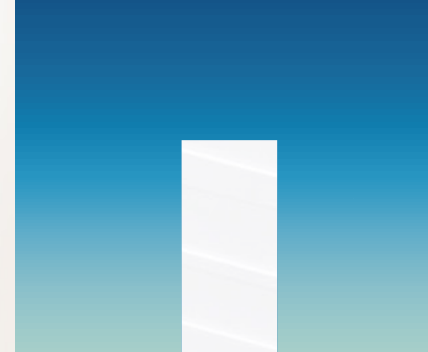
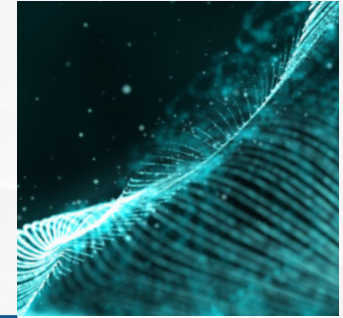


E-BOOK

3 Benefits of Running Your Business-Critical Applications on NetApp



Accelerate Your Business with Data

Today's customers are connected. They want information at their fingertips, a painless purchasing experience, and quick and easy support. They expect speed. They're hungry for innovation that helps them beat the status quo and satisfy their customers. And they absolutely demand the highest levels of data privacy, security, and availability.

Physicians at [Mercy Health System](#) monitor patients in their homes, enabling them to catch early warning signs of medical problems and reduce readmission rates. Students at [CSU Chico](#) register for classes when and where they want. Engineers at [Ducati](#) use machine learning to improve the aerodynamics, electronics, and mechanics of their motorcycles, taking cutting-edge innovations from the racetrack to the street.

Creating extraordinary customer experiences begins with data. Organizations must reinvent themselves to unlock new value from existing enterprise applications as well as next-generation social, mobile, cloud, and analytics technologies. But many IT teams are saddled with aging data storage systems that are difficult to maintain and can't keep up with constantly evolving business needs.

Modernize your data infrastructure to accelerate your business-critical applications, improve efficiency, take advantage of cloud, and protect your data and your business. Do all of this and more with [NetApp® cloud-connected flash](#).

[Mercy Technology Services](#)

Mercy Technology Services, the technology backbone of Mercy Health System, accelerated query response times by 6 times and improved early sepsis identification by 30%.

[CSU Chico](#)

CSU Chico admissions officers reclaimed 100 to 200 business days per year in lost productivity by reducing application response times from 1.5 minutes to just seconds.

[Ducati Corse](#)

With real-time analysis of telemetry data captured during practice sessions, the Ducati Corse moto sports team can update the bike setup on the fly and instantly boost performance.

This paper explains the three reasons to run your business-critical applications on NetApp cloud-connected flash solutions. Are you struggling to meet service levels for performance and availability using out-of-date disk-based storage technology? Spending too much time putting out fires to focus on delivery of new applications and services? Then this paper is for you. Table 1 describes the three areas that you need to optimize in order to realize maximum benefits for your organization.

1. Smart efficiencies. Optimize your infrastructure and take advantage of the cloud.	<ul style="list-style-type: none">• Connect to more clouds, in more ways.• Optimize your hybrid cloud with AI-based predictive analytics delivered by NetApp Active IQ® monitoring software.• Improve data center efficiencies—cut power consumption by up to 15 times and shrink storage footprint up to 37 times.
2. Powerful performance Accelerate your applications and services.	<ul style="list-style-type: none">• Improve customer satisfaction and business outcomes.• Drive business productivity and growth.• Unleash the power of NVMe to gain a competitive edge.
3. Trusted data protection. Protect your data and your business.	<ul style="list-style-type: none">• Meet the strictest SLAs with integrated data protection and compliance solutions.• Simplify hybrid cloud backup and recovery.• Enable zero-data-loss protection for an entire system or for selected critical data.

Table 1) Flash essentials for business-critical applications.

Smart Efficiencies

Connect to More Clouds,
in More Ways

Optimize Your Hybrid Cloud
Improve Data Center Economics

Powerful Performance

Trusted Data Protection
and Security

Bring Modernization
to the Server

Migrate with Confidence

Choose the Innovation
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1. Smart Efficiencies

As you modernize your current infrastructure, you want to make choices that future-proof your business. You can more easily adapt to constant change by:

- Connecting to more clouds, in more ways
- Optimizing your hybrid cloud with AI-based predictive analytics
- Simplifying infrastructure to improve data center economics

Connect to More Clouds, in More Ways

The old approach to infrastructure with disparate systems is no longer relevant. If 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 sufficient attention to security, data protection, or regulatory requirements.

