

THE AUTHORITATIVE GUIDE TO **SOFTWARE-DEFINED STORAGE**

Understanding **the power of SDS**
and why now is the time to
implement it in your IT department



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THE TIME IS NOW FOR SOFTWARE-DEFINED STORAGE

One of the biggest challenges in IT is that we still have a hardware-centric mindset when we think about storage. We talk too much about hardware technologies, we like throwing hardware at problems (especially performance), and IT spends way too much time and money upgrading hardware and migrating storage, often paying a premium to get storage from a vendor they are locked into in one way or another. **This has to change.**

The future of IT is software-defined. Not only has our industry fully adopted compute virtualization, software-defined technologies are leading the way for cloud computing and emerging trends are abuzz with talk of SDx, or software-defined everything. It's time for us to apply this same modern thinking to storage.

Every IT department should be looking at software-defined storage (SDS) as a catalyst to modernize their infrastructure and prepare them for the future - right now, not next quarter or fiscal year, now.

There are many benefits to reap: from hardware abstraction that removes vendor dependencies to the efficiency gained from pooling capacity across systems and the ability to deliver a consistent set of data services across different types and brands of storage systems.

Simply put, **software makes your storage smarter.** A few hyperconverged infrastructure (HCI) and all-flash array (AFA) vendors have realized this already and are evolving to try to become software companies. Other SDS platforms, like DataCore, are mature and fully featured, already offering dramatic improvements in **performance, availability, and flexibility** on top of all the benefits of SDS.

As you'll see throughout this book, SDS platforms are already making strides to unify primary, secondary, archive, and cloud storage, to support block, file, and object interfaces, and to provide API-driven, container-ready storage abstraction. **This is the near-future of SDS.**

Often times, we in IT focus our energy on fixing the urgent problem at hand, missing important strategic investments that will bring us greater benefits. SDS is one of those technologies: it can make all your current and future investments in storage better: **smarter, faster, and more efficient.**

So why wait? The time is now.

David Marshall - Founder & Executive Editor of VMblog



**By 2024,
50% of the global
storage capacity will
be deployed as SDS
on-premises or on the
public cloud (up from
less than 15% today).**

-Gartner*





WHAT IS SOFTWARE-DEFINED STORAGE, AND WHY IS IT IMPORTANT?

Tim Stammers



What is software-defined storage, and why is it important?

Analysts - Tim Stammers

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Software-defined storage (SDS) has been a hot topic for the last five years, but it has never been clearly defined. Some interpret the term as involving modern storage qualities such as automation, policy-based management and scale-out architectures. Others use SDS simply as a label for storage systems that can be bought as software, and installed on a choice of commodity hardware. Others apply a different rationale, and even use SDS to describe products that are only sold as appliances.

The 451 Take

Thanks largely to Moore's law and flash, hardware performance is now relatively abundant, and IT has entered a software era. Software has always had a major role in defining storage products, but it is now the primary focus of engineering efforts for much mainstream infrastructure. The ability to run the resulting software on commodity hardware is a major benefit for both customers and vendors, and it is also changing suppliers' business models. If there's a catch to this phenomenon, it's that the SDS label has been applied shotgun style to such a wide range of products that it is extremely hard to determine what it means. If 451 Research had the choice, we'd like to see SDS used only to describe a breed of highly scalable, automated storage systems that were designed from scratch to run on commodity hardware. We admit that's a loose definition, and we know that not everybody would agree with it, but the existence of such systems also reflects two other trends in the IT industry – the rapid growth in scale of operations, and the rise of public cloud services.

SDS is an all-embracing label

Suppliers are pitching products as SDS in every major category of storage offering. Some can only be bought as appliances. Others are software-only versions of legacy products that have been sold as appliances for decades. Many of the products that can be bought as software can also be bought as appliances – and some of those are more often bought as appliances. These are the major categories in which products are being pitched as SDS, alongside examples of those products:

- Primary storage – Dell EMC Unity and Isilon; IBM Spectrum Accelerate and Spectrum NAS; NetApp ONTAP Edge, SolidFire Element X; Pure Storage FlashArray

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What is software-defined storage, and why is it important?

- Hyperconverged storage – VMware vSAN; Nutanix Acropolis HCI; Cisco Hyperflex; Red Hat Hyperconverged Infrastructure
- Secondary storage – Dell IBM Spectrum Scale; Hitachi Vantara HCP; IBM Object Storage; Red Hat Ceph
- Storage management – IBM Spectrum Control
- Storage virtualization – FalconStor Data Mastery Platform; Datacore SANSymphony; IBM Spectrum Virtualize
- File systems – IBM Spectrum Scale; Red Hat Gluster; Veritas InfoScale
- DR and backup – IBM Spectrum Protect; VMware Site Recovery Manager

SDS: the official story

In 2015, the Storage Networking Industry Association (SNIA) published a paper titled Software Defined Storage, which was co-authored by seven experts. In our opinion, the paper falls far short of giving a clear idea of what SDS is, or how it is distinguished from other types of storage. This is despite SNIA's status as the paramount technical body for the storage industry, and the fact that market education is one of its major activities. In short, if SNIA can't define SDS, probably nobody can.

Although the association said in its paper that SDS is a 'marketing buzzword,' it also said the term represents an evolution of storage technology. The paper did not give a definition of SDS, but described the 'attributes' and 'differentiation' of the term. It said SDS builds on data path virtualization, but is not virtualization alone. Because SNIA acknowledged that many storage products are already abstracted and virtualized, it said the differentiating capabilities that are needed to justify labeling a product as SDS are:

- Automation – simplified management that reduces the cost of maintaining the storage infrastructure
- Standard interfaces – APIs for the management, provisioning and maintenance of storage devices and services
- Virtualized data path – block, file and object interfaces that support applications written to these interfaces
- Scalability – seamless ability to scale the storage infrastructure without disruption to the specified availability or performance (e.g., QoS and SLA settings)
- Transparency – the ability for storage consumers to monitor and manage their own storage consumption against available resources and costs

Source: SNIA, Software Defined Storage, January 2015

451 Research believes the above simply describe common qualities of modern storage products. To be fair, the paper also describes 11 'attributes' of SDS, but we believe most of those attributes are also highly inclusive. They include self-service interfaces; support for chargeback; policy-based management, and what SNIA says is 'nearly always' a scale-out architecture and the pooling of storage and other resources. The paper lists another attribute that may be more significant, which is the use of metadata in service-level management. SNIA discusses this in some depth in the paper – but again, there is no clear-cut definition, and we believe many vendors could claim to be using metadata the way SNIA describes.

The rise of commodity hardware

For many years, storage management and virtualization products have been sold as software-only, as have object-based storage systems. However, spending on primary storage systems is greater, and until about five years ago, primary storage was sold almost exclusively as pre-built systems or appliances. Now, a wide range of primary storage systems can also be bought as software, including

What is software-defined storage, and why is it important?

versions of legacy systems designed decades ago. In all cases, it has happened because IT has entered a period of relatively abundant hardware performance.

For around three decades, the x86 processors used as main storage controllers in storage systems have obeyed Moore's law of exponential growth in processing power. More recently, flash has transformed media performance. As a result, levels of storage system performance that previously required carefully selected hardware can now be delivered by standard commodity servers. This is not true for every system or workload, but it is true for a wide range of mainstream primary storage systems.

Software-only benefits for customers

The software that has always underpinned or 'defined' a storage system can now run on a choice of hardware, freeing customers from hardware lock-in, and giving benefits in flexibility and cost. Customers can install software on existing hardware in their datacenters, or, if they are buying new equipment for the job, they can choose and source their own hardware. Their hardware preferences may well be based on discounts and contracts they have already negotiated with specific server makers, but even when that is not the case, the software-only model still promises savings.

Storage systems vendors apply markups to hardware. If customers source their own hardware, they sidestep those markups, reducing costs. This is not just true at the time of implementation, but also during the life of a storage system, because the markups are notoriously high for replacement components such as disk and flash drives. On the supply side of the fence, the use of commodity hardware also cuts costs for vendors when they are selling pre-built systems or appliances. Because of competitive pressure, that results in lower prices for those products.

The blur between software-only and appliances

The relationship between appliances and software-only products is confused. A significant share of customers do not want to buy storage systems as software, for multiple reasons including operations and support. Converged systems became popular for the very similar reason that many customers want pre-integrated systems that are quick to deploy, and ideally, supported by a single vendor. On the other side of the fence, software-only buyers tend to be large or sophisticated IT shops. Also, some vendors are selective about the customers they offer a software-only option to, because unskilled buyers may run into problems creating appliances from that software, causing problems for the vendor.

The impact on business models

Two examples of vendors whose business models have changed because of commodity hardware and software-only sales are SolidFire (now owned by NetApp) and Kaminario. When SolidFire began business, it sold its scale-out, all-flash storage systems as appliance. In 2015, SolidFire added the option for customers to buy its system as software, for deployment on their choice of hardware. In 2016, SolidFire made that software the outright focus of its business, by launching a program that altered the way it sold appliances, and the way it licensed its software.

