White Paper

Make Your Infrastructure Data Ready with NetApp

Ready-Built to Bring on the Future

March 2017 | WP-7245

NetApp®

Table of Contents

1 Transform Data Infrastructure with Flash

Data has become the lifeblood of companies of all sizes and across all industries. Many companies are undergoing a digital transformation because their customers increasingly rely on digital interactions for information, support, and ordering. Organizations are reinventing themselves to unlock new value from existing applications as well as next-generation social, mobile, cloud, and analytics technologies. To address these demands, businesses must modernize IT infrastructure to accelerate application performance, improve data center economics, and adapt to evolving business demands with confidence.

NetApp helps companies simplify and modernize data infrastructure. We help you deliver the highest performance and reliability, reduce costs, and increase agility by simplifying infrastructure with highly flexible and easy-to-manage flash storage.

1.1 Why Read This Paper?

Your IT team is struggling with aging, inflexible, and complex infrastructure and processes that make it difficult to support new business needs or take advantage of cloud. This paper explains how you can transform your data infrastructure using flash storage. If you've been struggling to meet service levels for performance and availability using out-of-date disk-based storage technology and spending too much time fighting fires to focus on delivery of new applications and services, then this paper is for you. **Table 1** describes how NetApp helps you improve business outcomes and reduce costs.

NetApp provides a flexible, proven data infrastructure that allows you to move forward with confidence. You can support both existing and emerging applications with NetApp's unified data management platform. Scale dynamically and move applications freely to where they run best: on the premises or in the cloud.

2 Simplification That Dramatically Improves Data Center Economics

Complexity is one of the biggest impediments to data center success. Complex and aging infrastructure drives up capital costs (capex), while complicated management, outdated tools, and risky manual processes drive up your operating costs (opex) and keep your team from delivering more value to your business. All-flash storage simplifies your infrastructure and your operations, delivering rapid return on investment.

2.1 Simplified Infrastructure

Many IT teams fail to recognize the impact that out-of-date infrastructure has on the bottom line. In most data centers, the expenses that result from excessive space, power, cooling, and maintenance costs due to older infrastructure quickly outweigh the benefit of running with equipment that's already been paid for.

Smart IT teams are updating data center infrastructure to achieve:

- **Increased density.** By replacing older equipment with the latest gear, you can free up valuable space and decrease the money spent on power and cooling.
- **Greater flexibility.** With the IT environment evolving rapidly, you have to make infrastructure choices that give you the greatest flexibility to move in different directions in the future, including to the cloud.
- **Infrastructure standardization.** By eliminating specialized infrastructure to support different applications and services and standardizing your hardware selections, you create a simpler, more flexible data center that adapts to new requirements and enables self-service.

Table 1

Improve Business Outcomes and Reduce Costs	
Simplify your data infrastructure to improve data center economics	• Reduce storage footprint, power, and cooling by 10x • Simplify operations with application-optimized 10-minute setup
Accelerate your applications and services while increasing availability	• Double your performance at half the latency of leading competitors • Deliver 98% faster data recovery for planned and unplanned system, site, and regional outages
Future-proof your IT infrastructure and take advantage of cloud	• Industry's fastest growing SAN vendor[1] • Top-rated platform for private and hybrid clouds by Gartner[2] • Migrate confidently from existing SAN with pathway to the cloud

Because of improvements in storage technologies over the past few years and the rapid transition to flash, storage offers the biggest opportunity to increase density and infrastructure standardization while delivering greater flexibility to your business.

NetApp all-flash storage reduces your storage footprint, power, and cooling by up to 10x. In just 4U of rack space, NetApp can deliver over 1PB of effective capacity, replacing multiple racks of existing hard disk drives (HDDs).

With NetApp, you can consolidate all your workloads on high-density, energy-efficient flash storage, reducing data sprawl. NetApp all-flash storage delivers optimal efficiency using state-of-the-art data reduction, including inline compression, deduplication, and compaction, further reducing storage footprint and saving dollars from your IT budget. The NetApp All-Flash Guarantee gives you even greater peace of mind with a guaranteed effective storage capacity and guaranteed efficiency ratio based on your specific workloads.

