ESG Lab Validation Report Summary	# Consolidating Workloads with VMware and Pure Storage
	## Tested Workloads: Desktop Virtualization using Horizon View and Server Virtualization for Email and Databases

ESG Lab validated through hands-on testing that tier-1 application workloads such as desktop virtualization, databases, and email can be run on a shared, consolidated [Pure Storage](#) FlashArray//m storage system without compromising service levels and delivering consistent sub-millisecond response times. A 5,000-user enterprise was simulated to validate this premise, running on a single all-flash storage array. In addition, failure scenarios were introduced to test resiliency.
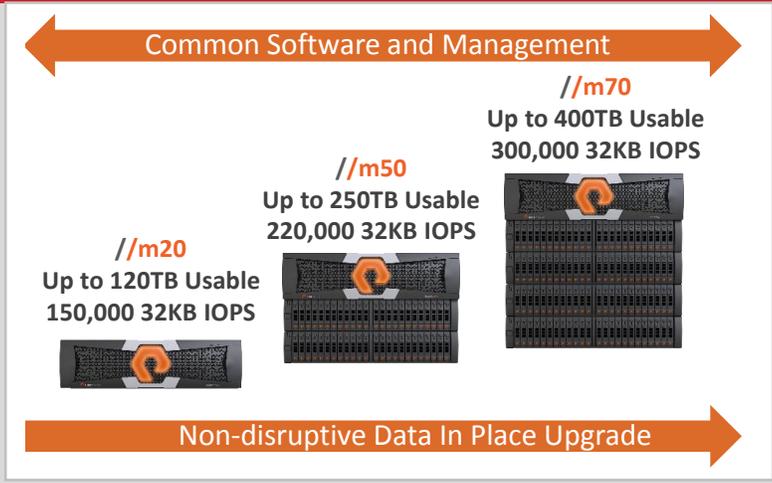
Read the Full Report at
http://info.purestorage.com/2015Q3-NAM-ESG-Mixed-Workloads-Lab-Validation_Request.html

The Product

Pure Storage FlashArray//m is designed with performance, density, and power efficiency in mind, without compromising the modularity or upgradeability that Pure's customers have come to expect. FlashArray//m offers data-in-place, non-disruptive upgrades of the software and hardware components without impacting performance.

It's important to note that the performance numbers claimed by Pure are for 32KB IOPS. Many vendors commonly report 4KB IOPS results because systems can service higher numbers of smaller IO requests. ESG Lab has observed that real-world environments are dominated by I/O that averages around 32KB. FlashArray//m is designed to adapt automatically to any I/O block size to provide optimal performance, scalability, and data reduction without application tuning. Pure Storage also considers its data reduction technology, FlashReduce, to be a significant differentiator. FlashReduce automatically deduplicates and compresses live data as it is written to the array. Pure claims an average reduction ratio of 5:1, or 80%, but this will vary across different types of applications.

Common Software and Management

//m70
Up to 400TB Usable
300,000 32KB IOPS

//m50
Up to 250TB Usable
220,000 32KB IOPS

//m20
Up to 120TB Usable
150,000 32KB IOPS

Non-disruptive Data In Place Upgrade

Why This Matters

In a dynamic IT environment, the ability to quickly provision and manage data services is crucial for enabling IT administrators to meet the demands of the business. Leveraging virtualization to consolidate workloads can help drive higher levels of infrastructure efficiency through improved resource utilization, but when multiple applications share the same underlying storage system problems can quickly arise. A burst of I/O activity from one application (e.g., a long-running database query) can significantly impact all the other applications, leading to poor response times, lost productivity, and, in the worst case, lost revenue.

ESG Lab validated that five virtualized, mission-critical applications were easily consolidated onto a single Pure Storage FlashArray//m without impacting each other. As the workloads ramped up, performance of a demanding VDI infrastructure that supported 1,500 heavy users remained high. For consolidated, mixed workload virtual environments, the variety of I/O types and sizes can wreak havoc on the latency of each application, so latency is often considered the most important performance metric for these types of environments. ESG Lab confirmed sub-millisecond response times for each application throughout all phases of testing, with the exception of a less than a minute bump in latency to just 2ms during a recompose.