Under the new SolidFire program, when customers buy appliances, the hardware underpinning those appliances is sold at 'transparent' and 'pass through' pricing, with a markup limited to what was needed only to cover SolidFire's costs. Meanwhile, the software is sold under perpetual licenses that can be pooled and transferred across any customer hardware.

Kaminario also began life selling scale-out, all-flash systems as appliances, and its systems can still only be bought as appliances. However, early in 2018, Kaminario handed the hardware side of its business to giant distributor Tech Data, turning Kaminario into a software-only business. The

distributor loads Kaminario's software onto hardware specified by Kaminario, and sells and supports the appliances through Kaminario's channel partners, with what Kaminario describes as single-digit pass-through markups.

SDS as scalable, automated storage

For many years, object storage has long been based on commodity hardware, and offered as software-only. As stated above, primary storage has gained those two qualities only over the last five years or so. But a new breed of primary storage system has also emerged. Unlike legacy primary storage that recently gained the ability to be sold as software-only, this new breed of primary storage was designed from scratch to be based on commodity hardware, and to be very scalable. Together with object storage, we would consider this new breed to deserve the label software-defined storage, because it delivers more than simply the ability to be bought as software.

Among the types of product now being pitched as SDS are an emerging breed of highly scalable, primary storage systems. Examples include Dell EMC's ScaleIO, Datera's Data Services Platform, Hedvig's Distributed Storage Platform, INFINIDAT's InfiniBox, and the scale-out, all-flash arrays of Kaminario and SolidFire. These systems were not all designed to handle the same workloads, and not all can be bought as software-only. But they all feature architectures designed to scale out to very large capacities and node-counts across commodity hardware, alongside a high degree of automation. The vendors that sell them say their architectures are different from those of previous generations of systems that were designed to achieve reliability using specialist rather than commodity hardware.

Broadly, these systems are off-the-shelf equivalents to the storage systems operated and developed in-house by hyperscalers, and they share the latter's scalability, automation via APIs, and use of commodity hardware. This makes them fit well with SNIA's list of attributes for SDS. The systems are aimed at very large enterprises, and second-tier cloud operators and service providers. Ten years ago, enterprises had limited needs for primary storage with this level of scalability, and the service provider market was also very different. As such, this new breed of storage systems reflects major changes in both storage, and the wider IT market.



FUTURE-READY IT INFRASTRUCTURE WITH FREEDOM FROM PAST DESIGNS

Scott Sinclair, ESG Senior Analyst

White Paper

Future-ready IT Infrastructure with Freedom from Past Designs

Achieving IT Modernization While Preserving Flexibility and Minimizing Migration Pain

By Scott Sinclair, ESG Senior Analyst
March 2019

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Introduction

In our developing digital economy, IT is a strategic asset. By effectively leveraging data, businesses become more operationally efficient, create more differentiated customer experiences, and develop new products and business models.

However, unlocking those benefits requires a higher degree of execution by IT. Simply keeping pace with demand is no longer good enough; IT needs to help drive the business's digital pursuits. The increased pressure on IT has amplified complexity, as well—66% of IT decision makers surveyed by ESG say IT is more complex than it was just two years ago.¹

Demands being placed on IT are scaling relentlessly, and the tools IT teams use are in a constant state of evolution. Integrating and optimizing those new infrastructure technologies while managing existing investments is a perpetual burden.

This state is not a short-term phenomenon, either. It will be the steady state for IT for the foreseeable future. IT organizations, therefore, have two choices: either increase their personnel and budgets enough to survive the evolution with just traditional tools, or redirect those people and budgets toward maximizing IT infrastructure flexibility, including abstracting from their applications any technology changes that they make to the infrastructure.

Choosing that second option means IT can also choose the high-availability and disaster recovery architectures they want, the vendors they want, and the best storage according to price/performance ... without the costs, complexity, and effort associated with data migrations. In fact, IT flexibility will likely become a foundational requirement for keeping pace in a digital age.

Increasing IT Complexity Necessitates Infrastructure Flexibility

It's not just that IT is more complex now; it's also that the complexity is continuously rising. Two macro forces are behind this phenomenon:

- First, elements under IT's purview have been scaling dramatically. According to ESG research, the factors behind the increased complexity include increases in endpoints, massive data growth, and new applications (see Figure 1).
- Second, data center technologies are rapidly evolving. New technology is often touted as a positive thing, but "new" also equates to "different," and unfamiliarity means complexity. New workload types, new technologies, digital transformation initiatives, and the need to leverage both on- and off-premises infrastructure were all complexity-related challenges mentioned by the surveyed IT managers.

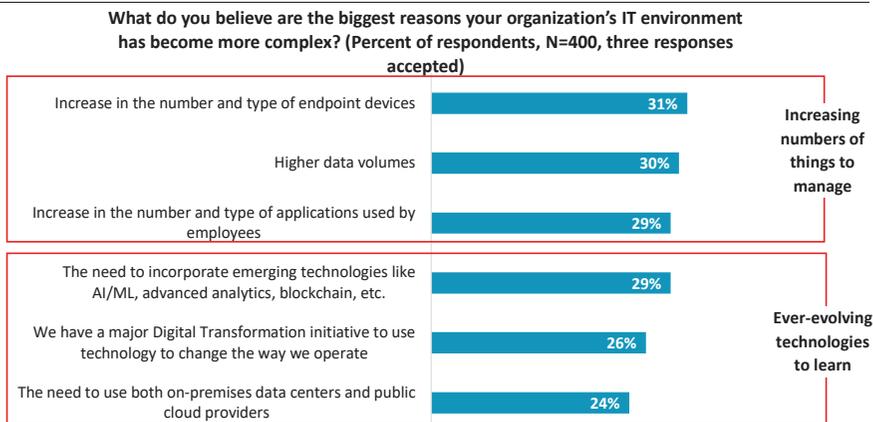
While some increased IT investment will likely be essential, simply throwing budget at this problem won't solve it. Qualified, productive IT specialists are not commodities. Even if companies were to simply scale their personnel budgets linearly with demand (which they are not willing to do), finding the right people isn't easy. According to ESG research, 38% of surveyed IT organizations can't find the IT architecture and planning personnel they need. IT architecture and planning is actually the second most commonly identified IT skill shortage, behind only cybersecurity.

The challenge of finding skilled IT architecture and planning personnel will be exacerbated even further by technology innovations that are now just on the horizon.

¹ Source: ESG Master Survey Results, 2019 Technology Spending Intentions Survey. All ESG research references and charts in this white paper have been taken from this survey results set, unless otherwise indicated.



Figure 1. Factors Driving IT Complexity



Source: Enterprise Strategy Group

New Technologies

In particular, on-premises storage technologies are evolving rapidly. Consider flash for example: All-flash storage adoption will likely continue its acceleration as non-volatile memory express (NVMe) flash technology starts to replace SAS- and SATA-connected flash. The impact of NVMe on infrastructure performance is expected to be positive, but systems management may become more complex, as the levels of performance added by NVMe are not known.

Similarly, the rise of NVMe over fabrics could complicate both on-prem storage arrays and storage networks. Progress is being made on a standard covering the dominant storage networking environments (Fibre Channel, Ethernet, and InfiniBand), but multiple considerations remain unresolved. For example, with NVMe over Fabrics on Ethernet, multiple options exist, and each has pros and cons. Leveraging a remote direct memory access (RDMA) protocol such as RDMA over Converged Ethernet (RoCE) will probably require new adapters and changes to the network, while alternatives such as NVMe over TCP might not provide the same low-latency performance benefits.

New Deployment Options

Widespread adoption of public cloud services and architectures such as new hyperconverged infrastructures have been altering the IT ecosystem, too:

- 62% of converged and hyperconverged infrastructure users told ESG that those deployments, all or in part, support existing workloads and are impacting their existing storage environments.²
- 41% of IT organizations reported they have had to bring back at least one workload from a public cloud service in an attempt to resolve issues of one sort or another.³ Basically, IT complexity cannot simply be “offloaded” to a public

² Source: ESG Master Survey Results, [2017 General Storage Trends](#), November 2017.

³ Source: ESG Master Survey Results, [2018 IT Spending Intentions Survey](#), December 2017.

cloud provider. But the costs associated with moving back can be significant—55% of respondents incurred both operational and personnel costs managing these moves; 46% incurred data export costs when bringing back the data, and 43% incurred downtime-related costs.⁴

The consistent churn of infrastructure technologies and deployment options will continue, and IT organizations must address the situation in a sensible way. With migrations in particular becoming so costly, it is imperative that IT finds and leverages technologies that can deliver infrastructure flexibility, choice, and movement.

Transformational Infrastructure Flexibility with Software-defined Storage

Software-defined storage (SDS) alleviates problems associated with perpetual migrations from one technology or vendor to the next. SDS is optimized to deliver infrastructure flexibility by abstracting the underlying storage technology from the application layer.

Some SDS solutions on the market leverage that abstraction capability to support a variety of storage hardware options. Some offer the same technology in different deployments, such as HCI or in the cloud. And some abstract multiple storage types, such as SAN arrays, all-flash arrays, and DAS—all under the same architecture. Other SDS solutions actually support all those variations.

