

Economic Validation

Analyzing the Economic Benefits of Consolidating SQL Server Workloads on Pure Storage FlashArray

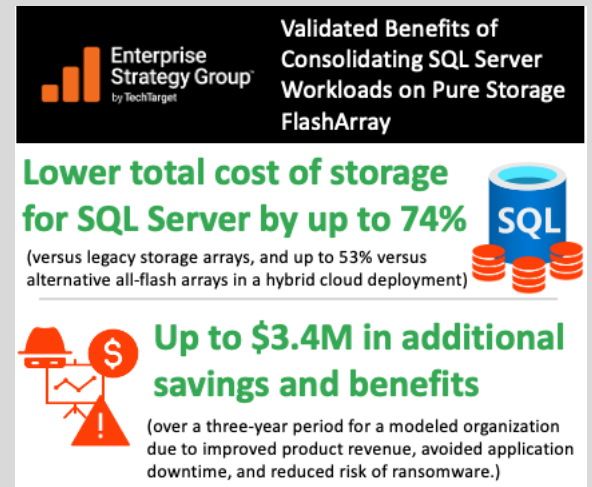
By Aviv Kaufmann, Principal Validation Analyst
November 2022

Executive Summary

Organizations are struggling with the complexity of providing low latency and highly available storage operations for on-premises SQL Server workloads while transitioning toward a hybrid cloud strategy that supports modern cloud-native application development and delivery.

TechTarget's Enterprise Strategy Group (ESG) validated the benefits that customers have realized by consolidating workloads running on aging storage systems and appliances onto Pure Storage FlashArray. We found that customers have significantly improved SQL Server workload performance, reduced complexity and risk, improved operational efficiency, and improved flexibility and agility for business operations.

Our three-year modeled scenario predicts that Pure Storage and FlashArray can provide a total cost of storage operations for hybrid cloud SQL Server deployments that is 53% to 74% lower than refreshing inefficient legacy storage deployments or consolidating workloads onto alternative all-flash storage offerings. In addition, our models predict up to \$3.4M in additional savings and benefits resulting from increased revenue through improved development and testing efficiencies, reduced risk of application downtime, and reduced risk of ransomware.



Enterprise Strategy Group
by TechTarget

Validated Benefits of Consolidating SQL Server Workloads on Pure Storage FlashArray

Lower total cost of storage for SQL Server by up to 74%
(versus legacy storage arrays, and up to 53% versus alternative all-flash arrays in a hybrid cloud deployment)

Up to \$3.4M in additional savings and benefits
(over a three-year period for a modeled organization due to improved product revenue, avoided application downtime, and reduced risk of ransomware.)

Introduction

This Economic Validation focused on the quantitative and qualitative benefits organizations can expect by consolidating and modernizing storage operations supporting SQL Server deployments with Pure Storage FlashArray.

Challenges

Today's modern organizations are more data-driven than ever, relying on data that is constantly generated from functions and locations across the organization as well as from outside of it. Data is vital to organizations, whether it is used to provide insight to guide business decisions and improve operations, to better understand customers and competitors, or to power revenue-generating products, such as applications, information, or services. Our research shows that, in just two years, the number of organizations that expect to develop new data-centric products and services has increased from 52% to 70%.¹

Microsoft SQL Server databases have powered business-critical transactional and business intelligence (BI) workloads for organizations for decades. These organizations have made significant investments in their Microsoft-powered data centers, management certifications, and development capabilities. But decades of siloed development efforts, mergers, and acquisitions have led to storage sprawl across aging and limited systems that must be supported by internal IT operations. These organizations must continue to support their legacy on-premises workloads and, at the same time, are looking to modernize by leveraging containers and Microsoft-centric services available from Azure and other public clouds.

