



White Paper

The Old Will Meet the New: A Tale of Two Data Worlds

Breaking with Tradition and Driving
Workload Innovation

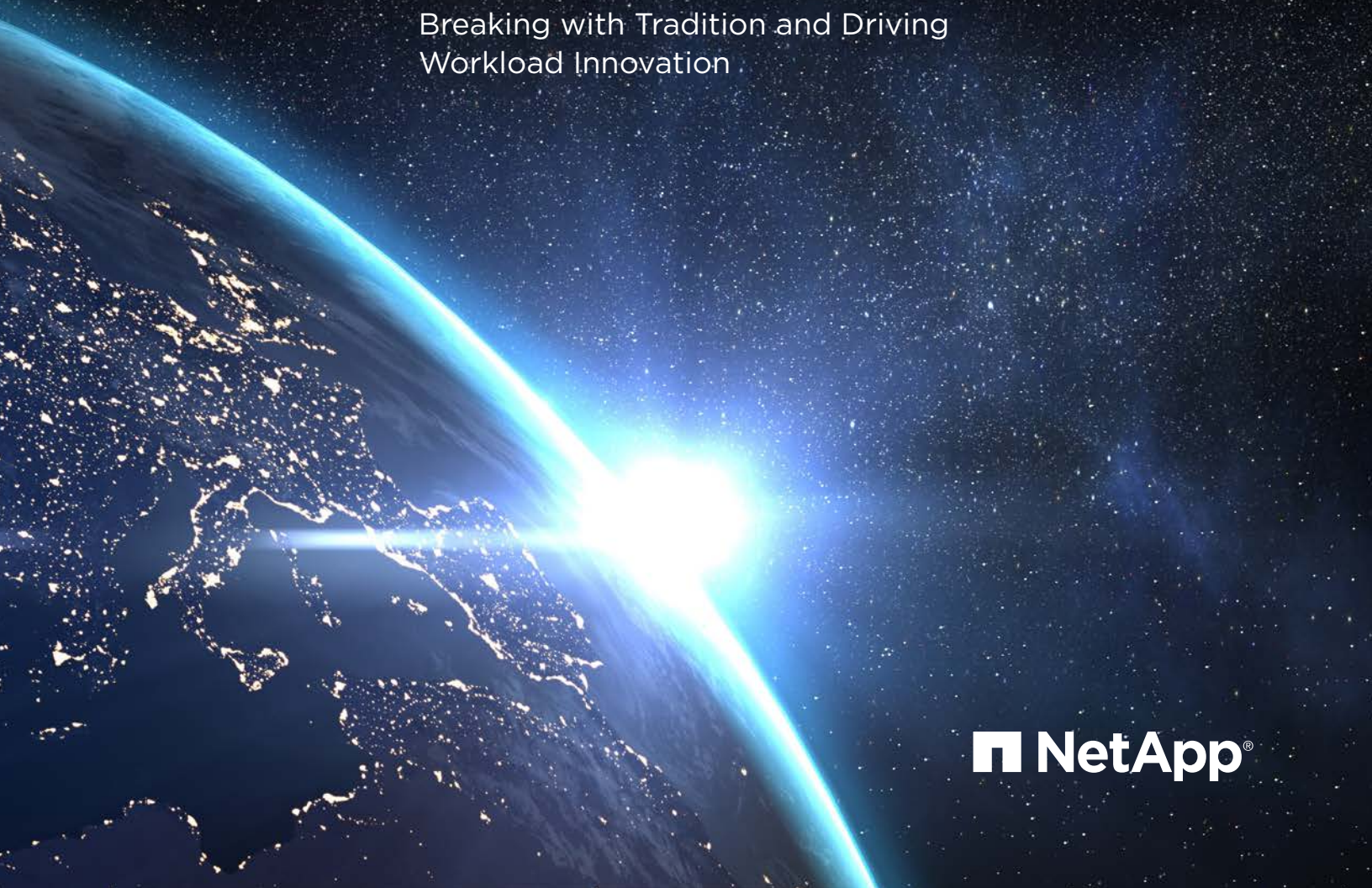


Table of Contents

Data Center Transformation is Coming: The Foundations You Need to Embrace	3
Enterprise IT Can't Transform by Using Traditional Architectures	3
Foundation #1: Predictability	4
Meeting All Application Needs - All of the Time	4
Noisy Neighbors	4
Missed SLAs	4
Unique Application Performance Requirements	4
The Old Data World Doesn't Address the Real Problem	4
The New Data World Controls Performance and Availability	4
The Benefits	5
Foundation #2: Scalability	6
Increasing Infrastructure Flexibility yet Reducing Cost	6
Scale Up is Complex and Inflexible	6
Increasing Resource Utilization Affects the User Experience	6
Siloed Application Specific Infrastructure	6
The New Data World Scales Out	6
The Benefits	7
Foundation #3: Agility	8
Progressing from Virtualization to Automation and Orchestration	8
Lack of Automation in the Old Data World	8
Complex Integration	8
Infrastructure Management that Takes Too Much Time	8
The Old Data World isn't Agile	8
The New Data World Integrates, Automates and Orchestrates	8
The Benefits	9
Achieving the Best of Both Worlds	10

Data Center Transformation is Coming: The Foundations You Need to Embrace

In today's digital economy, markets and customer purchasing behaviors are changing. Customers expect everything to be available online, anytime, anywhere. To satisfy these expectations, enterprise IT departments must be able to react quickly to changing business needs—while continuing to manage the mission-critical legacy workloads that “keep the lights on.” Enterprise IT staff face a daily multitude of operational challenges that increase the pressure on the infrastructure they manage.

To meet these challenges, enterprises must undergo a process of digital transformation. IT teams are moving away from traditional infrastructure and the “old data world” to a more flexible infrastructure that has the agility, scalability, predictability, and automation to react to changing business needs. A key imperative is to accomplish this transformation without risking well-established business operations or sacrificing resiliency and reliability.



Next-gen IT organizations are implementing infrastructure to allow self-service access to resources and to enable the refactoring of traditional client-server workloads onto agile cloud-based applications.