Modernizing your data infrastructure is the only way to avoid these pitfalls. Simplifying and standardizing infrastructure allows you to operate your data center in a cloudlike fashion and better satisfy user demands.

Progressive IT teams are taking a hybrid cloud approach, combining on-premises private cloud infrastructure with public cloud services as needed. They offer users a menu of choices that include both on premises and cloud services, and they monitor and charge back for usage.

For example, instead of provisioning data centers to accommodate peak load, the hybrid cloud approach uses cloud resources during peak demand times, and to accommodate unanticipated requests, lowering capital costs and containing data center growth.

To future-proof your infrastructure as your cloud needs change, NetApp combines industry-leading flash storage with proven cloud connectivity. With [NetApp AFF all-flash storage systems](#), you can freely move data and applications to where they run best—on your premises or in the cloud. You can also realize massive savings through automatic tiering of cold data to low-cost object storage tiers on the premises or in the cloud with [NetApp FabricPool](#). The automated tiering is transparent to applications and allows you to take advantage of cloud economics without sacrificing performance or having to rearchitect storage infrastructure.

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Optimize Your Hybrid Cloud

Economic and competitive pressures are forcing IT teams to continually improve efficiency, reduce costs, and respond more quickly to business and mission needs. Shared IT infrastructure and the cloud are increasingly viewed as the only ways to sustain constant IT improvement. Today's IT teams often find themselves managing a mix of flash, disk, and cloud resources.

Making certain that every resource is optimized across your hybrid cloud can be a tedious process that takes valuable time away from higher-value IT initiatives. What if you could consolidate all of your applications on a single, highly efficient data management platform that spans from your data center to the cloud? With the [NetApp Data Fabric](#), you can monitor and manage your data across your hybrid cloud. You can also relieve your IT staff from having to respond to unanticipated activities, such as downtime or running out of capacity.

[DreamWorks Brings Dragons to Life with Data](#)

[DreamWorks Animation](#) may have as many as 10 films in simultaneous production, which means that at any given time, up to 5 billion active digital files are being worked on in a hybrid cloud platform. With NetApp all-flash storage, DreamWorks rapidly and efficiently manages the massive amounts of data needed to bring beloved animated films such as *How to Train Your Dragon: The Hidden World* to life.

“Having hybrid cloud infrastructure is critical for how we want to work in the future. We partner with NetApp so we can optimize our workflows regardless of whether it is in the cloud or in the data center.”

— Jeff Wike, Chief Technology Officer, DreamWorks

Key Results:

- Empower production workflows
- Maximize creative development
- Streamline operations

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With NetApp Active IQ, you gain actionable intelligence that can help you stay ahead of capacity demands, optimize configurations based on proven best practices, and resolve performance issues quickly with real-time insights into system bottlenecks. Predictive analytics help you pinpoint and correct issues before they affect operations, while artificial intelligence and machine learning algorithms fed by the industry's largest installed base provide continual insights that get smarter all the time.

Improve Data Center Economics

Out-of-date infrastructure can negatively impact the bottom line. Excessive space, power, cooling, and maintenance costs due to older infrastructure can mount up quickly. Many IT teams spend too much time solving compatibility problems, managing data protection tasks, and troubleshooting performance problems and too little time on new applications and services to help the business succeed.

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.

With NetApp AFF, you can save money while you modernize, helping you to meet new business challenges despite budget pressures. You can consolidate all your workloads on high-density, energy-efficient flash storage, reducing data sprawl. Save your IT budget for more strategic initiatives by reducing your storage footprint with state-of-the-art data-reduction technologies, including inline compression, deduplication, and compaction. The [NetApp Efficiency Guarantee](#) gives you even greater peace of mind with a guaranteed effective storage capacity and guaranteed efficiency ratio based on your specific workloads.



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You can achieve the high-performance I/O connectivity, high transactional performance, low latency, and enterprise-class data management needed to support high-density flash. In customer deployments, AFF has been shown to reduce power consumption up to 15 times and shrink storage footprint up to 37 times. In just 4U of rack space, you get more than 1PB of effective capacity, replacing multiple racks of existing HDDs.

Consolidating important datasets on all-flash storage also streamlines operations. Simply reducing the number of storage components under active management is the first step in getting your data under control. Get the performance your applications need without constant performance tuning and eliminate the need for data tiering, saving hours of valuable admin time.

Online Credit Lending Company Accelerates Growth with Data

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.

With the power of data, PPDAI has surpassed the limits of consumer lending in China. Their digital transformation allows them to serve the financially underserved and lend money to everyone in China.