2.2 Simplified Operations

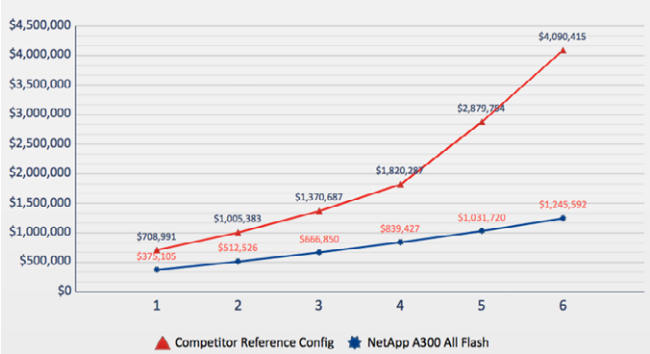
In most data centers, IT teams spend too much time setting up, configuring, managing, and monitoring storage and other infrastructure and too little time creating and deploying new applications and services to help the business succeed.

Managing a sprawling data infrastructure, which might span multiple data centers, remote offices, and cloud locations, can be a difficult task, made even harder by the diverse interfaces and tools required. IT experts spend too much time solving compatibility problems, managing data protection tasks, and troubleshooting performance problems to focus on higher value projects.

Consolidating important datasets on all-flash storage streamlines your operations. Simply reducing the number of storage components under active management is the first step in getting your data under control. NetApp not only allows you to reduce your data footprint, it also helps your IT staff get their time back. With NetApp all-flash storage, you go from setup to serving data in just 10 minutes with a configuration optimized for your application profile. The NetApp all-flash architecture delivers the performance your applications need without constant performance tuning and eliminates the need for data tiering, saving hours of valuable admin time.

With integrated data protection, NetApp simplifies backup and disaster recovery, increasing your level of protection and decreasing the risk of data loss. We make it simple to automate backup and other manually intensive data management tasks, saving time and reducing the chances of operator error. Your team can monitor storage health using predictive analytics that help identify potential issues before problems occur.

Figure 1 Cumulative cost of NetApp AFF A300 compared to a traditional competitor for a configuration with 300TB of effective capacity. NetApp advantages include data reduction and extended system life with six-year flash warranty.



Using the NetApp Data Fabric, you can monitor and manage your data across multiple locations, including the cloud. Your IT team's lives get a lot better when they can see and manage all data using a single set of intuitive tools.

Data moves easily from all-flash storage to hybrid storage to the cloud with no surprises. With NetApp, you can consolidate all your applications on the most data center–efficient storage you can buy combined with the best data management on the premises or in the cloud.

2.3 The ROI of Simplification

Most IT teams are being asked to do more while containing costs. According to the Spiceworks 2017 State of IT report, a survey of over 900 IT professionals, "IT budgets and staffing will remain fairly flat, making 2017 a challenging year."

Given budget limitations, it's easy to see the initial cost of flash storage as a deal breaker. Smart IT teams, however, look beyond the initial price to understand the full financial impact that all-flash storage can have. With flash, you can actually save money while you modernize, allowing you to meet new business challenges in the face of budget pressures.

Return on investment (ROI) is the best way to measure the value of IT expenditures. By comparing the ROI of different IT projects and different proposed solutions within a project, you can determine which projects have the highest ROI and therefore which make the most sense to undertake. An ROI analysis is also a useful tool when it becomes necessary to convince corporate executives.

All-flash storage modernization and consolidation projects have extremely high ROI. A recent Gartner study[3] found that all-flash storage pays for itself in just five to six months on average, the result of dramatic improvements in total cost of ownership (TCO). Operating expenses for administration, power, space, cooling, and maintenance are significantly reduced. Also contributing are reductions in software licensing costs and improvements in IT productivity.