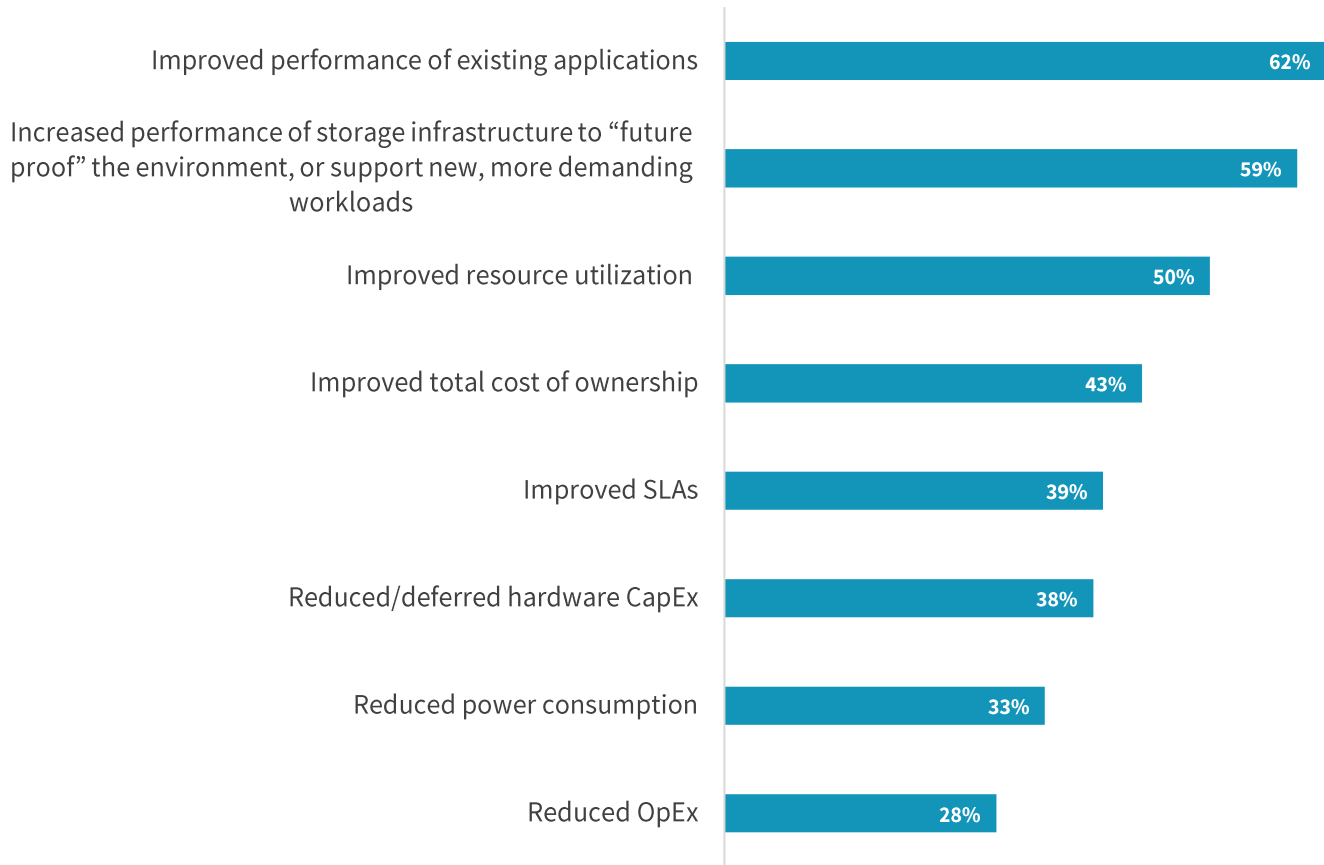
Storage consolidation is the first step, but business-critical workloads demand the highest levels of performance, availability, and security. Storage admins have struggled to consolidate and provide secure and highly available storage on-premises while continuing to meet the modern demands for cloud-like agility/flexibility and delivering predictable, low latency I/O performance for SQL Server workloads. An NVMe-based flash storage array can help with SQL Server storage consolidation efforts. Enterprise Strategy Group (ESG) research shows that NVMe-based flash storage technology has helped to improve the performance of existing applications and better meet the demand for new and more demanding workloads, while also improving resource utilization, total cost of ownership, SLAs, hardware CapEx, power consumption, and OpEx (see Figure 1).²

¹ Source: Enterprise Strategy Group Research Report, [The Evolution of Intelligent Data Management](#), January 2022. All Enterprise Strategy Group research references and charts in this economic validation are from this research report unless otherwise noted.

² Source: Enterprise Strategy Group Research Report, [Data Infrastructure Trends](#), November 2021.

Figure 1. Realized Benefits of NVMe Flash Storage

Which of the following benefits has your organization realized as the result of deploying on-premises NVMe-based flash storage technology? (Percent of respondents, N=119, multiple responses accepted)



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

While NVMe-based flash storage technology provides a great platform for workload consolidation, simply choosing a high-performance NVMe-based storage array is not enough. Organizations should consider all that a storage product and vendor have to offer in helping them to achieve their ultimate goals of supporting legacy and modern SQL Server applications, reducing complexity, implementing an effective hybrid cloud strategy, reducing risk, and accelerating operations while minimizing the impact on the business.

The Solution: Pure Storage FlashArray for SQL Server Workloads

The Pure Storage FlashArray is a software-defined all-flash, all-NVMe, unified block and file storage array designed to meet the current and future needs of modern corporate and enterprise organizations. FlashArray provides the following benefits:

- **Performance:** Ultra-low and predictable 150uS to 1ms latency for all applications. The self-optimized array is perfect for consolidating block (NVMe/NVMe-oF) and file (SMB/NFS) workloads with little to no performance impact. DirectMemory cache modules optimize read performance with Intel Optane SSDs.
- **High availability:** Provides 99.9999% availability with built-in business continuity and disaster recovery across product lines while continuing to meet SLAs.