This process of transformation must be tailored to the unique business drivers of each enterprise. At one end of the spectrum, organizations are looking for drastic cost savings from the consolidation of traditional enterprise IT environments. At the other end, IT organizations are implementing infrastructure to allow self-service access to resources and to enable the refactoring of traditional client-server workloads into agile cloud-native applications.

No matter where your business falls on this spectrum, you can't compete in today's digital economy with yesterday's technology. Smart enterprise IT teams are looking to the highly flexible architecture of a next-generation data center (NGDC) to enable transformation. This architecture ushers in a “new data world,” meeting changing business needs while also supporting the infrastructure and virtualization requirements of more traditional enterprise architectures.

Enterprise IT Can't Transform by Using Traditional Architectures

A next-generation data center has a foundation that is built on a new and different approach to architecture that is inherently agile, scalable, and predictable. NetApp offers this next-generation architecture to help satisfy business and technical requirements no matter where your business falls on the spectrum of transformation. The NetApp® architecture:

- Provides guaranteed, controlled application performance at cloud-like operational costs for predictable workload delivery
- Scales nondisruptively and incrementally to support multiple workloads and to drive business growth
- Leverages a comprehensive REST-based API that simplifies automation, scale, and orchestration—regardless of application enabling the delivery of self-service resources

Whether you are just starting to move to a next-generation data center or you are poised to implement DevOps, NetApp greatly reduces your operational risk. With NetApp technology, your IT team can make a smooth transformation to a new data world that is enabled by a next-generation data center.

Next-generation data centers are highly interconnected. The NetApp Data Fabric is a key advantage of a next-generation data center that is built on NetApp technology. The NetApp Data Fabric allows you to seamlessly transfer your data across multiple environments—whether on premises or in a public or hybrid cloud. The Data Fabric is optimized to protect your data and is designed to be simple to use.