Key Results:

- Accelerated transaction performance up to 3 times
- Kept latency below 0.7ms, even during peak hours
- Reduced costs by 60% to 70% versus disk-based systems

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2. Powerful Performance

Today's flash storage is shattering expectations about what's possible when it comes to demanding workloads, such as AI, IoT, and analytics. This level of performance 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

A Competitive Edge for RapidScale

Through [RapidScale's](#) IaaS and DaaS offerings, customers can achieve greater 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:

- Accelerated virtual desktop and database response times by up to 20 times
- Decreased virtual desktop login times by 80%
- Eliminated the need for storage performance tuning

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Improve Customer Satisfaction and Business Outcomes

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

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. According to Amazon, consumers are so impatient that a 1-second lag in page load times could cost \$1.6 billion in sales every year. Similarly, Google has reported that a 4-second lag in search results could cost it 8 million searches every day.¹

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. Weather warnings issued by DWD help the public stay safe in extreme weather, such as heat waves, tornadoes, and thunderstorms. The data collected by DWD has grown exponentially, making it increasingly difficult to deliver fast response times to customers.

“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 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

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The speed of a page view or a transaction depends on many things, some of which may not be entirely under your control. Your best strategy is to optimize 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.

AFF systems are ideal for supporting the demands of a shared environment of enterprise applications and data analytics with millions of IOPS and hundreds of petabytes of effective capacity in a single cluster. AFF systems run [NetApp ONTAP® software](#), which enables you to nondisruptively scale SAN and NAS from a few terabytes to up to 176PB. As your business grows, you can scale up by adding capacity or scale out by adding storage controllers to simplify management complexity.

Drive Business Productivity and Growth

What if your IT team no longer had to dedicate hours of time every week to managing storage? Or to dealing with the inevitable fire drills that require 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 decrease your team's productivity and empowers them to innovate faster than ever before. Fast-provisioning templates let you deploy new systems 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.

Faster performance has other benefits for your business as well. Energy leader [Vital Energi](#) cut their time to produce analytics reports from 3 hours to 10 minutes, giving decision makers far better access to information that enables them to optimize their systems and identify new business opportunities.

This level of responsiveness changes the way that 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. As new strategic projects get done on time and increase business value, your IT team will be valued as strategic data experts—not simply tactical troubleshooters.

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Unleash the Power of NVMe to Gain a Competitive Edge

Achieving maximum speed from SSDs is approaching a limit because of bottlenecks in the data pathway. To gain an edge, data-driven companies are turning to NVMe—a new storage access and transport protocol for flash and next-generation SSDs that delivers the highest throughput and fastest response times yet for all types of enterprise workloads. NVMe over Fabrics (NVMe-oF), such as NVMe over Fibre Channel (NVMe/FC) and NVMe over Ethernet, provide higher IOPS and reduced latency from the storage array all the way to the host software stack.

Third-party testing has demonstrated that NVMe/FC connectivity delivers 58% higher IOPS compared to SCSI FCP using the same hardware. The same study also observed 11% to 34% lower latency with NVMe/FC, depending on the test.²

NetApp AFF all-flash arrays support NVMe/FC, 100 Gigabit Ethernet, and 32GB Fibre Channel connectivity, allowing you to use the flash technologies of tomorrow, today. With NetApp AFF A800 systems you can power even the most demanding workloads, including AI, machine learning, analytics, and enterprise applications. The AFF A800 combines low-latency NVMe SSDs and NVMe/FC connectivity to deliver latency below 200µs and throughput of up to 300GB/s in a 24-node cluster.

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3. Trusted Data Protection and Security

Increased regulatory pressure and the ever-growing threats of data breaches and ransomware have elevated the importance of data privacy, data security, and data protection. To earn and retain your customers' trust, you need data protection and compliance solutions that:

- Meet the strictest SLAs
- Dramatically simplify hybrid-cloud backup and recovery
- Enable zero-data-loss protection

Meet the Strictest SLAs

Protecting data is a top concern for every enterprise. No CXO wants to risk losing business or damaging their company's reputation due to data loss or downtime. In the old days, backing up to tape was good enough. Today, organizations have petabytes—or even exabytes—of data. Restoring from tape or streaming disk services can take days and is unreliable at best. Few, if any, businesses can afford to go that long without their data.

Planned and unplanned downtime can also take a toll on internal productivity. With NetApp AFF, upgrades and maintenance can be performed while storage systems stay online, so you can eliminate the need for planned downtime that occupies your IT team and disrupts your business. NetApp AFF offers continuous availability that enables up to 98% faster data recovery across system, site, and regional outages, both planned and unplanned.

NetApp ONTAP data management software offers integrated data protection solutions that provide application-consistent data protection and clone management. Secure your data with strict role-based access controls, secure protocols, authentication, audit logging, and encryption for data at rest (FIPS 140-2 levels 1 and 2).