Across these variations, infrastructure flexibility is helping to boost interest in SDS. Thirty-three percent of IT organizations surveyed by ESG say their interest in SDS stems from the agility it provides them in adjusting a hardware infrastructure according to evolving requirements. And, thirty percent of respondents also cited the ability of SDS to support a mix of hardware generations, which can be a means to eliminate data migrations.⁵

SDS isn't the only option for eliminating data migrations, though. Many leading storage, HCI, and cloud providers offer options to non-disruptively integrate new hardware, but those solutions typically require data to remain on the vendor's technology. These capabilities offer benefits, but if IT desires to integrate an alternative vendors' storage or switch to an emergent architecture, a data migration will still be necessary.

Fortunately, [DataCore](#) offers an SDS solution that can accommodate not only different hardware generations, but also different vendors and architectures.

A Software-defined, Storage-based Control Plane

DataCore technology is software-only. It provides a control plane for a storage infrastructure—virtualizing the storage infrastructure behind it—and it comes with a layer of rich, *consistent* storage functionality. The combined attributes of hardware abstraction plus management consolidation make it incredibly easy for an IT ops admin to move, manage, adapt, and implement technologies seamlessly for any application.

The capabilities even extend to the cloud: DataCore lets an organization leverage the cloud as a storage tier, as a data repository, or for disaster recovery. In this way, DataCore users reap multiple benefits: uniform, heterogeneous storage management, automatic/seamless data migration, and an ability to optimize their existing investments.

Uniform, Heterogenous Storage Management and Consolidation

A single control plane that supports a diverse set of infrastructure components can radically decrease the demands on IT personnel. For example, tasks can be automated more easily. DataCore has engineered into the solution a wide variety of common management tools, as well as offering support for VMware vSphere APIs for Storage Awareness (VASA) and

⁴ Source: ESG Master Survey Results, [Tipping Point: Striking the Hybrid Cloud Balance](#), October 2018.

⁵ Source: ESG Research Report, [Software-defined Storage \(SDS\) Market Trends](#), February 2017.



VMware Virtual Volumes (vVols). This allows hardware, vendors, and technology to be switched out without VM admins even needing to know about it. DataCore also offers plugins for containers, as well as a full REST API to enable automation. When basic/rudimentary tasks are automated, busy IT staff can then focus on strategic, higher-value responsibilities.

DataCore’s control plane technology virtualizes multiple storage vendors, multiple storage types/architectures, and multiple hardware generations. Integrating traditional enterprise storage, all-flash arrays, HCI, and the cloud across heterogeneous vendors under a single control layer means that IT can easily tailor and adjust that underlying infrastructure as demands change. The ability to integrate cloud and on-prem resources is especially important: As mentioned, nearly a quarter of IT decision makers whose environments have become more complex over the past two years specifically cited the need to use both on-premises data centers and public cloud providers as a driver of that complexity.

Automatic, Seamless Data Migration

The typical data center is composed of a mix of new and legacy technologies. DataCore software can seamlessly and non-disruptively migrate data to newer infrastructure components by leveraging a third synchronous mirror: After a new device is deployed, admins replicate data to the new node asynchronously. Then, DataCore switches to synchronous replication, creating a third mirror on the newly deployed infrastructure. Once in sync, the admins can switch off the older node, knowing that redundancy is being maintained. In this manner, new infrastructure elements can be integrated seamlessly, without affecting applications or end-users.

Optimize and Accelerate Existing Investments

Ripping and replacing infrastructure investments simply to leverage the benefits of a newer technology is a typically a nonstarter option; budgets are never large enough. The DataCore single control plane extends the life of storage by making it faster, more agile, and more resilient. The complex task of manually assigning data sets to the right device is also automated: DataCore’s integrated, dynamic tiering algorithm ensures that the most active data blocks are sitting on the highest-performing infrastructure.

This is good news, considering that 22% of storage decision makers surveyed by ESG report challenges in managing, optimizing, and automating data placement.⁶ They would be reassured to know that when demands change or new infrastructure options arise, DataCore can dynamically move active blocks to the fastest tier—including the very fastest one, NVMe-based SSDs in the DataCore system itself, thereby accelerating even all-flash investments.

The Bigger Truth

For most organizations, IT has reached a tipping point. With the demands of the business constantly increasing, IT can either stick with the traditional infrastructure architecture and deployment model—essentially forcing the business to slow to its pace—or it can evolve. The churn associated with keeping pace with evolving technology is too costly and wastes too much time and effort. Businesses have already lost too many manhours to the pain of migrating data.

While the pace of innovation is not expected to slow down anytime soon, technology does exist to minimize and possibly even eliminate the impacts of constant change, and of migrating data, on an organization. DataCore is a simple, capable, flexible solution to consolidate infrastructure and free an IT organization from becoming overwhelmed by the minutia associated with adopting new technology. The result: Valuable staff can instead focus on maximizing the value of the business.

⁶ Source: ESG Master Survey Results, [2017 General Storage Trends](#), November 2017.

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I&O leaders focused on data center infrastructure should grade SDS products by their ability to be truly hardware-agnostic, API-driven, based on distributed architecture, and capable of supporting edge, core or public cloud deployments.

-Gartner*





**DATACORE ONE BRINGS NEW
APPLIANCES AND ANALYTICAL INSIGHTS
TO ITS HIGH-PERFORMANCE
SDS PLATFORM**

Steven Hill and Liam Rogers

REPORT REPRINT

DataCore ONE brings new appliances and analytical insights to its high-performance SDS platform

JULY 12 2019

By Steven Hill, Liam Rogers

The early advocate of the software-defined storage model has leveraged its Adaptive Parallel I/O technology to bring top-level storage performance to scale-out SDS. As part of its unifying DataCore ONE announcement, the company has unveiled a new pair of HCI-Flex appliances for customers that prefer the convenience of pre-integrated HCI systems.

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REPORT REPRINT

Introduction

As an early advocate of the software-defined storage model, DataCore has leveraged its patented Adaptive Parallel I/O technology to bring top-level storage performance to scale-out SDS. DataCore's SANsymphony SDS platform is already validated for primary and secondary storage applications on x86 systems from more than 30 top-tier vendors, and as part of its unifying DataCore ONE announcement, it has unveiled a new pair of DataCore HCI-Flex appliances for customers that prefer the convenience of pre-integrated HCI systems. Also announced is a new cloud-based analytics platform (DataCore Insights Services) for single pane of management, as well as a new subscription-based pricing model.

451 TAKE

Since a leadership shift in early 2018, DataCore has looked to transform parts of the company, and sharpen its focus on the evolving HCI and persistent container storage market. We agree that there's a growing number of customers embracing the simplified HCI model for a widening range of roles within their deployment strategies, and DataCore's high-performance and data protection capabilities could make it a serious contender for high-end, HCI-based storage applications. Of organizations deploying HCI, 79% say its role is to simplify infrastructure acquisition, management and maintenance, but we've also seen growth for a wide range of secondary storage applications, and for supporting emerging technologies such as containers (36% currently claim HCI serves this purpose in their organization). Edge and remote office/branch office usage is a considerable opportunity where IoT and other remote production require more infrastructure at the edge to accommodate data processing.

Today, most HCI vendors are also chasing the edge opportunity, and DataCore will need to make a case for its cost/performance model, which makes the new, flexible pricing important for enterprises that are starting to expect their on-premises infrastructure to share the flexible consumption model of public cloud services. 451 Research sees capex cost and storage growth as primary pain points for enterprise storage infrastructure, and the DataCore ONE approach offers a unified model for primary and secondary storage that looks to balance price, performance and system management with the scale-out simplicity of modular, HCI-based storage.

Context

Software-defined storage (SDS) vendor DataCore was founded in 1998 and is headquartered in Fort Lauderdale, Florida. DataCore has almost 300 employees across 12 countries with multiple offices across the EU and the APAC region. Despite being US-based, the majority of revenue is currently coming from outside the US with most sales taking place in the EU, with the rest balanced between the US and APAC.

DataCore claims it has been profitable for the past 10 years, so is not seeking any funding at this time. The company brought in new leadership in April 2018 with CEO Dave Zabrowski (previously founder and CEO of cloud consumption analytics provider Cloud Cruiser, which was acquired by Hewlett Packard Enterprise) and CMO Gerardo Dada (previously VP of product marketing and strategy at SolarWinds). Former CEO George Teixeira now serves as executive chairman.

REPORT REPRINT

Strategy

The sales strategy for DataCore is 100% channel-driven with no direct sales. The company maintains a host of partnerships, and its platform is compatible with x86 systems from a wide range of vendors, but it also offers validated designs in conjunction with partners Lenovo, Intel and Western Digital. Lenovo has been a principal partner for DataCore, packaging its software with Lenovo servers. Although the DataCore platform has its own continuous data protection functionality, it is also certified by partners Veeam and Commvault to serve as a repository for snapshots.