Foundation #1: Predictability

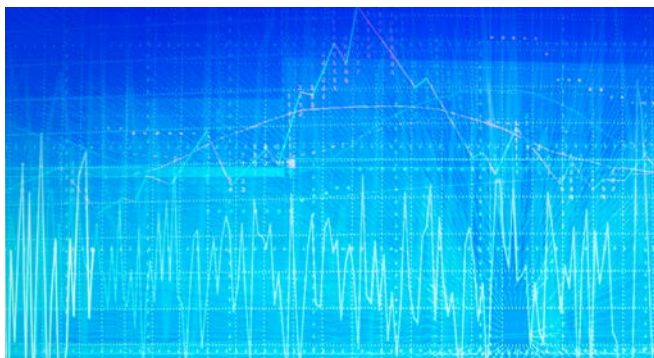
Meeting All Application Needs - All of the Time

One of the biggest challenges in any data center is delivering predictable performance, especially in the face of proliferating applications and services, many of which can be extremely resource intensive. The old data world—using traditional storage architectures—is plagued by three main challenges: predictability, scalability, and agility. These challenges limit your ability to consolidate workloads, eliminate noisy neighbors, and meet performance requirements.

Noisy Neighbors

Any time you have multiple applications that share the same infrastructure, the potential exists for one application to interfere with the performance of another. Important workloads such as virtual desktop infrastructure (VDI) and database applications have very different I/O patterns that tend to affect one another.

This noisy neighbor problem becomes more complicated as your organization moves to self-service. With little or no visibility or control over the applications that run on your virtual infrastructure, it becomes difficult or impossible to troubleshoot the performance problems that inevitably occur.



Any time you have multiple applications that share the same infrastructure, the potential exists for one application to interfere with the performance of another.

Missed SLAs

A lack of infrastructure predictability also causes your IT team to miss SLAs, which can block business growth and cause your company to miss new opportunities.

You can't afford for digital services—whether internal or external—to be slow, unpredictable, or at worst offline. The need for predictability extends beyond predictable workload performance; it includes predictable resilience and availability, even when operating in a degraded state after drives or entire servers fail.

Unique Application Performance Requirements

Some of the applications and services that run in your IT environment have performance needs that can be unique. VDI, for example, is well-known for its boot and login storms. These storms generate spikes of I/O that not only slow the response to VDI users, but also might interfere with other applications that share the same storage. Storage systems are too often dedicated to VDI for exactly this reason.

The Old Data World Doesn't Address the Real Problem

In the old data world, the only means used in an attempt to meet these challenges is to overprovision shared infrastructure or to create dedicated infrastructure silos for important applications. As you know all too well, the impact that either approach has on your data center and your IT team is significant. Hardware utilization goes down, your infrastructure sprawls, and capital costs go up. As the complexity of your environment rises, IT productivity falls, increasing your operating costs. And even with all that effort, the results are mixed, leaving your IT team struggling to keep up with the business.

The New Data World Controls Performance and Availability

NetApp SolidFire's next-generation storage architecture provides the solution for IT predictability challenges. Applications and services can share the same infrastructure and receive the resources they need without the concerns of noisy-neighbor problems or missed SLAs.

NetApp eliminates the need for silos of infrastructure and overprovisioning:

- **Guaranteed performance**, enabled by quality of service, allows the granular control of every application, eliminates noisy-neighbor effects, meets unique performance needs, and can satisfy performance SLAs.
- **A self-healing architecture** helps you meet availability SLAs. The SolidFire architecture can sustain multiple failures without affecting operational performance and restores full resilience quickly without administrator intervention.
- **Non-disruptive hardware and software upgrades** further protect the availability of important applications and services without the need for planned—or unplanned—maintenance outages.

Because the NetApp next-generation storage architecture supports multiple systems—VMware, OpenStack, Docker, and many others—at the same time, all your workloads, old and new, can share the same infrastructure.

The NetApp next-generation architecture is available in the following forms:

- **NetApp SolidFire All-Flash Array.** A 100% programmable, scale-out storage platform that delivers unmatched agility and guaranteed application performance at web scale.
- **NetApp HCI.** Built on the SolidFire architecture, NetApp HCI overcomes the limitations of first-generation hyperconverged infrastructure (HCI) solutions while simplifying consumption with storage and compute.
- **FlexPod SF.** Leveraging the SolidFire architecture, FlexPod SF is an innovative converged infrastructure solution with the proven performance, agility, and value required to handle increasingly larger enterprise workloads and constantly changing business demands.