ESG Lab Validation Highlights

ESG Lab performed hands-on evaluation and testing of Pure Storage FlashArray//m at Pure Storage's Mountain View, CA facilities. The following is a summary of the results:

- ESG Lab leveraged a single Pure Storage FlashArray//m50 and deployed five VMware virtualized, mission-critical applications: VMware Horizon View (VDI), Microsoft Exchange Server (e-mail), Microsoft SQL Server (OLTP), Microsoft SQL Server (data warehouse), and Oracle (OLTP).
- ESG Lab observed a data reduction ratio of 6:1, or more than 83%.
- The performance of each application workload was monitored as it was started and ramped up to reach a steady state.
- Response times remained manageably low throughout all phases of testing, reaching an average level of .57ms during peak workload execution.
- Six different failures were simulated while all workloads were running, and aside from minor, transient effects, performance remained high and sustainable. Response times were remarkably consistent as well, exceeding 1ms on only two occasions, when the primary controller was rebooted, and when an NVRAM module was pulled.
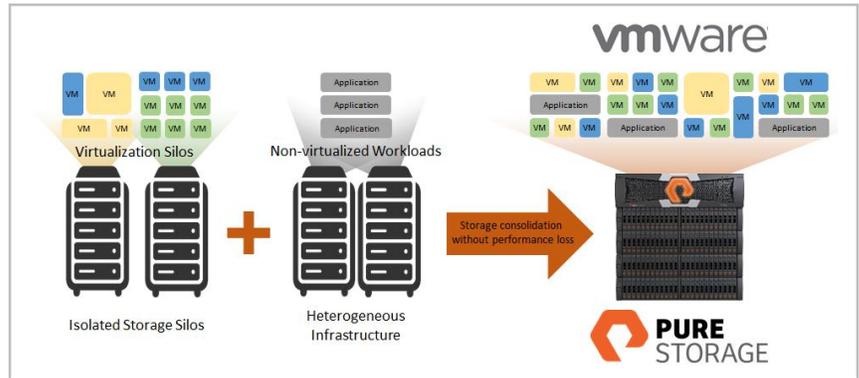
Issues to Consider

Default server BIOS, operating system, and application settings were used during ESG Lab testing. While tuning of application workloads is common, this testing found that no tuning was necessary to successfully consolidate tier-1 workloads. ESG Lab is confident that the results presented in this report meet the objective of demonstrating the achievable performance levels of a highly virtualized, mixed workload environment.

The modular FlashArray//m is a key component in Pure's Evergreen Storage ownership model, a model designed for data-in-place generational upgrades. The goal of Evergreen is to eliminate forklift upgrades with infrastructure that expands the useful life of storage from a few years to a decade or more. Evergreen expands Pure's Forever Flash program: Controller upgrades are included in ongoing maintenance and performed every three years, all software upgrades to new versions are included, and a trade-in credit is provided for existing controllers when purchasing additional capacity that necessitates a controller upgrade.

The Bigger Truth

ESG research reveals that increased use of server and desktop virtualization technologies, along with data growth management, are frequently cited important IT priorities. The amount and variety of data that businesses need to store is growing rapidly, driving the growth in overall storage use and costs. Another key objective for any IT administrator is providing sufficient performance to give business users the best possible experience. This is especially important for virtual desktop deployments and mission-critical applications, which are becoming increasingly virtualized. Pure Storage FlashArray//m is designed not just to offer value, but also to drive a more strategic solid-state discussion. The FlashArray//m is designed with the goal of "non-disruptive everything." This, enables Pure to extend the value proposition of its storage architecture further into the future, allowing organizations to look past simple price-per-capacity or feature comparisons to include many of the other total cost of ownership benefits of solid-state. ESG Lab is pleased to validate that the Pure Storage FlashArray//m delivers consistently high performance at extremely low response times and is clearly well suited to support a mix of demanding, real-world business applications running in a performance-critical, highly virtualized infrastructure. Organizations that have been considering the potential value of consolidating business- and mission-critical applications and users but have had concerns about performance and availability would be well served to take a closer look at Pure Storage FlashArray//m.

Read the Full Report at
http://info.purestorage.com/2015Q3-NAM-ESG-Mixed-Workloads-Lab-Validation_Request.html