- **Storage efficiency:** Highly efficient 5:1 data reduction and 10:1 total efficiency provide up to 5.5PB of effective capacity in a greatly reduced footprint.
- **Simplicity:** Single-pane-of-glass and AI-driven management with Pure1 combined with REST API automation to free storage administrators from time-consuming tasks. Non-disruptive updates, upgrades, capacity expansions, and integrated and predictive support ensure no business disruption and reduce strain on admins.

FlashArray provides significant benefits for SQL Server deployments, including:

- **API integrations and automation** through Windows Admin Center and SQL Server Management Studio, which eliminates the need to switch interfaces and reduces operational overhead.
- **Significantly improved uptime and availability** for SQL Server workloads during capacity expansion, technology updates and upgrades, and unplanned failures or disasters.
- **Reduced footprint** due to industry-leading data reduction technologies that help to lower infrastructure-related costs.
- **Predictable, low latency performance**, allowing consolidation of mission-critical SQL server workloads.
- **Seamless Azure hybrid-cloud deployments** enabled by Pure Storage technologies like Cloud Block Store and CloudSnap for Azure with unified management through Pure1.

Figure 2. Pure Storage FlashArray for SQL Server Workloads



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

FlashArray is available in several models:

- **//X:** High-density, high-performance array aimed at business-critical consolidation.
- **//XL:** Highest performance and density for mission-critical applications.
- **//C:** Cost-effective QLC flash storage for capacity-oriented workloads.

Enterprise Strategy Group Economic Validation

The Enterprise Strategy Group (ESG) Economic Validation process is a proven method for understanding, validating, quantifying, and modeling the economic value propositions of a product or solution. The process leverages ESG’s core competencies in market and industry analysis, forward-looking research, and technical/economic validation. For this validation, ESG interviewed Pure Storage customers and reviewed existing analysis and customer case studies to better understand and quantify how they have improved their storage-related operations and functions for SQL Server workloads since deploying FlashArray.

Pure Storage FlashArray Economic Overview

Our economic analysis revealed that since migrating their SQL Server databases and workloads to FlashArray (from traditional storage systems as well as alternative all-flash storage arrays), organizations have realized a considerable number of improvements, savings, and benefits. We found that FlashArray provided its customers with significant savings and benefits in the following categories:

- Improved SQL Server Workload Performance
- Improved Efficiency and Operational Savings
- Cost Savings and Business Enablement
- Reduced Risk to the Organization



DBAs and developers struggle with slow access to data and must deliver improved end-user experiences. SQL Server databases require low and predictable latency for transactional workloads and high-throughput operations for BI queries and database load, copy, backup, and restore operations. When too many SQL Server instances are serviced from a legacy storage array, workload contention and performance bottlenecks can lead to missed SLAs, lost customers, and slower development.

- **Lower and more predictable latency** – Customers reported performance improvements of 5-10x or more after migrating to FlashArray, including lower latency for SQL Server transactional database operations; faster load, copy, and restore times; and faster execution of BI scripts. End-to-end NVMe design helps to avoid bottlenecks and contention and minimizes latency for all front-end, controller, back-end, and disk operations. This helps to provide low and predictable latency for all consolidated workloads with no manual tuning required.
- **Improved consolidation of SQL Server workloads** – Enterprise Strategy Group (ESG) validated that a single FlashArray can deliver 3-5x more or even greater throughput for transactional and BI workloads per system. Because of this, organizations were able to consolidate more database workloads, applications, and users onto each FlashArray without negatively impacting performance. Pure’s always-on quality of service (QoS) helped to avoid contention and automatically tuned for

“Even when compared to our [alternative all-flash array]—which was already super fast—latency was cut in half once we moved the data over to our Pure FlashArray//X70.”

the best customer experience. One customer was able to consolidate the SQL Server workloads that they were previously running on nine enterprise storage arrays and appliances down to only two Pure FlashArrays, while significantly lowering latency and improving the performance of all operations.

- **Improved end-user experience** – After moving workloads to FlashArray, storage administrators reported improved and more responsive customer experiences and a reduction in the number of performance-related tickets seen by their organization.



Improved Efficiency and Operational Savings

Providing enterprise storage for large SQL Server deployments requires teams of storage administrators to manage, maintain, and optimize the storage system, as well as DBAs to perform storage-related functions like requesting/provisioning new storage; monitoring and tuning the database for storage performance; and ensuring data protection, security, and compliance. Simplified storage operations can offer an opportunity for database administrators to spend less time waiting on storage resources and more of their time managing complexity around other areas required to operate their SQL Server database workloads and applications.