As part of this recent announcement, DataCore is introducing a new subscription pricing model. One of the factors that appeals to customers about the public cloud is the flexible consumption and pricing models associated with it, namely shifting infrastructure to opex spending. Data from our Voice of the Enterprise: Storage, Workloads and Key Projects - Quarterly Charts and Figures shows flexible consumption is important to 78% of customers, and deemed very important to more than one-third of respondents. Flexible consumption is also deemed very important by 43% of respondents that are currently executing on their digital transformation strategies, showing that it has a greater draw for enterprises that are further along in modernization efforts.

Products

DataCore ONE looks to simplify the transition from classic three-tier, SAN-based storage platforms to HCI with flexible software and licensing options, and DataCore's SANsymphony software environment can be deployed on virtualized, bare metal and containerized environments. In addition to its high-performance block services, the platform also supports cross-array auto-tiering, which helps unify the diverse collection of primary, secondary and cloud storage now popular in datacenters. Earlier this year, the company released a Container Storage Interface (CSI) driver for Kubernetes clusters, and a Docker certified Docker Volume Plugin that enables the use of persistent storage in conjunction with containerized stateful applications.

Most recently, the company unveiled a pair of branded HCI appliances, which adds the convenience of pre-integration, simplified scalability and ease of deployment that has become the hallmark of HCI systems. DataCore's newly announced HCI-Flex appliance is available in 1U and 2U models, and both appliances support a flexible mix of flash and/or disk, as well as the choice of VMware or Hyper-V for hypervisors. The 1U model can accommodate 3-6TB storage and 64-128GB memory, and capacity for the 2U model is 15TB-25TB storage and 192GB-384GB memory. Storage capacity and performance can be scaled out through the connection of additional external storage arrays, and it's worth noting that DataCore offers full data protection with a minimum of only two nodes. Pricing is said to be \$24,950 to \$40,895 for the 1U model, and \$68,745 to \$79,950 for the 2U.

As part of the DataCore ONE initiative, the company also announced DataCore Insight Services (DIS) for its subscribers, a cloud-based analytics platform that provides a central control plane for operations management and observation. This platform collects data from storage deployed by customers using an opt-in 'phone home' model to provide predictive analytics. While this may present issues for customers that can't or won't allow internet access to their storage utilization telemetry, it's easy for a company to opt out, at the cost of missing out on free DIS insights. In our data, we see that the majority of organizations (75%) recently surveyed believe that artificial intelligence and machine learning will simplify IT infrastructure management, although only 11% 'strongly agree' that they would pay a premium for such AI-enhanced features.

REPORT REPRINT

Competition

Within the HCI market, DataCore will have to contend with offerings from larger vendors including Cisco (Hyperflex), Dell EMC (VxRail), Hitachi Vantara (UPC HC), Hewlett Packard Enterprise (SimpliVity), NetApp (NetApp HCI), Nutanix and VMware (vSAN). Nutanix remains a prominent force in the HCI market – it now has over 12,000 customers, and has continued to sharpen its focus on enabling multi-cloud infrastructure deployments.

The HCI competitive landscape is rounded out by Cloudistics, Datrium, Diamanti, HivelO, Kaleao, Pivot3, Red Hat, Robin.io and Scale Computing. Some vendors are also targeting the intersection of HCI and containers. Diamanti offers a bare-metal HCI platform for Kubernetes and Robin.io, which also offers a hyperconverged product for Kubernetes. Nutanix's Kubernetes service Karbon is its entrant into providing infrastructure for containers.

In terms of SDS vendors, DataCore will encounter the likes of Asigra, FalconStor, Hedvig, LINBIT, MayaData, Nexenta (acquired by DDN earlier this year), Portworx, Qumulo, StorageOS, Storidge and Virtuozzo. Many of the aforementioned players also target the container storage market.

SWOT Analysis

STRENGTHS

DataCore Parallel IO technology puts it at the top of the performance list for SDS, which makes for a strong combination when you include its continuous data protection and auto-tiering capabilities.

WEAKNESSES

DataCore currently focuses on providing block-level virtualization and presenting both block and file services, while many of the SDS competition is offering an integrated combination of block, file and object services.

OPPORTUNITIES

With much of DataCore's revenue coming from the EU, the US market represents untapped potential. In addition, as more IoT-based analytics applications move toward the edge, DataCore's performance and compact HA capabilities can give it an edge over other HCI storage systems.

THREATS

The HCI storage market is extremely crowded, and nearly all SDS vendors are targeting the same growth opportunities of edge and ROBO deployments.

THE STATE OF SOFTWARE-DEFINED STORAGE, HYPERCONVERGED AND CLOUD STORAGE

Seventh Annual Market Survey

[View the Full Report](#)

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Introduction

For the seventh consecutive year, DataCore Software explored the impact of software-defined storage (SDS) on organizations across the globe.

According to IDC, “the enterprise storage market started 2018 with significant momentum, underscoring clients’ appetite for transformative storage solutions, both in on-premise and cloud environments.”¹

In its seventh consecutive market survey, DataCore Software sought to find out more about what is driving that momentum. DataCore’s survey questioned organizations across a variety of markets to distill the expectations and experiences of 400 IT professionals who are currently using or evaluating software-defined storage (SDS), hyperconverged and cloud storage to solve critical data storage challenges. The results yield surprising insights from a cross-section of industries over a range of workloads.

Please refer to the section on Survey Demographics for details on the size of companies, geographies, and vertical markets represented.

Summary of Findings

- High availability/disaster recovery are still top issues. The biggest concern for storage infrastructure of any type is to minimize disruptions; providing business continuity and disaster recovery are the top cited examples by respondents. Interestingly, business continuity is an overarching key concern when it comes to storage, whether on-premise or in the cloud.
- The biggest surprise reported is that there is still too much vendor lock-in within storage, with 42% of respondents noting this as their top concern. Software-defined storage is being used to solve this (management of heterogeneous environments) as well as for automation (lowering costs, fewer migrations and less work provisioning). Therefore, it should not be a surprise that the results also show adoption of software-defined storage is about double that of hyperconverged (37% vs. 21%), with 56% of respondents strongly considering or planning to consider software-defined storage in the next 12 months.
- The reality of hyperconverged deployments was also revealed. While it continues to make inroads, in addition to above, respondents also said they are ruling out hyperconverged because it does not integrate with existing systems (creates silos), can’t scale compute and storage independently, and is too expensive. Hybrid-converged technology is a good option for IT to consider in these cases.
- Interestingly, while simplifying management, higher performance, and reduced costs are reported as top reasons for deploying software-defined storage, those who have reported the top reasons to rule out software-defined storage were a need for separate management, lack of performance and too expensive to implement. However, not all software-defined storage solutions are equal. For example, DataCore reports a 95% renewal rate and similar customer satisfaction scores.
- Many enterprises are exploring containers, although actual adoption is slow due to: 1) lack of data management and storage tools; 2) application performance slowdowns—especially for databases and other tier-1 applications; and 3) lack of ways to deal with applications such as databases that need persistent storage.

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The Current State of Software-Defined, Hyperconverged and Cloud Storage	<ul style="list-style-type: none"> While all-flash arrays are viewed as the simplest way to add performance, more than 17% of survey respondents found that adding flash failed to deliver on the performance promise, most likely because it does not solve the I/O bottlenecks pervasive in most enterprises. Technologies such as Parallel I/O provide an effective solution for this. NVMe is still struggling to become mainstream. About half of respondents have not adopted NVMe at all. Thirty percent report that 10% or more of their storage is NVMe and more than 7% report that more than half of their storage is NVMe. However, while adoption is still slow, enthusiasm for the technology does appear strong. Technologies such as software-defined storage with Gen6 HBA support and dynamic auto-tiering with NVMe on a DAS can help simplify and accelerate adoption. In looking at cloud storage adoption and maturity, while cost savings is a driver, many report² that it is also a major obstacle, along with security and regulatory concerns. 36% percent realized the cloud is not less expensive, and 42% are not considering public cloud storage. Furthermore, another top response for surprises reported is that using the cloud failed to reduce storage costs. Overall, respondents view requirements, use cases and decision drivers very differently based on where they stand relative to how much and how long they currently are using storage—on-premise or in the cloud. For example, databases, consolidation and VDI are the top three use cases reported for on-premise software-defined storage and hyperconverged infrastructure deployments whereas backup, archival and disaster recovery, as in past surveys, continue to be the top three use cases for public and hybrid cloud deployments. Reducing new hardware costs and adding performance were the main decision drivers in past surveys (prior to 2017) across all types of deployments. There has been a significant shift this year as well as last year, making automation, simplification and extending the life of existing assets top of mind.
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The Current State of Software-Defined, Hyperconverged and Cloud Storage

In its recent [Hype Cycle for Storage Technologies 2018](#), analyst firm Gartner¹ advises enterprises that have not yet leveraged technologies that improve efficiency and modernize data protection to include them in the next technology refresh. Organizations should then shift their focus to innovation areas such as software-defined storage, NVMe and NVMe-oF, public cloud storage, container-native storage and hybrid cloud storage as these technologies mature.³

We asked respondents, **what are the business drivers for implementing software-defined storage; hyperconverged storage; public cloud storage; and hybrid cloud storage?** Below is a breakdown of the responses by technology category.



