

Thin provisioning dynamically allocates capacity on demand for all volumes and all workloads, optimizing the utilization of the array. While many vendors use thin provisioning as a way to boost data reduction savings, thin provisioning is an over-provisioning, not a data reduction technology. This is why our Purity Reduce Ticker separates the average data reduction savings from deduplication and compression only from Pure's total efficiency, with thin provisioning included. And granularity? It's at the 512-byte level just like all Purity services, meaning that Purity thin provisioning delivers even more efficiency than the competition.

Purity FA 5

PURITY ASSURE

Purity Assure is resiliency that never quits. Purity for FlashArray delivers 99.9999% proven availability, inclusive of maintenance, failures, and generational upgrades. So your data is always available, always performing, and always protected – with no performance loss.

ZERO-IMPACT MAINTENANCE

Add flash capacity online; expand performance, even across generations; replace any failed component, or upgrade software – Purity for FlashArray delivers 100% performance through all of these operations.
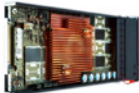
HOW PURITY DELIVERS NON-DISRUPTIVE EVERYTHING

Active/Active High Availability – A clustered controller design allows for the complete failure of a controller or any controller component without impacting operations.

Mirrored NV-RAM – Write IOs are persisted to NV-RAM modules, ensuring in-flight writes are protected against power loss and device failure.

Hot-Swappable Components – Flash Modules, NV-RAM Modules, and controllers are hot-swappable for continuous operation, even when recovering from a failure.

Stateless Controller Architecture – Simply unplug a failed controller, cable up a new one, and the FlashArray is back to full-availability, without any performance loss.

NDU EVERYTHING

Upgrade and expand everything non-disruptively, with data in place – and without performance impact. Hello weekends.

AVOID DOWNTIME

Designed for 99.9999% availability, FlashArray has no single point of failure, and all components are hot-swappable and upgradeable online.

PROTECT YOUR DATA

Adaptive dual-parity RAID-HA and always-on encryption mean zero data loss.

DATA THAT'S ALWAYS PROTECTED

Purity for FlashArray incorporates RAID-HA that's redesigned specifically for flash and its failure modes.

DEVICE FAILURE RAID-HA protects against concurrent dual-drive failure, and re-builds around failures automatically within minutes.

BIT ERRORS RAID-HA uses independent checksums and dedicated parity to detect and heal around bit error issues.

PERFORMANCE VARIABILITY RAID-HA manages performance variability to deliver consistent latency.

PURITY QOS

Get worry-free consolidation of workloads via comprehensive, powerful, effortless storage QoS.

ALWAYS-ON Automatic protection against "noisy neighbors" – no knobs, no configuration.

RATE LIMITS Enforce performance expectations for targeted workloads with throughput limits per volume or workload.

PURESTORAGE®

PURITY PROTECT

Purity is designed to ensure your data is safe by delivering self-protecting storage. From full business continuity with Purity ActiveCluster, to multi-site replication, to space-efficient local and remote snapshots — get the flexibility you need to operate worry-free. Purity supports automation of Purity ActiveCluster deployments, replication, and local snapshots — all within the Pure Storage GUI.

OPEN, SELF-PROTECTING STORAGE, FROM LOCAL TO DR TO CLOUD

Data backup is no longer simply about storing data: it's about flexible protection, fast restores — and above all, making your valuable data available for other uses, such as test/dev and analytics. Legacy, complex **disk-to-disk-to-tape** backup architectures can no longer keep up with the advanced and constant flow of data that businesses are tasked with protecting — and exploiting — today. FlashArray//X is a key element in **flash-to-flash-to-cloud** — designed for the scale and use cases of a modern backup strategy that provides more flexible backup and recovery options, faster restores to meet aggressive RTOs, and simpler, more efficient operations while taking advantage of cloud economics. Consolidate workloads on FlashArray and secure them with a robust flash-to-flash-to-cloud backup and recovery strategy.