The Benefits

The predictability of the SolidFire next-generation architecture provides guaranteed, controlled performance that reduces operational costs and enables a much higher degree of consolidation than you could achieve in the past—without affecting user experience.

Your team saves significant time on troubleshooting, and decisions can be made and carried out quickly when action needs to be taken. By spending less time on trouble tickets and on managing infrastructure to meet SLAs, your IT team transitions from being tactical and reactionary to becoming a valued strategic partner for your business.

The new data world that the SolidFire next-generation architecture creates simplifies the deployment and management of both storage and—with NetApp HCI and FlexPod SF—compute. You can deliver reliable performance and can consolidate workloads to increase resource utilization, minimize performance issues, and decrease licensing costs.

Large Retailer Chooses Guaranteed Performance

A large retailer that operates a chain of stores across North America needed a new storage system for next-generation application initiatives for its stores and corporate IT requirements. The retailer chose SolidFire storage to support a growing private cloud, providing infrastructure as a service (IaaS) to satisfy testing-and-development and application delivery needs.

Guaranteed performance to support important SQL Server and Oracle databases was a critical factor, and proven integration with VMware was also critical.

Key results:

- A next-generation storage architecture
- Guaranteed performance
- Flexible Scale-out

Guaranteed performance eliminates 93% of storage performance issues, removes noisy-neighbor problems, and helps you meet critical SLAs. With NetApp technology, one architecture—available as either an all-flash array, hyper converged infrastructure, or converged infrastructure—meets your application requirements, both traditional and new. You can simplify your IT environment and position your team and your business for greater success.



Foundation #2: Scalability

Increasing Infrastructure Flexibility yet Reducing Cost

As the digital economy reshapes your company's approach to business, the scalability of your IT infrastructure becomes critical to continued success. New applications and services require infrastructure to scale more quickly and more flexibly, while still supporting the needs of more traditional applications. Meeting the scalability needs of your business by using a traditional approach can be a costly proposition in terms of both capital and operational expenses. Typically complicated and inflexible, resource utilization is often low with assets stranded in multiple locations, and on top of that you can't easily share infrastructure across your business systems. In the old data world, using traditional, scale-up storage and compute, you face numerous scalability challenges that limit your flexibility and drive up costs.

Scale-Up is Complex and Inflexible

In the old data world, scaling up storage is a complicated undertaking. Conventional storage scales only within narrow limits. You might be able to add capacity, but that extra capacity doesn't necessarily translate to more performance. It can be difficult to predict when performance will reach its limit, making infrastructure planning a challenge. As a result, the tendency is to overprovision storage up front to avoid surprises later, but that approach can mean paying ahead for resources that might sit idle for months or years.

When a storage system reaches its limit, you either rip it out and replace it with a more powerful system, or you add another separately managed array. The whole process is inflexible, disruptive, and expensive, creating a management burden that drives up operating costs.

When it comes to compute, many enterprises still have some applications that run on bare-metal servers. In many cases, these servers are themselves specialized and different from the server hardware that is used in virtual environments. These applications are siloed on their own infrastructure and don't benefit from the flexibility that virtualization provides. Managing and scaling compute for these applications pose many of the same problems as scaling traditional storage.

Increasing Resource Utilization Affects the User Experience

Your IT team naturally wants to get the maximum benefit possible from every dollar that is invested in infrastructure. An obvious way to maximize benefit is to drive up the resource utilization on each server and each storage system. When each device accomplishes more useful work, the total number of systems that you need goes down, reducing capital costs, licensing costs, power and cooling, and so on. However, most IT teams find that they can't drive up resource utilization without affecting the user experience. To protect it, most data centers end up overprovisioning servers and storage, operating infrastructure at low average utilization.