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For software-defined storage, the top responses were:

These were all selected by more than half of respondents. In the prior survey, conducted in 2017, DataCore asked respondents a similar question regarding software-defined storage business drivers. The top results in that study included: simplify management of different models of storage (55%); future-proof your infrastructure (53%); and extend the life of existing storage assets (47%). For the second time, these survey results portray the market's recognition of the economic advantages of software-defined storage and its power to maximize IT infrastructure performance, availability, and utilization.

Gartner's Hype Cycle for Storage Technologies 2018 also stated that "I&O leaders should look at infrastructure SDS not as another storage product but as an investment in improving storage economics and providing data mobility including hybrid cloud storage integration." Additionally, the report echoed some of this research as in its list of the top reasons for interest in software-defined storage, which included:

- Improving the management and agility of the overall storage infrastructure through better programmability, interoperability, automation and orchestration
- Opex reductions via reducing the demands of administrators
- Capital expenditure (capex) reductions via more efficient utilization of existing storage systems⁴

This year's DataCore survey found that the top three business drivers for hyperconverged include:



Deliver **higher performance** storage



Simplify **management** of different types of storage



Automate **frequent or complex** storage operations

It is not surprising that higher performance has risen to the top since that was a main complaint in past surveys. Likewise, previous surveys highlighted that hyperconverged systems were more constrained, offered less choice in types of storage and that it was a vendor-specific technology, and therefore limited to managing only vendor-supplied storage offerings. This made systems difficult to integrate with existing storage investments and more applicable to 'green field' or departmental use cases. Clearly, the trend continues from past surveys that automation and simplification of storage operations are key decision criteria for hyperconverged deployments.

Interestingly, when asked the same question regarding public cloud and hybrid cloud storage, many respondents are still not considering cloud technologies (54 % and 47% respectively), citing security and regulatory concerns as the top obstacles. Paradoxically, while cost savings is a common driver, many report that it is also a major obstacle. Other surveys, including those from 451 Research⁵, note cloud storage cost post migration as becoming the number one pain point.

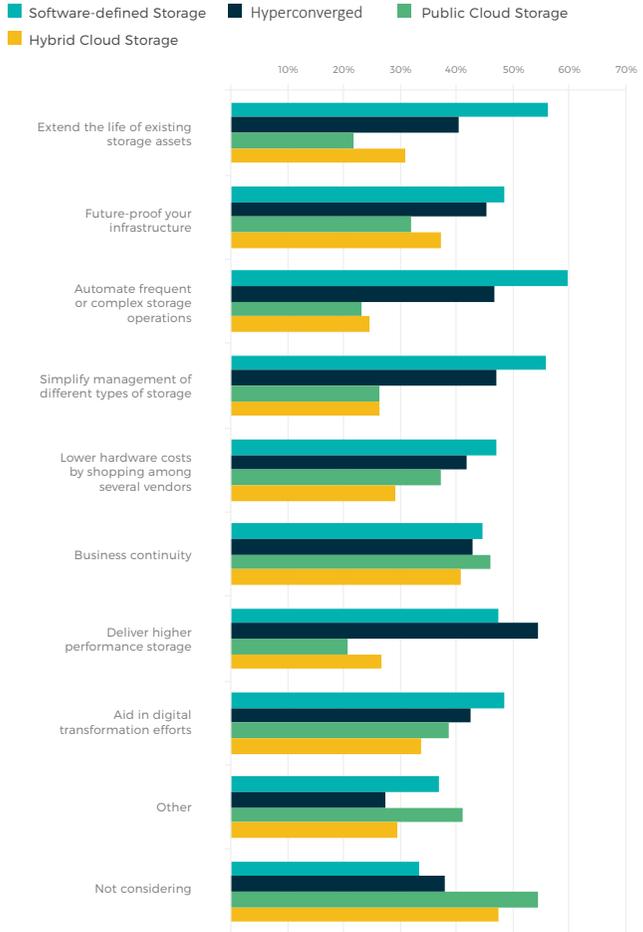
Of those that are deploying public cloud, the top three business drivers identified for doing so include: business continuity (46%); aid in digital transformation efforts (39%); and lowering their hardware costs by shopping among several vendors (37%). Of those that are deploying hybrid cloud, the top three business drivers identified for doing so include: business continuity (41%); future-proof your infrastructure (37%); and aid in digital transformation efforts (37%).

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What are the business drivers for implementing the following storage technologies?



We also asked our respondents **"what are the primary capabilities that you would like from your storage infrastructure?"** The top capabilities identified were: business continuity/high availability (metro clustering, synchronous data mirroring) at 74%; disaster recovery (from remote site or public cloud) at 73%; and enabling storage capacity expansion

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without disruption at 72%. In our previous survey, we asked respondents a similar question, "what are the primary capabilities that you would like from your storage infrastructure when virtualizing storage?" The majority of respondents (83%) similarly identified business continuity from high availability (metro clustering, synchronous mirroring) as number one. Enabling storage capacity expansion without disruption received nearly an identical response as well, with 73% of respondents previously identifying that, and disaster recovery also ranked high at 60% in the past survey.

Eliminating Application Downtime and Business Disruption Are Top Priorities

In general, to answer "what primary capability is most needed from a storage infrastructure," the best solution is "minimize disruptions and provide continuous availability to run the business." Fundamentally, business continuity, disaster recovery and adding capacity for growth without impacting application downtime represent variations of that answer and were the top three most mentioned examples.

Business Continuity and Data Protection are Top of Mind for Users

Of note in the first two questions is that business continuity is top of mind for respondents across all technologies, irrespective of how and where storage is deployed. It's first on the list at 74% for the primary capability that respondents would like from their storage infrastructure and was also number one in the previous DataCore market survey. Additionally, business continuity is the top business driver for those deploying public and hybrid cloud storage (46% and 41%), and similarly ranks high in the complete results for software defined and hyper-converged storage business drivers, coming in at 45% and 43% respectively (see accompanying visual for question 1).

How to Protect your Data

Unfortunately, it is likely that equipment will fail at some point in time. Even highly reliable hardware isn't enough to ensure that systems will stay operational. The ideal way to protect against the myriad equipment, environmental and human factors that contribute to downtime is to mirror data, transparently, automatically, in real time.

Establishing physically separate nodes, each in a different fault zone, provides a level of availability that highly reliable hardware can't match. If one of the nodes is impacted, the other node(s) continue to provide data access to applications, ensuring uptime. Synchronous mirroring ensures zero downtime, without the need for a witness to ensure proper handoffs so the failover is completely automated. Asynchronous replication ensures that when disaster strikes a region and a data center becomes inoperative, data has been replicated to a disaster recovery site, either another physical location or the cloud. This enables operations to resume as soon as possible.

Furthermore, malware, viruses, and ransomware can also corrupt data or prevent users from accessing data. Additional defenses such as continuous data protection provide users with the ability to time-stamp every change to data, and the ability to go back to any point in time to the last known healthy state. Continuous data protection keeps track of all writes and changes to data for a specified time period (e.g., two weeks). As a result, any data can be restored to the immediate point before corruption. From an RTO perspective, continuous data protection makes it easy to create another volume that rollbacks to the good state and mapped to a different file server so the process takes just minutes. This provides insurance against malware, ransomware and other threat vectors that alter data.



...SDS can deliver performant storage solutions and reduce TCO. Because SDS is compatible with most industry-standard hardware, I&O leaders can utilize the latest storage media and quickly adopt high-performance protocols — especially Nonvolatile Memory Express (NVMe) and NVMe over Fabrics (NVMe-oF) — to realize lower latency and optimal speed. Existing hardware can be leveraged with SDS to maximize usage of available resources while supporting both structured and unstructured data workloads.

-Gartner*

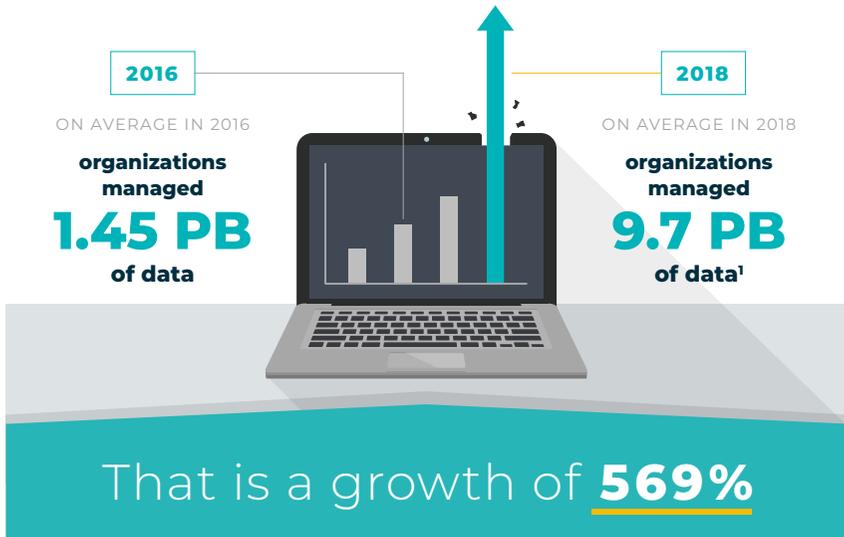


REDUCING DATA CENTER INFRASTRUCTURE COSTS WITH SOFTWARE-DEFINED STORAGE

DataCore™ White Paper

1. INTRODUCTION: TODAY'S STORAGE COST CRISIS

The pace of change and innovation in enterprise computing during the last decade has created enormous pressure on the underlying data storage infrastructure, which was designed for an era that predated the recent explosion of innovation. To attempt to keep up with the pace of change, IT teams have rapidly expanded storage capacity, added expensive new storage arrays to their environment, and deployed a range of disparate point solutions.