Note that this Gartner study only considers the tangible benefits from direct operating expense reductions. It's much harder to calculate the benefits from dramatic improvements in performance (see following section), increased flexibility and agility, or standardization. However, there's no doubt that these factors contribute directly to the success of both your IT team and your business.

The savings that accrue from high-density, high-capacity flash storage are significant, and NetApp has moved quickly to become a flash leader.

NetApp is the first all-flash array provider to ship 15TB SSDs, delivering 50% higher capacity than the largest HDDs. And NetApp delivers the high-performance I/O connectivity, high transactional performance, low latency, and enterprise-class data management needed to support high-density flash.

With the introduction of the latest NetApp All Flash FAS (AFF) models NetApp provides:

- **Fastest enterprise storage.** AFF is the top-performing enterprise all-flash array among the major storage providers and in the top three overall on the SPC-1 performance list.
- **Industry-leading data center efficiencies.** TCO is improved through a dense form factor that reduces power consumption by up to 11x, rack space by up to 19x, and support costs by 67%.
- **Most cloud-connected all-flash array.** NetApp connects to public clouds from AWS, Azure, IBM Cloud, and more, giving you maximum visibility and seamless data control.

Flash represents a massive economic opportunity for the enterprise data center. If you have a conventional array that's past warranty, you can likely replace it for less than the annual cost of maintenance with a NetApp all-flash array that includes three years of support and delivers additional savings through much higher performance; ease of management; and savings in power, space, and cooling.

Online Credit Lending Company Meets New Challenges

As the first online credit lending platform in China, Shanghai PPDAI Financial Information Service Co., Ltd. has seen continuous business growth along with an increasing user base.

PPDAI's production systems, including its core database and virtualization applications, were running on disk-based NetApp storage. With storage performance expected to reach 50,000 to 100,000 IOPS and a need for extremely low latency, the company opted to upgrade to NetApp flash storage. By using NetApp integrated data protection, PPDAI also achieves more comprehensive and consistent business availability.

Key Results:

- Accelerated transaction performance up to 3x
- Kept latency below 0.7ms, even during peak hours
- Reduced costs by 60% to 70% versus disk-based systems
- Saved money in space, power, and cooling
- Addressed scalability and management needs, propelling business growth

拍拍贷 ppdai.com

3 Performance to Accelerate Every Application with No Disruptions

NetApp flash storage delivers dramatic improvements in performance and availability. What does that mean in practical terms for the applications and services on which your business relies? Critical applications can be accelerated up to 20x versus traditional storage while eliminating common causes of both planned and unplanned downtime. This level of performance and availability translates to:

- A better experience for your customers and higher customer satisfaction
- Greater productivity for your IT team
- Increased competitiveness and growth for your business

3.1 Better for Your Customers

Your company's customer relationships depend more and more on digital interactions. Customers visiting your website or using your mobile apps have high expectations for the quality of the digital experience. Mobile users, who make up an increasingly large percentage of all accesses, are particularly sensitive.

A few seconds' delay might mean the difference between a satisfied customer who completes a transaction and a customer who clicks over to a competitor's site. Just a few bad experiences, and that customer might not be back. You can't afford for the digital services you offer your customers—whether internal or external—to be slow, and you certainly can't afford for them to be offline.

According to Amazon.com, 100ms in increased latency corresponds to a 1% drop in sales. The speed of a page view or a transaction obviously depends on a great many things, some of which might not be entirely under your control. Therefore, your best strategy is often to optimize all the elements you do control to the greatest extent possible. For example, eliminating 200ms of latency from back-end database I/O compensates for the extra 100ms of latency resulting from network congestion outside your data center that you can't control.

Whether you're supporting customer-facing applications, internal applications, or both, by optimizing the performance and availability of your storage, servers, and networks and making sure that your virtualization environment is correctly configured and all application VMs are properly aligned, you enable your applications to deliver as much performance as they are capable of. In practice, many IT teams have found that moving an application to flash is a fast way to "fix" the performance problems that result from a complex or poorly designed application.

