Flash Storage Moves Front and Center in the Enterprise

Abstract

In competitive business environments, speed is a key differentiator. IT organizations worldwide have realized significant value in transitioning from traditional disk to flash-based storage architectures, paving the path to making businesses more responsive and, ultimately, more competitive. This paper highlights the benefits of NetApp® flash programs, which transform traditional IT with high-speed data delivery while reducing the costs and risks associated with a change of this magnitude.

1   Flash Is the New Normal

According to a recent Gartner report, "Solid-State Array TCO Reality Check," all-flash storage systems offer an average of 76% power and cooling savings. These programs also offer an average of 63% rack space savings, 48% greater simplicity in administration, and 16% reduction in maintenance costs. These efficiencies, combined with accelerated performance, are fueling the rapid adoption of flash-based storage arrays within enterprise data centers.

Industry analysts predict that solid-state-disk (SSD) revenue will soon surpass hard-disk-drive (HDD) revenue in enterprise data center implementations. According to one such report, the compound annual growth rate (CAGR) for data center SSDs is approximately 20% compared to a 4% CAGR for enterprise HDDs.

Although TCO is a strong consideration, what really drives this shift toward flash is the simultaneous convergence of four key attributes: capacity, performance, reliability, and cost:

Capacity

In 2004, the world's first serial ATA solid-state flash disk entered the market: Adtron's model A25FB, a 2.5" SSD with a capacity of 40GB. Since that time, SSDs have steadily climbed the capacity ladder. Last year, we saw the introduction of Samsung's model PM1633 SSD, with 3.84TB capacity, followed by this year's PM1633a, containing 15.36TB capacity. In 12 years, SSD capacity has grown by an astonishing 38,450%.

Performance

The physics of rotating platters and moving heads limits the ability of HDDs to provide data at rates higher than 300MBps. Flash-based SSDs, free of moving parts, have no such restriction, with continuous read throughput today in the range of 1200MBps. Random read operations have an even larger delta, with a single SSD able to sustain 100,000 input/output instructions per second (IOPS) compared to a rather dismal 200 IOPS for HDDs. Although HDDs appear to have hit the performance wall, SSDs will continue to get even faster with new software techniques such as parallelism and quicker processing of background tasks.

Reliability

Concerns about long-term reliability—in particular, the fixed number of writes that can occur over the lifetime of a flash cell—have historically held back widespread adoption of SSDs. This subject was recently scrutinized in an academic study that analyzed thousands of SSDs operating over a six-year period and accumulating millions of drive hours within Google's data centers. The result of the study showed that SSDs had a lower failure/replacement rate than HDDs, regardless of the vendor and type of flash used in the units. Studies such as this one and observations from vendors confirm that flash-based SSDs provide the reliability required by enterprise applications.

Cost

The high cost of SSDs has undoubtedly been the single biggest factor preventing widespread adoption in enterprise data centers. However, as flash SSD prices decline, inevitably there will be a day when SSDs are less costly than HDDs. For high-performance SAS HDDs, that day is already here. Witness this quote from SanDisk:

> *…with the introduction of SanDisk's 4TB Optimus MAX SAS SSD, we observed that the Total Cost of Acquisition alone (up-front purchase cost of equipment) for SSD-based systems was cheaper than HDD-based systems. Given the larger capacities of SAS SSDs over 10K and 15K RPM SAS HDDs, you can actually buy less infrastructure gear of system enclosures, rack cabinets, cabling, etc. to deploy a server or storage system solution with SSDs versus HDDs…*

If 4TB SSDs signaled a transition from high-performance HDDs, will the impact of 16TB SSDs also hasten the transition of SATA HDDs to flash? Many people believe this is the case.

Conclusion

SSD technologies have progressed to the point at which increased capacity, performance, and reliability are disrupting existing perceptions of where HDDs and SSDs should reside in enterprise data centers. Plummeting SSD prices have driven an inflection point at which flash is viewed as a viable replacement for HDDs, regardless of the application. As history has shown, successful organizations utilize proven technologies that accelerate access to data, increasing responsiveness and overall competitiveness.

2 NetApp FlashAdvantage

The NetApp FlashAdvantage Program is designed to make it easier for companies to experience the benefits of flash without risk. Using FlashAdvantage, customers can test all-flash storage systems in their environment with no cost for 45 days. NetApp also offers pricing bundles with high-capacity SSDs that make flash very affordable for businesses. In addition to free trials and pricing bundles, NetApp FlashAdvantage also includes the following components:

Simplified Setup

NetApp All Flash FAS (AFF) systems are preconfigured at the factory with preset defaults for network configuration, storage virtual machine creation, and storage protocol configuration. In addition, NetApp System Manager (included with each AFF system) contains a setup wizard with simplified LUN creation for SQL Server and Oracle databases conforming to best practices. With preconfigured systems and database setup wizards, setup time is reduced to 30 minutes or less.

Six-Year Support

Traditionally, storage array vendors progressively increase support costs as equipment ages. This is not the case with NetApp AFF. In addition to the included three-year support contract, you can purchase support for years four through six for the same price per year at the time of initial purchase.

Free Controller Upgrade

Power your enterprise applications with the best performance and efficiency that the newest technologies have to offer. Upgrade your All Flash FAS controllers free of charge every three years when you purchase three or more years of NetApp SupportEdge Premium support at the time of purchase. Alternatively, extend your existing SupportEdge contract by three or more years.

3X Performance Guarantee

When select customers* purchase a NetApp AFF8080 or NetApp EF560 all-flash system, we guarantee that Microsoft SQL Server and Oracle database applications can achieve 3X more IOPS at 1ms latency. If you do not see at least a 3X performance improvement, NetApp will provide up to two days of professional optimization services at no cost. (*Check with your NetApp authorized sales representative for eligibility requirements.)

Enhanced AutoSupport

The NetApp AutoSupport® system is a proactive and predictive tool that helps increase storage efficiency and reduces operational issues, thus lowering the overall costs of flash-based systems. With AutoSupport, the health of flash-based storage systems is constantly monitored so that potential issues can be addressed before they become a problem. This monitoring happens automatically and requires no intervention from IT staff. AutoSupport includes advanced SSD reporting, including parameters that enable customers to estimate the projected lifetime remaining for each SSD, enabling proactive replacement of any SSD approaching the end of its useful life.

3   Flash 3-4-5

The chief benefits of FlashAdvantage were recently encapsulated in the Flash 3-4-5 promotion, which adds the industry's only guaranteed efficiency reduction of 4:1. This program also includes new 15TB solid-state drives (SSDs), making flash-based storage arrays the ideal workload consolidation platform for diverse infrastructure needs.

Guaranteed success with Flash 3-4-5

3X Guaranteed Performance	4:1 Guaranteed Efficiency	5 Ways to Get Started
▪ 3x increase in IOPS ▪ SQL Server and Oracle ▪ Backed by up to 2 days of professional services	▪ 4x effective for any workload ▪ Includes inline efficiencies, snapshots, and clones ▪ Cover any shortfall with additional SSD capacity	▪ Risk free evaluation ▪ Free controller upgrades ▪ Extended warranty ▪ 3X performance guarantee ▪ 4:1 efficiency guarantee

4   Summary

To be successful, IT organizations must adapt to shifts in technology. During these times of upheaval, the ability of companies to embrace new technology is crucial for survival. Those companies that can successfully transform to new technologies will not only survive, but enhance their competitive position.

As flash moves into mainstream use, NetApp Flash 3-4-5 makes it easier for organizations to bring flash into their environment with a try-and-buy program. The program also offers a suite of features designed to reduce risk, ease migration, and curtail costs.

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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