Yet, despite pouring significant investments into the infrastructure, the storage layer has remained particularly problematic and, despite representing a significant percentage of IT budgets, it continues to be at the root of many of the top challenges in IT: inability to keep up with rapid data growth rates, vendor lock-in, lack of interoperability, and most significantly, increasing hardware costs.

Most storage hardware vendors suggest that all hardware should be replaced every three years with new arrays that promise better performance and

more capacity, despite the cost and the enormous burden of replacing hardware and performing complex data migrations. Moreover, hardware-vendor pricing models aim at locking decisions for six or more years. Given that IT teams cannot continue to simply outspend the problem, it has become clear that a more fundamental solution is required to address the cost and complexity of the storage infrastructure.

2. THE RISE OF SOFTWARE-DEFINED STORAGE

As IT architects and decision-makers look for long term solutions to this challenge, and prepare their organizations for a future of unpredictable change, software-defined storage (SDS) is increasingly being recognized as a viable solution for the short and long term. SDS is software built to run on commodity server hardware, aggregate physical storage capacity from many separate systems into a single shared storage pool, and deliver a broad set of storage services similar to the functionality provided by traditional SAN storage arrays.

SDS stands in contrast to the traditional method of enterprise storage management, which has been defined by monolithic expensive storage systems from large vendors that offer limited interoperability with other vendors, and enable no sharing of resources amongst systems. By providing a virtualization layer that abstracts away the underlying physical storage, the promise of SDS is to deliver a new level of flexibility to IT, increasing storage efficiency, enabling unlimited scale of data and operations, clearing away vendor lock-in, solving interoperability issues, and ultimately delivering dramatic cost savings.

Moreover, by enabling a reduction in capital spending and staff time dedicated to infrastructure management, SDS frees up resources for higher order activities. Indeed, the capital and human expenses that are liberated from maintaining the status quo can now be redeployed to the important projects that are intended to drive growth and innovation.

The IT industry at large has already adopted server virtualization and enjoyed its benefits. It is becoming obvious that storage virtualization can bring similar—if not more significant benefits. Indeed, industry experts clearly see that software-controlled storage hardware is now a standard part of the overall IT architecture.

“...by 2024, 50% of the global storage capacity will be deployed as SDS on-premises or on the public cloud (up from less than 15% today).”

Gartner

”

The recognition of the promise of SDS is driving a surge in adoption. The market for SDS reached almost \$10 billion in worldwide sales in 2017, and is expected to reach \$16.2 billion by 2021, according to IDC . This rapid growth has drawn in a slew of new offerings in recent years, from both start-ups and traditional vendors.²

Within this growing market segment, DataCore™ SDS has emerged as the industry's leading software-defined storage platform. DataCore SDS is the industry's most robust and versatile SDS platform, and brings new levels of performance, availability and agility to the enterprise data center infrastructure.

On the strength of its robust architecture, DataCore™ SDS delivers dramatic cost savings when compared to traditional approaches and various new alternatives. This brief paper demonstrates the many ways in which DataCore SDS delivers significant TCO improvements, in the form of both CAPEX and OPEX savings. It is intended to help infrastructure teams assess the potential economic impact of deploying DataCore SDS within their environment.

3. DETERMINING THE COST OF TODAY'S COMPLEX INFRASTRUCTURE

The potential economic impact of software defined storage is best understood in the context of the complexity and cost crisis that characterizes most enterprise IT environments today.

Hardware and Software Costs: A peek into the enterprise storage environment today reveals many specialized products, built with proprietary technology, and often using expensive componentry—such as Flash storage, NVMe, or high-end quad-core processors—in order to deliver the reliability and high-performance that enterprise workloads necessitate. To meet all of the enterprise requirements, while accounting for both capacity growth of existing workloads and the addition of new workloads, IT teams have had to devote significant portions of their annual budget to these capital expenditures (CAPEX). Year over year growth in data, applications supported, number of users, and number of sites all drive further CAPEX spending just to maintain the status quo.

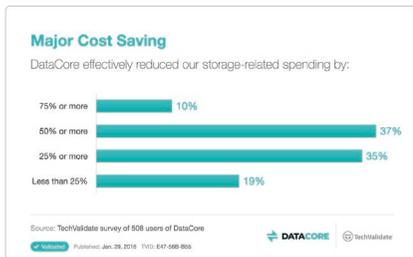
Operating Expenses (OPEX) and the Inability to Innovate: Infrastructure complexity also consumes significant manpower, as IT staffers must continually monitor each component in the data center, conduct

routine maintenance, manage upgrades, manage patches, etc. The complexity increases with the increase in key variables, including: storage arrays, vendors, locations, applications, and operating systems.

The volume of activities required to keep the existing infrastructure available and working as expected means that the majority of staff time goes to maintaining the status quo infrastructure, leaving a much smaller percentage of IT staff cycles available to dedicate toward innovation or new programs that can enable growth and differentiation for the business.

4. DATACORE SDS – DELIVERING THE INDUSTRY’S BEST OVERALL TCO (AND FUELING NEW INVESTMENTS)

DataCore SDS delivers all of the promised value of SDS, while meeting the performance, availability and functional needs of demanding enterprise IT environments. Importantly, DataCore SDS overcomes the limitations found in other SDS products, giving IT teams the ability to address a wide range of use cases and application requirements—including Tier 1 enterprise applications and high-performance databases—with a single, centrally managed platform for both primary and secondary storage. These many strengths all converge to drive dramatic cost savings compared to alternative solutions, giving DataCore SDS the best overall TCO.



Three primary factors allow DataCore SDS to address the full spectrum of enterprise use cases and environments, while reducing spending compared to alternative solutions:

1. Its mature and robust software architecture, built to leverage 3rd party hardware with maximum efficiency
2. A set of software-based patented performance breakthroughs that are incorporated into the platform
3. Several critical storage efficiency features that further reduce the amount of storage hardware required for any workload environment

1. Enterprise class data architecture:

DataCore SDS is built upon the robust architecture of the market's first true software-defined storage solution—DataCore SANsymphony™. Originally delivered to the market almost 20 years ago, the software platform is currently in its 10th major release, and is deployed in more than 10,000 customers globally.

This robust software architecture allows DataCore SDS to drive down OPEX costs by reliably virtualizing and pooling the existing infrastructure resources in the data center. In terms of infrastructure cost, pooling resources pays immediate dividends by freeing up islands of underutilized capacity, thereby allowing application workloads to leverage the entire environment rather than silos of dedicated resources. The impact is a major improvement in resource utilization, which directly reduces the amount of required hardware for the environment. Beyond this, DataCore's core SDS functionality reduces the complexity of heterogeneous storage management, reduces the risk of outages, and improves the overall responsiveness and uptime of applications—all of which feed into direct and indirect cost savings.

The key attributes of DataCore SDS that make it the market leader derive directly from this long, successful run in the market and produce tremendous TCO advantages compared to the alternatives:

- **Widest functional range of data services**, based upon years of responding to the market, and customer requests for new functionality.

By incorporating all required data services into its software, DataCore eliminates the need for a range of expensive dedicated 3rd party products, yielding remarkable cost savings.

- **Highest level of interoperability**, based on close to 20 years of delivering storage software that is built to easily integrate into the existing data center environment, and supports the widest range of 3rd party offerings for each major component of the IT ecosystem. This has the two-pronged benefit of supporting (and extending the life of) the infrastructure already in place, and “future-proofing.” The IT team can easily add any 3rd party hardware offering into the environment in the future, selecting the best price/performance option, and/or allowing them to drive better purchasing terms through the leverage of hardware choice.
- **Most robust**, in terms of Reliability, Availability, Serviceability (RAS), based on billions of system hours running in customer environments. This has a direct impact on TCO through avoidance of application downtime, and elimination of wasted IT labor spent on resolving outages.

2. Breakthroughs in Performance Efficiency Drive Huge Infrastructure Cost Savings:

Historically, achieving improved performance (typically measured in I/O throughput, or application response time) required the addition of more expensive hardware to the environment. Indeed, this concept has been the driving force for the widespread adoption of all-flash storage arrays in recent years, and is the motivation behind the recent surge in NVMe popularity which places expensive memory cards inside the application servers in order to boost I/O performance.