When it comes to choosing flash storage, NetApp can double your performance at half the latency of leading competitors. That's a critical distinction when milliseconds matter. And NetApp is the only leading storage vendor that supports the latest high-speed 32Gb Fibre Channel and 40 Gigabit Ethernet connections, allowing you to pair the latest high-speed networks with high-performance flash so the network doesn't become a bottleneck.

A Competitive Edge for RapidScale

Through offerings such as CloudServer (IaaS) and CloudDesktop (DaaS), RapidScale customers move to the next level of productivity and profitability. RapidScale turned to NetApp as the storage partner for its global cloud platform.

"We ultimately chose NetApp based on ease of use, nondisruptive operations, and native NFS capabilities. Plus, NetApp had a great overall package, including software features such as deduplication and compression that help make flash storage more efficient and affordable." — William Hiatt, CTO, RapidScale.

Key Results:

- Up to 20x acceleration in virtual desktop and database response times
- Virtual desktop login times decreased by 80%
- Eliminates the need for storage performance tuning
- Supports 100% annual growth

RapidScale
personalizing business cloud

A Day in the Life of an Enterprise IT Team

You probably know the story all too well. At 9 a.m. on Monday, your team sits down to plan infrastructure changes for an important new application. At 10 a.m. someone reports that a critical application is running slowly. Your team disperses for a few hours to troubleshoot, regrouping at 1 p.m. after pinpointing the failure to a storage system running in degraded mode. A disk failure that happened overnight didn't get flagged by your monitoring tools.

At 2 p.m. someone reports that backups from your Houston data center didn't complete, and two of your team get pulled away to look at that. And the pattern goes on that way day after day, while strategic activities suffer or fall by the wayside.

In addition, NetApp all-flash storage offers continuous availability that enables up to 98% faster data recovery across system, site, and regional outages, both planned and unplanned

3.2 Better for Your IT Team

What if your IT team no longer had to dedicate hours of time every week to managing storage? Or dealing with inevitable fire drills requiring performance tuning, load balancing, storage migrations, and myriad other tasks?

These unplanned tasks cost far more than just the direct costs of the person-hours spent. They rob your team of the focus needed to complete strategic tasks on time.

NetApp flash storage helps remove the distractions that rob your team's productivity. Fast provisioning templates let you deploy new solutions in less than 10 minutes, and the performance of flash eliminates the need for the careful ongoing performance tuning that was essential with disk-based storage.

NetApp upgrades and maintenance can be performed while storage systems stay online, eliminating the need for planned downtime that disrupts your business and distracts your IT team.

And flash storage is inherently more reliable than HDDs. If a flash solid-state drive (SSD) does fail, rebuilds happen more quickly. In many situations flash provides enough performance cushion that your users and customers are unlikely to see a change in performance during a rebuild.

Predictive analytics help you pinpoint and correct issues before they affect your operations, and NetApp can also provide tools to help you see and manage all your data across all your business locations and the cloud. You can quickly identify the source of infrastructure problems, including virtualization, servers, and networking in addition to storage.

With NetApp, you and your team uplevel both your business and your careers. As new strategic projects get done on time and increase business value, you naturally transition from being thought of as a tactical troubleshooter to a strategic data expert.

3.3 Better for Your Business

By helping increase both customer satisfaction and IT productivity, NetApp storage makes a positive contribution to your company's success. Satisfied customers are repeat customers. A productive IT team helps you complete strategic projects and add new features to customer-facing services and applications. Thus, your customers are likely to find new and improved services every time they return, keeping them coming back. This pattern contributes directly to your company's continued growth.

Up to 20x faster performance has other benefits for your business. Many customers find that reports that previously took hours to run now finish in minutes, giving decision makers far better access to information. This level of responsiveness changes the way teams across the company, from IT to sales to manufacturing, do their work and approach problems. You can drill down quickly and find real answers instead of relying on outdated assumptions and educated guesses.