- **Significantly reduced footprint:** – Organizations that we spoke with were able to significantly reduce their storage footprint by consolidating workloads onto Pure Storage FlashArray. Enterprise Strategy Group (ESG) has previously validated and quantified the significantly improved levels of data reduction provided by Pure through its always-on data reduction technologies. One of the customers that we spoke with was able to reduce 9 or 10 full racks of storage and appliances down to only 6U of FlashArray. This lowered power, cooling, and data center floor space costs significantly and led to lower administration and maintenance costs by not having to manage and maintain racks of storage, networking, and data protection/replication appliances.

- **Simplified management experience** – Customers were able to use the built-in automation and AI-driven insight of Pure1 to manage all Pure storage arrays across locations and even in the cloud from a single pane of glass. They reported greatly reducing the amount of time spent managing and maintaining their storage, allowing them to focus on other business initiatives. Others reported the ability to use Pure’s REST API to automate repetitive tasks and better integrate operations with other services and workflows.

“The skill set and complexity that was required to manage our previous solutions is gone. With Pure, we barely have to touch the arrays, and we have the same simple management for all Pure arrays, independent of size, across all locations.”

- **Integration with Microsoft and SQL Server Management tools** – Pure customers reported that they were easily able to initiate storage operations like local and remote backup and restore operations from within SQL Server Management Studio (SSMS), Windows Admin Center, and the Powershell SDK. This was true for both local and remote databases. Customers saved valuable time not having to coordinate with remote teams or open storage tickets for the storage administrators to handle operations. Teams reported that they were able to leverage their existing Microsoft skills and training and didn’t have to hire specialists or acquire new management training and certifications.
- **Improved visibility and reporting** – Customers reported spending less time collecting and consolidating information across management interfaces to provide reports on system status, capacity planning, and performance of workloads. All of this information was available to them whenever and wherever needed in the Pure1 interface.



Cost Savings and Business Enablement

Pure FlashArray provides cost savings through all-inclusive arrays, software, and Evergreen subscriptions. It also enables the business to achieve transformation and modernization goals faster:

“We used to manage a 50 page long Excel sheet for maintenance from [previous vendor], and it took us such a long time just to go through it line by line. With Pure, that complexity is gone. It has a line item per array—in one screen shot, we got all our storage arrays for all our 10 locations.”

- All-inclusive array and management software** – Pure1 and Purity lower cost of licenses for multiple software products and appliances. There is no additional cost to enable technology feature support or software functionality. Technologies like ActiveCluster and ActiveDR are included in the software subscription at no cost. They compress traffic, eliminating the need for replication appliances or software and greatly lowering the cost and complexity of DR.
- All-inclusive array and management software** – Evergreen//One and Evergreen//Flex pay-as-you-go storage subscriptions give financial flexibility of choice and eliminate the need to manage storage and/or reduce the effort required to plan for capacity and technology upgrades.
- Guaranteed innovation** – With a Pure Evergreen//Forever subscription, organizations are able to take advantage of the latest improvements in hardware technology over time, without having to research, plan, or purchase new storage arrays. Customer deployments are upgraded in place with forklift upgrades or disruption to service every three years as new technology is made available, providing improved performance and scalability for their workloads.
- Hybrid-cloud agility and flexibility** – With Cloud Block Store and CloudSnap, organizations are able to leverage the cloud operating model and provide self-service storage consumption on demand. Customers were able to move workloads between on-premises SQL Server instances and the Azure or AWS clouds and provide up-to-date dev/test instances to remote workers. The Purity operating environment provided seamless storage services and the entire hybrid environment could be managed from within a single Pure1 window. This provided the storage teams the agility and flexibility to quickly meet the needs of business operations today and then balance and optimize operations when the time was right.
- Faster path to modernization** – Containerization of SQL Server databases is a key consideration for many organizations going forward, as developers develop modern cloud-native applications or re-platform legacy SQL Server-based applications into containerized microservices. Pure ensures the availability, visibility, and performance required for successful containerization both on-premises and in the cloud. Portworx by Pure Storage is a data management platform that makes the management and mobility of Kubernetes containers containing SQL Server workloads much simpler, which allows organizations to provide highly available, scalable, and high-performance data services for Kubernetes containers.



Reduced Risk

Downtime and service interruptions of SQL Server-based applications have an immediate negative effect on revenue, productivity, customer satisfaction, and functionality of operations. Storage admins must ensure the highest levels of data availability, compliance, recoverability, and protection against threats.