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Simplify Hybrid Cloud Backup and Recovery

Historically, backing up and archiving data represented a safety net for businesses. This approach limited them to sporadic restore of deleted, corrupted, or otherwise lost primary data. Businesses are now tapping into emerging elastic analytics applications to use artificial intelligence and machine learning to transform their secondary data into value-generating assets.

With NetApp you can quickly back up your on-premises primary flash storage to the cloud. The cloud-based interface offers a simple and intuitive way to orchestrate data movement across primary, secondary, and cloud storage. Your cloud backups can be up and running in just a few minutes. You can also rapidly and easily restore data by selecting from a built-in catalog with search and browse capabilities, enabling you to use previously unusable data for test/dev, QA, analytics, and more.

Enable Zero-Data-Loss Protection

Organizations increasingly face the challenge of ransomware. These attacks, which are constantly changing and difficult to detect by traditional methods, can cost a business time, waste resources, and damage their reputation. With this growing threat, security is on the mind of most businesses, regardless of size or industry. Detection software can find and reduce the amount of damage that ransomware can accomplish, but it can't stop or reverse the effects of an attack.

Following a ransomware attack, an organization typically has two options: pay the ransom or restore from backups. A ransom payment does not guarantee that your files will be restored, and restoration from backups can be a tedious process that takes up valuable time and resources.

The key to a successful recovery is restoring from uninfected backups. NetApp built-in Snapshot™ replication technology creates uncorruptible read-only copies at any level of granularity you desire. You can access your copies directly to check whether individual items were infected before restoring your data. At that point, you can roll back to any point in time to enable zero-data-loss protection for an entire system or for selected files. Snapshot copies take up minimal space and incur minimal performance overhead.



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NetApp Enhances Development Efficiency and Performance for Verint

Verint Systems is a global leader in customer engagement solutions, empowering organizations with crucial insights and enabling decision makers to anticipate, respond, and take action. Verint depends on AFF to create new development environments quickly and accelerate time to market, while saving on compute and management costs.

“When we experienced real-life crises, NetApp’s SnapRestore retrieved and restored the data within seconds, with absolutely no data corruption.”

— Maor Ben-Aroosh, DevOps Manager, Verint

Key Results:

- Recovered data in seconds with zero data loss
- Achieved 200:1 storage efficiency
- Slashed the time needed to create environments from 6 hours to 5 minutes

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Memory-hungry workloads (such as AI, machine learning, and deep learning), real-time analytics, and IoT have massive datasets that must be analyzed and shared in real time, demanding the lowest latency and highest throughput possible. To accelerate these performance-sensitive workloads, developers are turning to next-generation memory technologies, such as persistent memory (PMEM) in the server.

PMEM provides low-latency, solid-state memory next to the processor. Because it is accessed like volatile memory (RAM) by the CPU and application, it can achieve orders of magnitude lower latency than direct-attached storage, but it retains its contents after a power loss.

Until now, it has been impossible for developers to take advantage of this promising new memory tier without rearchitecting their critical applications. To help you achieve maximum performance from your infrastructure, [NetApp MAX Data](#) gives you the power to give existing applications nearly instant access to data for reads and writes without rearchitecting your applications or waiting for application vendors to modify their code. NetApp AFF with MAX Data gives you an additional 60% higher performance and 5 times lower latency for tier 0 business applications powered by relational and NoSQL databases.

Migrate with Confidence

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 can be intimidating. Handled incorrectly, data migration processes can disrupt your business and damage your company's reputation.

Data migration is often the most challenging part of modernization. With NetApp you can confidently migrate from your existing SAN. NetApp ONTAP easily discovers the foreign LUNs to be imported for data migration. As data is migrated, you can roll out application-integrated data protection services that increase the level of protection for critical data.

Choose the Innovation Leader in Data Solutions

Leading organizations worldwide count on NetApp for software, systems, and services to manage and store their data. Customers value NetApp teamwork, expertise, and passion for helping them succeed now and into the future.

Trust NetApp data solutions to power your business-critical applications and deliver extraordinary customer experiences.

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About NetApp

NetApp is the data authority for hybrid cloud. We provide a full range of hybrid cloud data services that simplify management of applications and data across cloud and on-premises environments to accelerate digital transformation. Together with our partners, we empower global organizations to unleash the full potential of their data to expand customer touchpoints, foster greater innovation, and optimize their operations. For more information, visit www.netapp.com. #DataDriven

Endnotes

¹ Fast Company. “[How One Second Could Cost Amazon \\$.16 Billion in Sales.](#)”

² Demartek. “[Performance Benefits of NVMe over Fibre Channel.](#)”

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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