Speed Saves Lives

Deutscher Wetterdienst (DWD), Germany's national meteorological service, is constantly looking for ways to improve the speed and quality of weather forecasts used by aviation, shipping, railway services, and emergency responders across the country. The data collected by DWD has grown exponentially, making it increasingly difficult to deliver fast response times to customers.

"When it came time to select a flash vendor, we knew that NetApp could deliver more than just speed. We could count on NetApp to deliver the data our customers need whenever they need it." — Alexander Harth, Head of User Support Division, DWD.

Key Results:

- Reduced latency to less than a millisecond
- Reduced time to calculate weather from 15 seconds to 1 second or less
- Accelerated development of new application features
- Streamlined management for more than 8PB of data across 21 sites

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

4 A Future-Proof IT Architecture

It seems that change is the only constant in the IT world these days. As you look to modernize your current infrastructure, you naturally want to make choices that are as future-proof as possible. NetApp storage is uniquely positioned to allow you to:

- Adapt dynamically to changing business demands
- Grow with ease, eliminating the stresses of data migration
- Protect the investments you make today

NetApp delivers a level of confidence that you can't get from other storage vendors for greater peace of mind.

4.1 Adapt to Changing Business Demands

The old approach to IT infrastructure with disparate systems, siloed solutions built around individual applications, and old technologies such as HDDs for primary storage simply doesn't cut it anymore. Data centers that operate this way have frustrated IT teams and frustrated user communities. Morale is low because you're behind the power curve, and it might seem impossible to catch up.

When you can't respond quickly enough to requests from line of business managers and developers, they respond by circumventing IT and going to the cloud to satisfy infrastructure requirements, resulting in "shadow IT." Well-meaning people develop and deploy new applications in the cloud without paying enough attention to security, data protection, or regulatory requirements.

Modernizing your data center infrastructure is the only way to avoid these pitfalls. Simplifying and standardizing infrastructure, as described earlier, allow you to operate your data center in a cloudlike fashion and better satisfy user demands. This fact doesn't mean that public clouds and cloud service providers aren't in your future. However, your IT team is in the driver's seat, eliminating the need for shadow IT.

Most enterprises are taking a hybrid cloud approach, combining on-premises private cloud infrastructure with cloud services as needed. You offer your users a menu of choices, which could include both on-premises and cloud services, and monitor usage.

By offering highly available high-performance flash storage and the latest server infrastructure on the premises, you meet the performance and availability needs of your most critical and most sensitive applications from your data centers.

Instead of provisioning your data centers to accommodate peak load, you utilize cloud resources during peaks of demand and to accommodate unanticipated requests, lowering your capital costs and keeping your data center growth contained.

Enterprises have found that not all applications are well suited to the cloud, and many enterprises are already "repatriating" applications that moved to the cloud to reduce cloud expenses. As a rule, highly elastic applications that consume resources when they need them and give them up when they don't are best suited to the cloud. In most cases, these applications were written specifically to run in the cloud.

It's wise to develop your own criteria for which applications you run in the cloud and which you run on the premises. This approach allows you to maintain control of the applications and data you absolutely must control, while taking full advantage of the agility that cloud resources give you.

As Gartner's top-rated platform for private and hybrid clouds[4], NetApp flash storage gives you a leg up on your modernization efforts. You can manage applications where they run best by freely moving data between flash, disk, and cloud.

Faster Time to Market for HR Services
Shanghai FESCO Cloud (SFSC Cloud) provides a one-stop human resources management and service platform for HR as a service. SFSC Cloud's platform leverages a hybrid cloud based on NetApp Private Storage (NPS) and All Flash FAS.

"Our business is built on a foundation of trust. The unique NPS architecture gives us complete ownership and control of sensitive HR data while retaining the scalability and cost benefits of a public cloud." — Johnny Wang, CEO, SFSC Cloud.