In contrast, DataCore SDS incorporates several innovations at the software level which deliver significant performance gains efficiently, without reliance on massive amounts of dedicated expensive hardware:

Parallel I/O:

DataCore’s patented Parallel I/O technology is a standard, “always-on” feature of DataCore SDS. It elegantly eliminates the server I/O bottleneck by processing I/Os in parallel leveraging multi-core processor systems. On the strength of this new technology, DataCore set records for industry benchmarks, with measurements of 459,000 IOPS,

price performance of \$0.10 per IOPS, and application latency of just 0.22 ms—all with a low cost, 2 node HCI configuration using standard Lenovo servers. These measurements were 2-4X better than those of competing solutions, including expensive all flash arrays.³

- **High-Speed Caching** is a proprietary caching algorithm that accelerates I/O by leveraging RAM as a read and write cache. DataCore supports up to 8 TBs of high-speed cache per node, creating a true “mega-cache” to turbocharge application performance. Given that RAM is the fastest storage component in the architecture, a RAM-based cache can deliver a 3-5x performance boost to applications, while simultaneously freeing up application servers to perform other tasks. Using RAM-based cache also extends the life of traditional storage components by minimizing the stress experienced from disk thrashing.
- **Quality of Service Controls:** QoS is an optional feature that allows the IT team to ensure that high-priority workloads meet SLAs with predictable I/O performance. This is particularly useful in environments with many applications and workloads of differing priority, all sharing the same storage pool. QoS allows IT to set thresholds and limits on lower priority workloads ensuring that the top tier applications do not suffer in performance based on resource contention with lower priority applications. This feature also helps to reduce or eliminate the need to dedicate expensive silos of resources for high priority applications, contributing to the overall infrastructure cost reduction enabled by DataCore SDS.

Collectively, these capabilities enable SDS to deliver on a given workload’s performance requirements with a fraction of the hardware costs required by competing solutions.

3. Storage efficiency drives cost savings even further

In addition to the efficient performance features listed above, DataCore SDS has a number of other features aimed at efficient use of storage resources which drive down the TCO even further. Collectively, all of these features give DataCore SDS a “light footprint” compared to all other alternatives.

Features that allow DataCore SDS to drive up resource utilization, and significantly drop overall TCO include:

- **Auto-Tiering and Load Balancing**

DataCore SDS includes dynamic block-level auto-tiering. This function moves data at a granular level to the storage system that delivers the ideal performance, based on the observed performance profile for each application. The software uses machine learning to assess likely storage bottlenecks, and then automatically moves the “hot” blocks to the fastest media resource, eliminating the bottleneck and bolstering overall application performance, at the same time, migrating warm or colder data to lower cost storage. With this capability, a relatively small amount of flash storage in the DataCore SDS storage pool, can yield superior performance to one consisting of all-flash arrays.

- **Thin Provisioning**

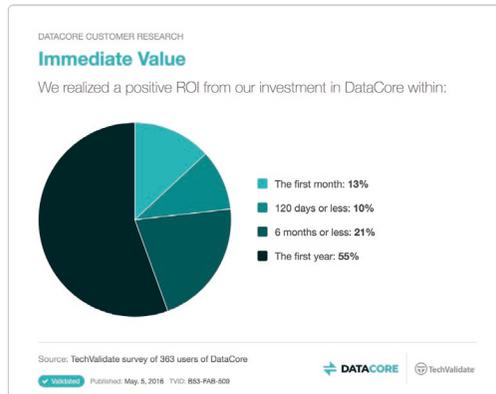
This feature allows IT to define large virtual volumes and assign them to application workloads, without the need to tie-up physical space on disk until it is needed.

- **Deduplication and Compression**

Deduplication and compression are storage efficiency technologies that further increase utilization and reduce the capacity required for a given workload. With DataCore SDS, they are selectable features that IT can choose to utilize for different workloads, and they are implemented as post-process activities, ensuring that the processing required to perform these tasks does not interfere with production application activity.

Bringing it Together to Demonstrate the Economic Impact of DataCore SDS

Each of the strengths described above lead directly to remarkable cost savings across a range of capital and operating costs. Collectively, these savings add up quickly, enabling DataCore SDS to achieve a positive return on investment (ROI) far faster than alternative solutions.



Indeed, a survey of 363 DataCore customers found that over half of them (55%) achieved positive ROI within the first year of deployment, and 21% were able to reach positive ROI in less than 6 months, see chart below.

5. DATACORE SDS TCO SUMMARY

	DATACORE SDS TCO IMPACT
COST OF ACQUISITION - CAPEX	Requires fewer and less costly resources compared to alternatives while addressing the same use cases
	Defers new storage purchases by unlocking stranded capacity from existing resource silos while extending their useful life
	Reduces dependency on premium priced flash through in-memory caching and auto-tiering
	Enhances negotiating positioning when shopping for new technology since storage hardware and suppliers become largely interchangeable
OPEX- DIRECT SPENDING	
HARDWARE AND SOFTWARE MAINTENANCE	Lowers maintenance expenses through use of fewer and less complex hardware components further
DATA CENTER COSTS	Higher resource efficiency reduces power, cooling and space consumption
LABOR	Less time spent managing and troubleshooting storage-related problems
OPEX- INDIRECT SPENDING	
APPLICATION PERFORMANCE IMPROVEMENTS	Faster app performance improves productivity, customer satisfaction and drives down labor costs
DOWNTIME COSTS	Uninterrupted data access can substantially avoid lost revenue, prevent data loss and mitigate risks

The potential economic impact of software defined storage is best understood in the context of the complexity and cost crisis that characterizes most enterprise IT environments today.

The cost savings for each line item in the table above can be quantified, allowing for an overall quantitative analysis of the TCO benefit of DataCore SDS in a given data center scenario. The next section provides guidance for assessing the TCO impact of DataCore SDS in your environment.

6. ASSESSING THE TCO AND ROI BENEFITS OF DATACORE SDS IN YOUR ENVIRONMENT

DataCore SDS customers typically experience significant OPEX and CAPEX savings, yielding a superior TCO:

- Initial acquisition costs will be much less than alternatives, driven by the customer's ability to use lower cost storage at a much lower cost per TB. In addition, less overall capacity is needed, as DataCore SDS increases the overall utilization of resources. Additionally, far less expensive Flash storage will be required as the customer can take advantage of various performance and efficiency capabilities with far less expensive hardware.
- 3-Year Operating costs typically yield even more savings than capital costs, as a result of both significant labor cost reductions for normal operations, and the elimination of downtime that carries a cost of lost productivity for both IT and business resources.

Given many characteristics and variables that are unique to each IT environment, a TCO analysis must be customized, and we encourage you to conduct your own analysis using data about your environment. The table below is offered as a way to approach your analysis. It includes the primary cost drivers that should be included in the calculation of the total cost of ownership over a 3-year horizon. Because the TCO of a given solution is a relative metric that is best viewed in contrast to alternatives, the table is structured to allow for a comparison between DataCore SDS and one or more alternatives. Typically, customers compare the TCO of DataCore SDS to their status quo environment and/or other new solutions that they are considering.

The table below exemplifies a simple way to structure the TCO comparison, by looking at the key cost drivers and comparing the alternatives along each dimension.

	3 Year Cost			
	Legacy Approach	Alternative 2	Alternative 3	DataCore SDS
CAPEX				
Acquisition Cost				
Avg. Annual Capital Expansion cost (yrs 2 and 3)				
OPEX- Direct Costs				
HW and SW Maintenance				
Data Center costs				
Labor				
Total Annual Direct Opex				
OPEX - Indirect Costs				
Application Performance Lags / Throttles				
Application Downtime Costs -- Loss of productivity				
Total Annual Indirect Opex				
3-Year TCO				
Total 3 Year CAPEX				
Total 3 Year OPEX- Direct Costs				
Total 3 Year OPEX- Indirect Costs				
3 Year Total TCO				

TOP 10 REASONS TO ADOPT SOFTWARE-DEFINED STORAGE

DataCore™ White Paper



OPINION

The Top 10 Reasons To Adopt Software-Defined Storage

Learn the Reasons Why 10,000 Customers Have Chosen DataCore Software

1. No Hardware Vendor Lock-In Enables Greater Buying Power

With DataCore, you gain the freedom to buy from any hardware vendor, putting you in a better position to negotiate the best deal and “right sizing” your purchase to buy what you need instead of what just one vendor has to offer. It’s easy to add, replace or migrate across storage platforms with a minimum of IT pain and best of all you can avoid disrupting users and business applications.

2. Future-Proof Your Storage with Software-defined Flexibility; Be Ready for Whatever is Next

A flexible DataCore software defined storage infrastructure lets you bring in new storage and technologies non-disruptively, so you can be ready to integrate whatever comes next. Whether it is incorporating new flash or cloud storage into your infrastructure or gaining the competitive advantage that the next new storage innovation brings, your infrastructure is ready to bring it in and put it to work. On the other hand, hardware vendors have no interest in allowing you to bring in new technology to work with the storage you’ve have already purchased from them. Their reason for being is to sell you, each year, year after year, on ripping and replacing your last purchase from them with the newer model.

3. Get the Most from What You Already Own Before Buying More

Virtualization = Highly Efficient Utilization. Flexible and smart, DataCore virtualization software lets you optimize the utilization of your storage resources, extending the time to hardware refresh. This is another huge advantage over a hardware-defined infrastructure that forces you to over provision, over-size and buy more hardware to meet unknown demands before you have fully utilized what you already have. When you do buy new storage hardware, the DataCore advantage is that there is no waste—so you buy only what you need.