Siloed Application Specific Infrastructure

Traditional infrastructure lacks the flexibility to accommodate cloud-native apps and traditional enterprise applications at the same time because the different styles of applications interfere with one another. With multiple systems unable to coexist on the same infrastructure, you have no choice but to deploy separate silos to support each environment. These silos increase capital expenditures, add to the complexity of your IT environment, and drive up operational expenses.

The New Data World Scales Out

The NetApp next-generation storage architecture helps solve your scalability challenges. You can scale performance and capacity independently as needed, increase resource utilization, and support traditional and cloud-native apps with the same infrastructure:

- **An advanced granular scale-out architecture** allows you to independently add or remove resources incrementally as they are needed, avoiding up-front overprovisioning, simplifying capacity and performance planning, and eliminating the disruption of forklift upgrades.
- **Guaranteed performance** for each application and service enables resource utilization to be dramatically increased without diminishing the user experience.
- **Multisystem integration** means that a single infrastructure environment can support all your applications—traditional and cloud-native. Having a single infrastructure minimizes complexity, decreases the training needed, and gives your team more time to spend on valuable business efforts.
- **Global efficiencies**, including thin provisioning, compression, and deduplication, reduce storage consumption. Global deduplication eliminates duplicate data blocks across an entire scale-out system, not just within a single array. This feature provides maximum efficiency and significant costs savings. It is especially beneficial in VDI and in other environments that have a large amount of intrinsic duplication.

The Benefits

The scalability that NetApp brings to the new data world allows you to scale across multiple systems as needed to support growth in both traditional enterprise applications and next-generation cloud apps. Because you buy only what you need and when you need it, your capital expenditures map more closely to your budget requirements.

The reduced capital and operating expenses that result from a smaller footprint and from lower management overhead let you stretch your budget further to deliver more value to your business.

The NetApp architecture lets you scale and provision compute and storage independently, and you can significantly increase resource utilization without affecting the user experience that you deliver. Because you have full visibility, you can simply add resources incrementally as they are needed, avoiding overprovisioning and stranded infrastructure. You benefit from more control over your budget expenditures and from the ability to scale by using the latest technology.

Financial Service Company Meets Its Scalability Needs

The financial services industry has embraced digital transformation more quickly than almost any other industry, with companies racing to deliver new digital services to satisfy customers. This financial services company chose NetApp SolidFire to support its efforts to both broaden its customer base and extend its market leadership.

The SolidFire scale-out architecture supports the company's rapidly growing next-generation application needs, with guaranteed performance for application delivery and back-end databases. Superior VMware integration and Windows PowerShell support were important factors in the company's decision.

Key results:

- Nondisruptive, linear scalability
- High availability
- Economies of scale and increased efficiencies
- Fast and predictable performance

The NetApp next-generation architecture—allows you to consolidate both traditional and cloud-native apps at scale while increasing resource utilization and minimizing footprint through global efficiencies.



Foundation #3: Agility

Progressing from Virtualization to Automation and Orchestration

IT infrastructure is supposed to be a means to an end, not an end itself. In the old data world with traditional IT infrastructure, however, your IT team must continually attend to monitoring, management, and maintenance. These tasks can keep your IT team from focusing enough attention on the applications and services that are needed to move your business forward. The problem is that the virtualized infrastructure you have is failing to deliver the agility that you need to transform your business and meet the ever-changing customer needs.



The holy grail of IT is to automate all routine tasks, eliminating the risk of user error that is associated with manual operations while freeing up your team to focus on higher value assignments.

Lack of Automation in the Old Data World

The holy grail of IT is to automate all routine tasks, eliminating the risk of user error that is associated with manual operations while freeing up your team to focus on higher-value assignments. However, the automation of traditional infrastructure, especially storage, can be fraught with difficulty.

Available tools, if they exist at all, can be challenging to use and are often not robust enough for production. You might end up resorting to complex bolt-on vendor-provided APIs or software development kits (SDKs) to accomplish the automation that you need. Although almost all vendors offer some form of automation, their solutions can be highly complex, difficult to manage, and unable to automate every task.