Key Results:
- Cut deployment time for new services in half
- Reduced capital expenditures by nearly 40%
- Increased security, convenience, and cost efficiency

外服云

4.2 Transition with Ease

When IT limitations are stifling your company's growth and leaving internal and external customers unsatisfied, it's time to modernize. However, the prospect of a major data center transformation is intimidating. Handled incorrectly, data migration processes can disrupt the business and further harm your company's reputation.

NetApp helps you make the transformation to a modern data center architecture with confidence. We address your migration concerns with proven approaches that enable you to upgrade to the latest technology seamlessly.

Data migration is often the most challenging part of modernization. NetApp allows you to painlessly and confidently migrate from your existing SAN. As data is migrated, you can roll out application-integrated data protection services that increase the level of protection provided for critical data.

When your data is stored on NetApp, the NetApp Data Fabric provides uniformity across your data center and cloud resources, including consistent data formats, fast and efficient data transport to move data where it is needed, and uniform management.

4.3 Protect Your Investment

After you've made the decision to modernize, you still need to consider the best way to protect your IT investment. Choosing a storage solution that helps you adapt to changing needs and transform and grow easily is important. So is choosing a vendor that serves as a partner for your IT success.

You can't bet your business on unproven technology from a vendor that might not be around in three years when it's time to update. More than one company has suffered financial losses after making bets on leading edge technology that didn't pan out.

NetApp is a leading storage vendor for enterprise IT and a flash leader:

- Named a Leader in the 2016 Gartner Solid State Array Magic Quadrant[5]
- The fastest growing all-flash provider, expanding twice as quickly year over year as the overall all-flash market[6]
- The industry's fastest growing SAN vendor[7], with over 1 million SAN systems installed
- The only storage provider that can deliver end-to-end visibility across a hybrid cloud, thanks to software innovation and the industry-leading NetApp OnCommand® Insight software

NetApp continues to lead the storage industry with both the hardware and software innovation you need to move your business forward. NetApp is the first and only storage vendor to support large-capacity 15TB SSDs and will support larger sizes as they enter the market. We are also well positioned to capitalize on emerging standards, including NVMe and storage-class memory.

Our flash storage, in combination with our Data Fabric vision, is helping customers have a positive impact on the performance and availability of business-critical applications to consistently achieve and surpass service levels.

5 The Smart Choice for IT Transformation

Your company's brand depends on the strength of its digital presence. IT experts recognize that the infrastructure performance and availability that underpin critical applications and services have become critical to customer satisfaction and business growth. NetApp helps you create a data infrastructure to support your company's business needs. NetApp flash storage enables you to simplify to improve economics while accelerating application performance up to 20x, increasing availability, and slashing time spent on storage management and troubleshooting. NetApp is the only leading SAN vendor that simultaneously transforms your on-premises infrastructure while smoothing the path to the cloud, allowing you to move and manage data across all locations where your business operates. Be data ready, with NetApp.

[1] IDC, WW Quarterly Enterprise Storage Systems Tracker 2016Q3, December 1, 2016.

[2] Source: Gartner, Inc., Valdis Filks, Stanley Zaffos, Roger W. Cox, Santhosh Rao, November 22, 2016.

[3] Gartner, Solid-State Array TCO Reality Check, Joseph Unsworth, Arun Chandrasekaran, January 22, 2016.

[4] Source: Gartner, Inc., Valdis Filks, Stanley Zaffos, Roger W. Cox, Santhosh Rao, November 22, 2016.

[5] Source: Gartner, Inc., Valdis Filks, Joseph Unsworth, Arun Chandrasekaran, August 22, 2016.

[6] Source: IDC, WW Quarterly Enterprise Storage Systems Tracker 2016Q3, December 1, 2016.

[7] Source: IDC, WW Quarterly Enterprise Storage Systems Tracker 2016Q3, December 1, 2016.

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.

NetApp®