- Reduced risk of downtime** – Customers reported a significant reduction in impact on business operations since switching to Pure. Most customers reported that they had not realized a single downtime event since migrating to FlashArray, and those that did explain the downtime was planned and meant to accommodate workflows. Before Pure, these organizations had reported periodic downtime for updates and upgrades. The Pure1 Meta platform avoided issues for organizations by leveraging AI-driven analytics to predict and remediate issues before they happened.
- Improved local and remote DR recovery** – Pure ActiveCluster provided active-active synchronous replication with automatic zero RPO and zero RTO failovers for stretched clusters and ActiveDR provided a remote DR solution that greatly lowered RPO and simplified the operation of failover down to a single click for organizations (both included with no additional cost). One customer reported that, with a previous storage vendor, this was a poorly handled and highly visible DR impact event, which opened the door for their switch to Pure. There is a Pure Validated Design (PVD) reference architecture to help design high-performance hybrid cloud DR deployments for SQL Server, leveraging ActiveCluster and Microsoft Server Failover Clustering.
- Improved security and ransomware protection** – Customers reported that Pure offered them improved security with encryption of data to better meet regulations. They were able to use Pure SafeMode snapshots to cost-effectively protect against ransomware events and unintentional deletion and remediate events that did happen quickly, without impact to operations.
- Improved copy and restore times** – Customers reported that they were able to deliver business copies of databases to testers and developers much quicker (up to 90%) than they had before, allowing them to provide up-to-date copies that were refreshed several times per day instead of on a weekly basis. In addition, customers reported that recovering their SQL databases to earlier points in time was far faster with Pure than their previous solution (up to 45TB/Hr recovery with rapid restore), allowing the business to continue and reducing the need to plan rollbacks far in advance. One customer was able to reduce their 24 hour-long data warehouse refresh down to only 5 minutes with Pure, and then down to only 30 seconds by using Pure and vVols.

“We went from FlashArray//M20, to //M50, to //M70, to //X70 with 100% uptime over six and a half years over all those chassis, all the storage upgrades, all the Purity code upgrades, with nothing ever going offline.”

Enterprise Strategy Group Analysis

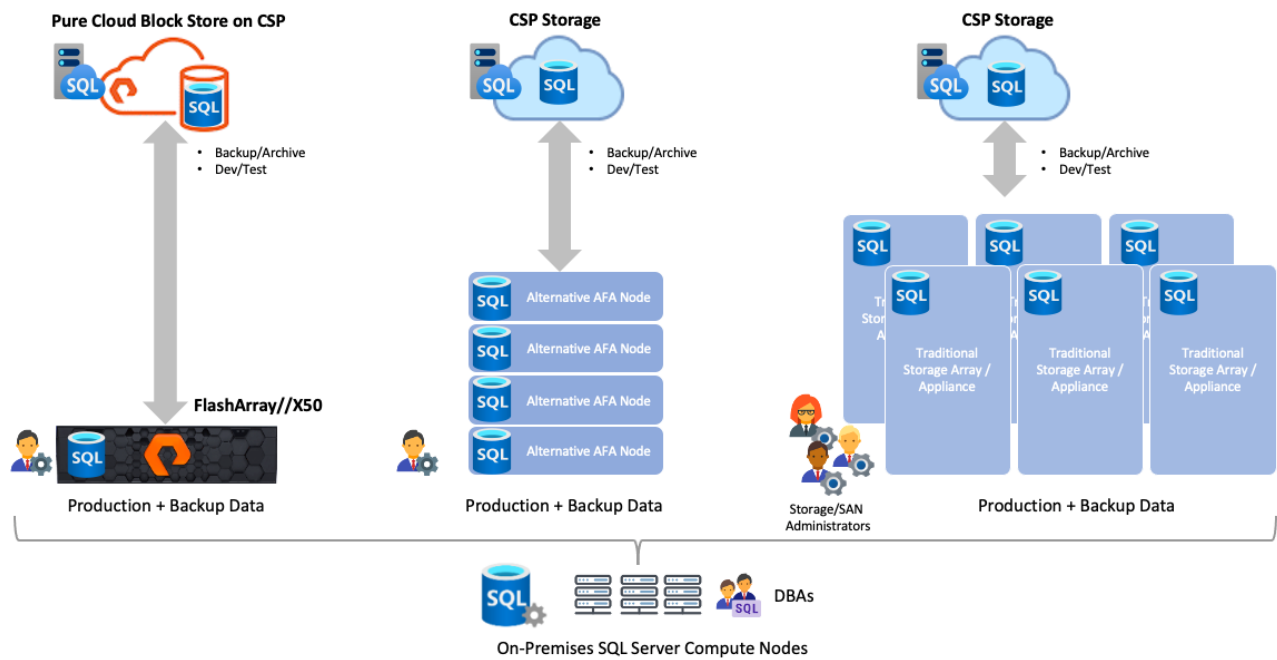
Enterprise Strategy Group (ESG) leveraged the information collected through vendor-provided material, public and industry knowledge of economics and technologies, and the results of customer interviews to create a TCO model that compares the expected costs and benefits of providing storage for hybrid cloud SQL Server operations over a three-year period. ESG’s interviews with customers who have recently made the transition, combined with experience and expertise

in economic modeling and technical validation of storage technologies from Pure Storage and alternative offerings, helped to form the basis for our modeled scenario.