Complex Integration

Integrating heterogeneous infrastructure from the old data world with systems such as VMware and OpenStack can be difficult. Traditional architectures can require a diverse set of APIs, SDKs, plug-ins, and drivers. Maintaining separate infrastructure for traditional apps and cloud-native apps simply adds to your integration challenges and to your team's workload.

Infrastructure Management that Takes Too Much Time

If your IT environment is in the old data world, it can be complicated and fragile, and your team dedicates too much time to just keeping the lights on. They spend valuable time on managing compute resources, virtualization, storage provisioning across multiple siloed storage arrays, and a seemingly never-ending stream of software and firmware patches and updates.

The Old Data World isn't Agile

There's almost no way to achieve the agility that your organization needs while still operating in the old data world. No matter what you do, your team is likely to spend too much time on infrastructure management tasks and system integration. The time that it takes to achieve a high level of automation in a siloed and heterogeneous IT environment might simply not be worth the effort or the cost. And your team might not have the right skills to accomplish the job in the first place.

The New Data World Integrates, Automates and Orchestrates

The next-generation storage architecture from NetApp makes your infrastructure and your IT team much more agile. As a result, you can easily adapt to changing business demands, whether that means consolidating traditional applications or adding new cloud-native services:

- **Easy automation** through an open REST-based API further simplifies provisioning and management. Unlike other alternatives, the SolidFire architecture was designed from day one with API based automation and orchestration in mind, making the NetApp API simpler and easier to use.
- **Multisystem integration**, into software suites such as VMware and OpenStack, takes the pain out of consolidating workloads and allows traditional and cloud-native applications to share the same infrastructure, simplifying planning and reducing infrastructure and management costs
- **An advanced self-healing architecture with guaranteed performance** scales out instead of up, reducing infrastructure complexity, alleviating the management burden, and facilitating consolidation. Operating expenses are reduced by up to 67%.

The Benefits

NetApp technology allows you to easily automate, scale, and orchestrate across multiple systems to drive workload consolidation and to unlock IT transformation. You achieve time savings through reduced management overhead and achieve cost savings through a common system for both traditional and cloud-native applications. Further cost savings result from automation that increases overall productivity.

For the virtualization administrator, the NetApp next-generation architecture allows you to easily deploy, automate, scale, and orchestrate storage and compute across multiple systems, reducing time to value and minimizing administration costs. You save time through faster virtual machine deployment, you increase uptime, and you have the automation and data management tools that you need to enhance developer productivity.

Auto Sector Company Deepens OpenStack Integration for App Development

A global automotive sector enterprise was struggling to increase agility and accelerate deployment cycles. The company wanted to implement a private cloud to support application development. SolidFire was chosen for its deep OpenStack integration. It was the best fit for the company's OpenStack development cloud, passing tests with ease. The ability of SolidFire to support both VMware and OpenStack—was also important.

Key results:

- Deep OpenStack integration
- Simultaneous VMware and OpenStack support
- Mature APIs
- Use of next-generation IT while supporting existing apps

Key NetApp differentiators are the simplicity, robustness, and ease of integration that allow you to automate mundane, inefficient tasks. The NetApp next-generation storage architecture—with automation through open, REST-based APIs—simplifies provisioning and management; cuts operating expenses by up to 67%; and enables superior scalability for your applications, both old and new.



Achieving the Best of Both Worlds

The old data world of traditional enterprise applications that have predictable infrastructure requirements must make room for the inherently flexible cloud-native workloads of the new data world. This transformation is coming to your data center whether you prepare to address it or not.

The NetApp next-generation storage architecture—available in the form of the SolidFire all-flash array, NetApp HCI, or FlexPod SF converged infrastructure solution—delivers the best of both the old and the new worlds. It replaces the traditional infrastructure of the old data world with a more predictable, scalable, and agile infrastructure that is designed to support both traditional enterprise workloads and cloud-native apps. By consolidating workloads from both worlds, NetApp technology simplifies your infrastructure and dramatically reduces costs.

Both the old and the new benefit from guaranteed performance that protects the user experience and from a scale-out architecture that rationalizes infrastructure growth. They also benefit from automation that frees your IT team to focus on the things that will drive business success in the digital economy.