GET FLEXIBLE BACKUP AND RECOVERY

Pure portable snapshots provide simple, built-in, local and cloud protection for Pure FlashArray. Purity Snapshots, Snap-to-FlashBlade, Snap-to-NFS, and CloudSnap together enable free movement of space-efficient copies either between FlashArrays, to FlashBlade, to 3rd-party NFS storage, or to the cloud, respectively. Unlike other cloud backup solutions, Pure portable snapshots are also cost-efficient, because they encapsulate metadata — which means they're incremental, space-efficient, and self-describing.
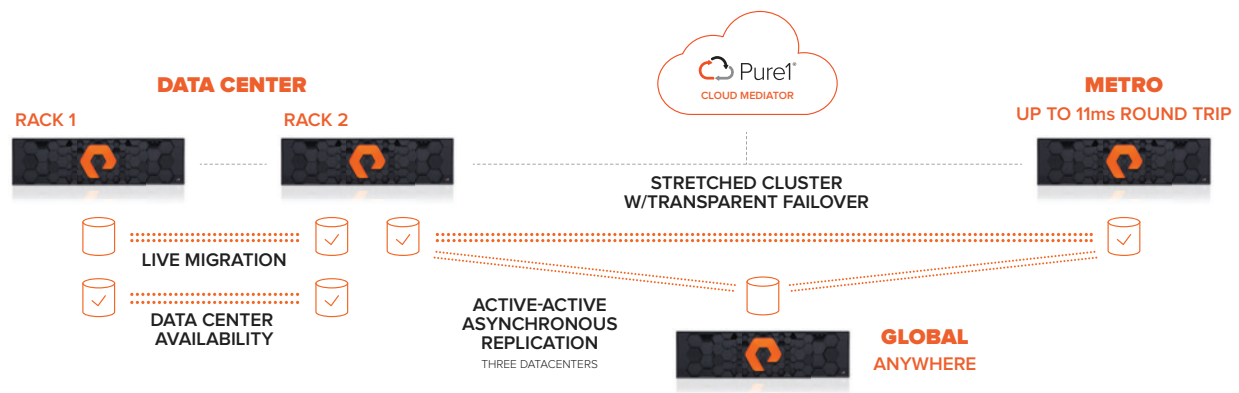
ENJOY COMPLETE VISIBILITY

Pure1® cloud-based management includes a snapshot catalog of all of your backups in one place — whether the target is another FlashArray, FlashBlade, another NFS target, or public cloud (like Amazon S3). Monitor for compliance and for storage consumption trends. Manage the repurposing of your data for other use cases, such as test-dev and analytics. Best of all, know exactly what options you have when you need to recover.

RAPID RECOVERY ON-PREMISES

RETENTION, RECOVERY & REUSE IN THE PUBLIC CLOUD
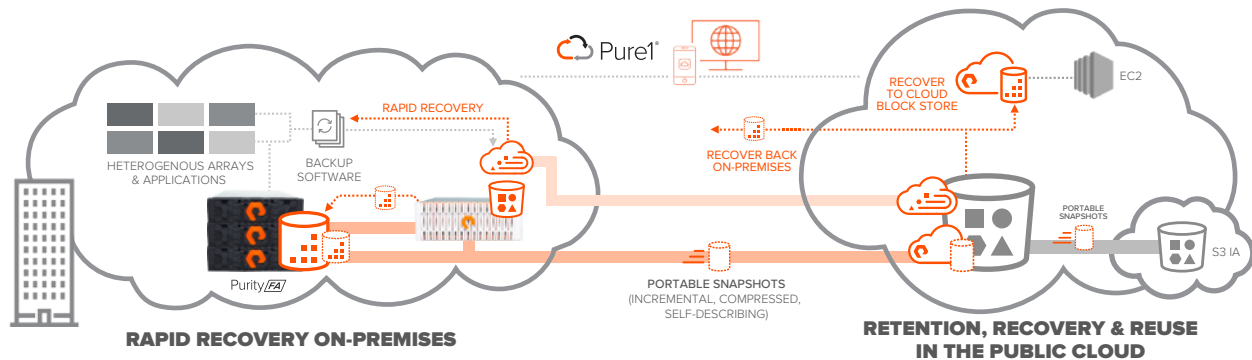
PURITY ACTIVECLUSTER

Make business continuity effortless with Purity ActiveCluster, Pure's ultra-simple solution for running applications Active/Active between two data centers. ActiveCluster's innovative design, including our cloud-based Pure1® Cloud Mediator and full integration with snapshot replication, enable all data center applications to take advantage of metro-area clustering. Best of all, ActiveCluster takes just minutes to set up, requires no third site, and is included with your Evergreen subscription.