Our modeled deployment assumed an organization was looking to provide high-performance storage for a total of 160 SQL Server instances with an initial average of 1.5TB of storage associated with each instance and a modest 10% annual growth in average storage demand. In addition, we assumed that for every GiB of effective production storage capacity, a total of 9.2 GiB of additional effective data for backups, snapshots, and dev/test copies was stored on local storage arrays. In addition, we assumed that a total of 200TiB of effective cloud storage capacity was required for cloud SQL instances, cloud backups/archive, and dev/test instances.

ESG then modeled the expected costs across three scenarios. The baseline case considered refreshing the current storage environment, consisting of six traditional scale-up storage arrays (populated with flash storage devices) and several appliances (replication and cloud gateway). We then sized and configured an alternative scale-out flash offering that could consolidate the storage into a singularly managed environment across several nodes of high-performance all-flash storage. And finally, we considered consolidating the storage requirements into a single Pure Storage FlashArray//X50. In addition, we calculated the expected costs to deliver the required capacity of cloud-based storage on the same cloud service provider (CSP) with (for Pure) and without (for the alternatives) the added cost and benefits of using Pure Storage Cloud Block Store and managing data with Pure1. A visual comparison of the three scenarios is shown in Figure 3.

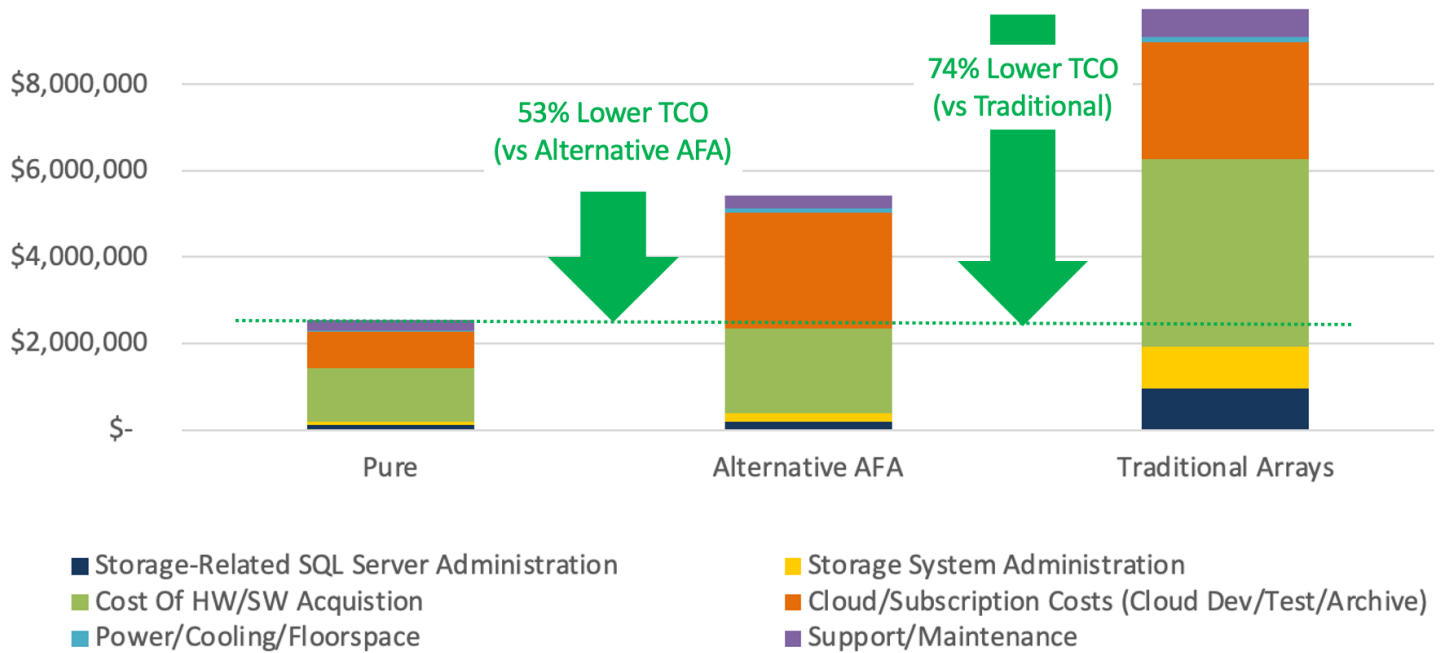
Figure 3. ESG Modeled Scenario Overview



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

Our models predicted that the Pure Storage FlashArray solution could lower the expected total cost of storage-related operations for the SQL Server deployments by 74% compared with managing and maintaining multiple arrays with flash storage from traditional storage vendors and by up to 53% compared with alternative purpose-built all-flash storage arrays. The results are shown in Figure 4.

Figure 4. Results of ESG’s Three-year Modeled Scenario



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

What the Numbers Mean

- Up to 72% lower cost of HW/SW acquisition:** The FlashArray solution required far less physical hardware to meet the capacity and performance requirements due to proven advantages in data reduction capabilities and predictable and low latency provided by the all-NVMe design. In addition, the base software cost included all features and functionality while traditional solutions required additional licensing or appliances to handle features such as synchronous replication and cloud connectivity. Finally, an Evergreen//Forever subscription kept upfront costs low, while any required annual capacity upgrades were simple and non-disruptive.
- Up to 91% reduction in operating expenses:** The 3U FlashArray solution significantly lowered expected power, cooling, and floorspace costs compared with the 22U alternative AFA solution and the six racks of hardware required by the traditional scale-up solutions.
- Up to 60% lower cost of support and maintenance:** The initial three years of support and maintenance contracts paid to vendors were 15% to 60% lower for Pure. These costs can vary between vendors and can increase drastically after three years but are generally proportional to the cost of HW and SW acquisition. The cost of a Pure Evergreen//Forever subscription is predictable, does not rise after three years, and can include upgraded technology.
- Up to 91% lower cost of storage system administration:** Our models assumed an existing two-person storage administration team was responsible for managing and maintaining the hybrid storage environment on-premises and in the cloud. Our models predicted that the FlashArray and Cloud Block Store managed with Pure1 could provide a significant reduction in the time to deploy/install new hardware; would provide a reduction in both the number of storage-related tickets and time to remediate them; require significantly less time to monitor and predict capacity; optimize performance for applications; perform data protection operations; and manage security, compliance, and user/system access to storage.

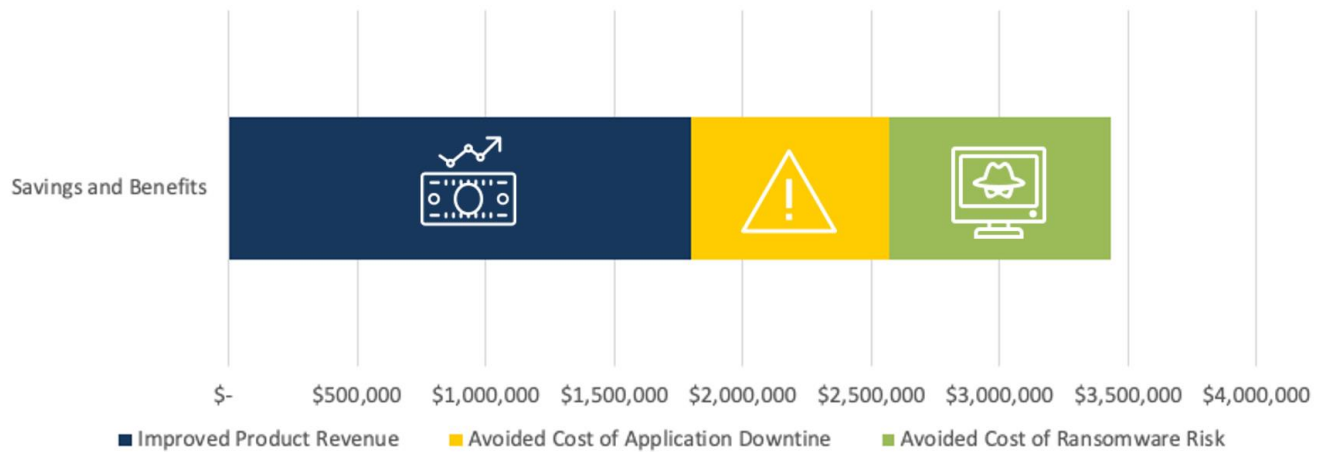
- **Up to 89% lower cost of storage-related operations for SQL Server administrators:** By leveraging the many benefits of Pure and being able to perform storage-related functions by themselves from within Microsoft and the SQL Server tools they used every day, SQL Server DBAs would be able to reduce the time they spent performing activities that were dependent on storage functions. This includes faster installation and provisioning of new databases, faster updates and database maintenance, less time spent tuning and balancing for performance or availability, and quicker completion of backups and restores of database instances.
- **Up to 69% lower cloud-storage related costs:** For the 200TiB of cloud storage, we leveraged a publicly available calculator to compare the expected pricing of Pure Cloud Block Store versus the native CSP performance tier of storage over a three-year period. This includes costs paid to Pure Storage and to the cloud service provider. Even when compared to the more cost-effective storage tier, Cloud Block Store provided 48% savings over three years. These savings are made possible by leveraging Pure's data reduction technologies to help reduce costs.