DATA CENTER

RACK 1   RACK 2

LIVE MIGRATION

DATA CENTER AVAILABILITY

Pure1®
CLOUD MEDIATOR

STRETCHED CLUSTER W/TRANSPARENT FAILOVER

ACTIVE-ACTIVE ASYNCHRONOUS REPLICATION
THREE DATACENTERS

METRO
UP TO 11ms ROUND TRIP

GLOBAL
ANYWHERE

POWERFUL REPLICATION FOR CRITICAL USE CASES

ActiveCluster has use cases within and between data centers. It enables live migration between any two FlashArrays, or rack-level HA clustering of four controllers for maximum resiliency. ActiveCluster really shines in the metro use case: simply take a running volume and "stretch" it between two sites separated by as much as 11ms of latency, with zero additional configuration required. Finally, ActiveCluster delivers asynchronous replication to a third site globally — and with Purity 5.2 async replication is Active-Active, meaning that a target array makes intelligent and resilient use of async replication links from both source arrays. ActiveCluster does not require re-baselining after the loss and recovery of a replication link.

INSTANT, LIMITLESS SNAPSHOTS

Purity Protect Snapshots to FlashArray, FlashBlade, an NFS target, or an S3 store in the public cloud are instantaneous, space-efficient, and have no effect on performance.

SNAPSHOT ANY VOLUME AT ANY TIME at the click of a mouse. No planning or reservations required, no performance overhead.

SNAPSHOTS HAVE FULL CAPABILITIES because all volumes in the FlashArray are virtual and independent.

ALWAYS FULL YET SPACE SAVING snapshots work like full clones, and are always thin, deduped, and compressed.

RECOVER ANYTHING TO ANYWHERE from any other volume or snapshot in the array, instantly.

ASYNCHRONOUS *AND* SNAPSHOT REPLICATION

The powerful combination behind ActiveCluster. Achieve low RPO with regular delta updates and enable RTO zero via instant recovery from point-in-time snapshots.

DATA REDUCTION-OPTIMIZED means always thin, deduped, and compressed. No more lost performance, ballooning data, and added complexity.

INSTANT RECOVERY ENABLES RTO ZERO with no data copying required. Get back online faster.

MULTI-SITE REPLICATION 1:Many, Many:1 or Many:Many replication delivers flexibility. Use for data sharing, centralized backup, or DR.

Purity FA 5

PURITY SECURE

Purity Secure incorporates software and hardware measures to meet the highest security standards, ensuring the safety of customer data, while streamlining administrative requirements. Purity Secure has no impact on performance and is completely transparent to both server hosts and users. It can also be a key resource for organizations needing to meet modern compliance regulations like GDPR.

ALWAYS-ON ENCRYPTION

Purity continuously encrypts all data within FlashArray via FIPS 140-2 validated AES-256 encryption, meeting the U.S. government's highest security standard for data-at-rest encryption. Encryption is built-in, always-on, always in-line, and costs nothing: no impact on performance, no administrative overhead, no key management — and no additional fee.

EVERYTHING ENCRYPTED 100% of data at rest is encrypted, protecting against drive theft or loss.

INLINE, WITH NO PENALTY Encryption is always-on, inline, and has no impact on performance.

ZERO KEY MANAGEMENT Internal key management provides security without user intervention.

TOUGH EXTERNAL SECURITY

FlashArray protection has achieved accreditation by the Common Criteria Organization (CCO) to meet its stringent standards for data system security. Rapid Data Locking (RDL) offers smart card-based instant locking of an array, and similarly KMIP support enhances software-generated secrets used to regenerate an array's flash module access keys.

INSTANTLY DISABLE an array and crypto-lock its data, greatly reducing risk of loss, capture, or compromise.

SIMPLIFY LOGISTICS of shipment and deployment.

SECURE ADMINISTRATION Multiple account types, directory-based authentication, and secure management connectivity enable secure administration.

PURITY CAN ASSIST WITH GDPR

Every organization that collects and/or processes the data of data subjects in the EU is subject to GDPR and must comply. Penalties for non-compliance are significant, but a combination of data policies and technology considerations — such as encryption and data reduction — can help you achieve GDPR compliance cost-effectively.