Additional Savings and Benefits

In addition to the expected lower total cost of ownership, Enterprise Strategy Group (ESG) modeled three potential areas in which the Pure Storage deployment could provide additional savings and benefits to the organization based on positively impacting SQL Server-related development operations, production SQL Server deployments, and protection against ransomware events. While the quantification of these examples may not be relevant to every organization, and actual impact is highly dependent on the organization, these examples help to illustrate the areas that should be considered by every organization.

- **Improved SQL-Server-related product revenue provided by accelerated development:** The FlashArray solution positively impacts development timelines by providing faster access to and more frequently updated dev/test copies to developers working on-premises and in the cloud, fewer issues with access to databases, faster rollback to earlier database views, and a quicker path to microservices and containers with Portworx. ESG assumed a team of 20 developers, each provided about \$1M in annual revenue generated through new product development and incremental product improvements to existing services. Assuming a 3% increase in development productivity, each developer could potentially generate an additional \$30k of annual revenue, totaling \$1.8M over three years.
- **Avoided cost of downtime for production SQL Server-based applications:** Customers reported that FlashArray provided them significantly faster restores of production databases, reducing the time live applications were impacted per restore from 2 hours to only 15 minutes. Our model assumed that the organization's \$20M in annual revenues was generated across 32 commercial instances, of which only two were impacted each year due to the need to restore the database, resulting in lost revenue until services were restored. Our models predicted that a total of \$767K of potential lost revenue could be avoided over the three-year period with FlashArray.
- **Avoided impact and cost of ransomware:** Pure's SafeMode snapshots can help to safeguard against an increasing number of successful ransomware events. Using industry-published numbers for the risk of encountering a successful breach and the expected cost to remediate a ransomware event, we modeled the expected cost to remediate ransomware events. We assumed that Pure could help reduce the risk of successful ransomware attempts by up to 80%, resulting in \$864K in avoided risk over a three-year period.

Figure 5. Additional Potential Savings and Benefits Provided by Pure Storage FlashArray



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

Issues to Consider

While models by Enterprise Strategy Group (ESG) are built in good faith upon conservative, credible, and validated assumptions, no single modeled scenario will ever represent every potential environment or engagement. ESG recommends that you perform your own analysis of your SQL Server storage requirements and consult with your Pure Storage representative to understand and discuss the options and potential possibilities proven through your own proof-of-concept testing.

The Bigger Truth

As organizations continue to support legacy applications and modernize their SQL Server environments for hybrid cloud operations, it is paramount that their storage strategy is designed with the accommodation of past, present, and future workloads in mind. Legacy SQL Server workloads that run on-premises require mission-critical performance and availability and are often distributed across several siloed storage arrays. Data protection and disaster recovery capabilities are provided through additional software and appliances. This results in inefficiencies, management complexity, limitations, and reduced visibility.

Azure has made a hybrid cloud strategy easily achievable for Microsoft-based environments, where teams can leverage their in-house investments, expertise, and processes while modernizing operations outside the data center. But managing data operations between on-premises and any public cloud can be time-consuming and costly.

Enterprise Strategy Group (ESG) validated that migrating and consolidating SQL Server environments onto FlashArray and using PureStorage technologies like Cloud Block Store and Pure1 resulted in greatly improved SQL Server workload performance, reduced risk to the organization, a significant reduction in administrative and operational overhead, and improved business outcomes. Our three-year models predicted a 53% to 74% reduction in the expected total cost of ownership for storage, as well as millions of dollars in potential savings and benefits provided by faster SQL Server-related development, less impact to commercial SQL Server applications, and improved protection against ransomware events.

ESG believes that Pure Storage’s vision is one that extends far beyond the traditional data center. FlashArray is an excellent solution to consolidate and accelerate on-premises SQL Server environments as well as for those looking to transform towards a hybrid- or multi-cloud strategy. Pure Storage provides investment protection with future-proof technology, allows organizations to choose the financial model that works best for them with up-front capital or pay-as-you go subscriptions, and provides a faster path to modernization and sustainability. If your organization is looking for a strategic partner and a storage solution designed to accelerate, protect, modernize, and simplify your SQL Server environment while reducing costs and enabling positive business outcomes, ESG suggests you consider Pure Storage FlashArray.

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