4. New or More Functionality? No Problem

Want auto-failover protection, remote site replication, snapshots, thin provisioning, data mobility or auto-tiering of storage devices? DataCore Storage virtualization software makes it simple to add powerful functionality onto existing or dissimilar hardware.

5. Standardized management that works infrastructure-wide

DataCore’s single interface and its universal set of features and functions minimize training and allow IT to more cost-effectively use and manage storage from a large variety of storage devices.

6. Improve Performance of Critical Applications

Empower your storage to new performance levels. Speed up response times for critical databases, mail servers and other storage intensive workloads. DataCore's selftuning, adaptive caching software leverages available CPU horsepower and commodity DRAM memory technology to dramatically improve performance. Customers regularly report 200-500% performance gains. In addition, the caching software complements the latest technologies like Flash/SSD if needed to attain even higher performance.

7. Protect more critical data and virtual machines without complexity

With DataCore, it is easy to safeguard critical data and VMs at remote sites for reliable and rapid disaster recovery. High-speed, metro-wide mirroring adds a higher level of protection than any single 'box' solution can supply, and DataCore's auto-failover and auto-failback requires no human intervention. . You can also reduce or eliminate traditional data protection backup windows with snapshot and CDP technologies that allow efficient, instant, and consistent backups and restores for virtualized environments.

8. Unique Infrastructure-wide Auto-Tiering Enables Optimal Performance and Cost Efficiency

Unlike those who offer limited tiers between a 2 tier levels within a single vendor's 'box', DataCore

provides fully automated, infrastructure-wide Storage Tiering that spans 15 tier levels across many devices and 'boxes'.. It reduces the time and effort administrators need to spend to optimize and meet SLAs, DataCore allows you to create storage profiles and simple 'set and forget' controls as it automatically optimizes workloads and data to be allocated to the most cost and performance efficient tier of storage available that meet the needs.

9. Protect Investments: Stop the 'Rip & Replace' Cycle

Storage hardware providers want you to constantly buy new models and "Rip and Replace" your storage assets. Feature sets are tied to each model. With DataCore software, you can add features as you need them without having to replace your storage hardware.

10. Proven in thousands of customer sites

Nearly 10,000 customers around the world with over 25,000 licenses deployed have realized the value of DataCore software to empower their storage investments. Check out datacore.com/testimonials to learn why so many businesses are choosing a software-defined future.

WITH DATACORE'S SOLUTION CUSTOMERS REPORT THESE IMPRESSIVE RESULTS:

UP TO

5X

PERFORMANCE INCREASE

UP TO

100%

REDUCTION IN STORAGE-RELATED DOWNTIME

UP TO

50%

COST REDUCTION

0719

REQUEST A DEMO

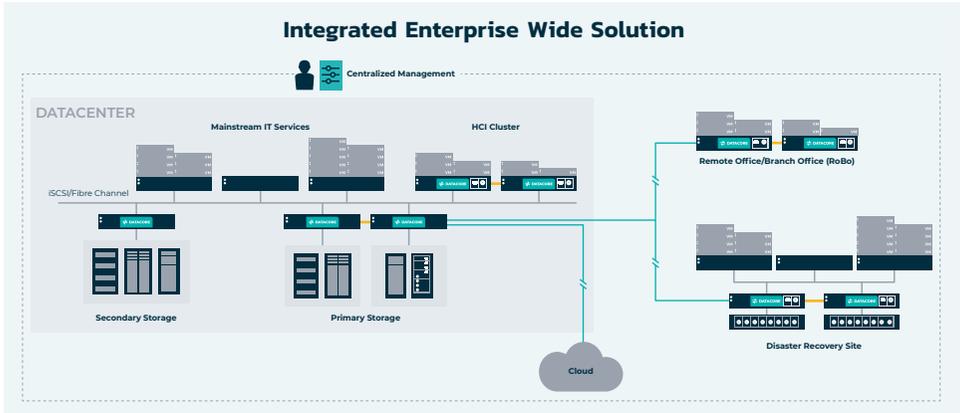
Discover the Ultimate Flexibility of DataCore Software

DataCore software-defined & hyperconverged storage solutions reduce costs, eliminate vendor lock-in, and deliver ultimate flexibility in how organizations manage, build and modernize their storage infrastructures.

See why over 10,000 customers recognize DataCore Software as the most flexible software-defined storage platform and visit www.datacore.com.



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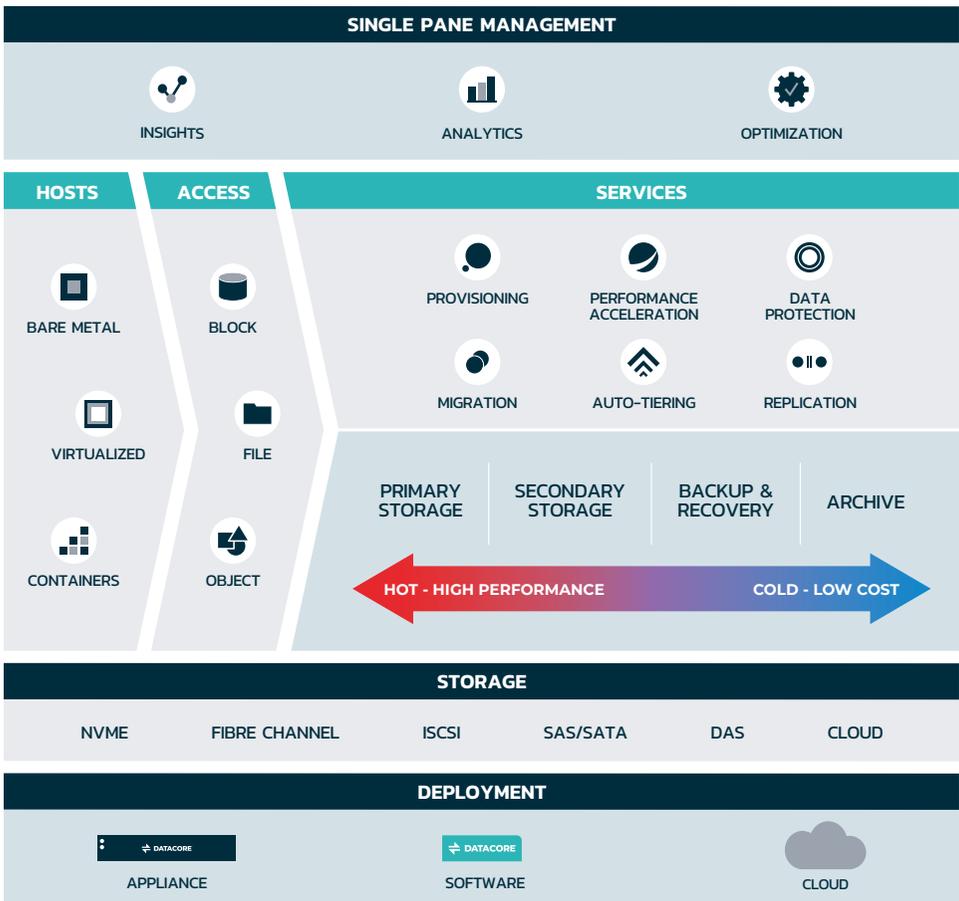


SOFTWARE-DEFINED STORAGE CONTROL PLANE				
CONSUMERS				
PHYSICAL SERVERS	VIRTUAL MACHINES	CONTAINERS		
ACCESS METHODS				
FC	ISCSI	NFS	SMB	
OPERATION & INSIGHTS	DATA SERVICES			COMMAND & CONTROL
PROVISIONING	AUTO-TIERING	QUALITY OF SERVICE (QOS)		REST API
DATA MIGRATION	CACHING	RANDOM WRITE ACCELERATOR		
HISTORICAL / REAL-TIME CHARTS	CONTINUOUS DATA PROTECTION	REPLICATION & SITE RECOVERY		POWERSHELL CMDLETS
HEALTH & PERFORMANCE GRAPHS	DEDUPLICATION/COMPRESSION	SNAPSHOTS		
PROACTIVE ALERTS	ENCRYPTION	STORAGE POOLING		PLUG-INS
PREDICTIVE ANALYTICS	LOAD BALANCING	SYNCHRONOUS MIRRORING		
ORCHESTRATION	PARALLEL I/O	THIN PROVISIONING		CONSOLE USER INTERFACE
STORAGE PROTOCOLS				
NVME	FC	ISCSI	SAS/SATA	CLOUD

DATACORE'S VISION FOR SDS

It is unquestionable that the future of IT is software-defined. Storage has lagged behind compute in this evolution. With the latest technology advancements and market maturity, the time has come for IT to leverage software-defined storage broadly. The power of software-defined storage breaks silos and hardware dependencies, enabling IT to make storage smarter, more effective, and easier to manage.

It is time for IT to realize the promise of software-defined storage: a unified platform to simplify and optimize primary, secondary, and archive storage tiers, managed under a unified predictive analytics dashboard.





The DataCore ONE approach offers a unified model for primary and secondary storage that looks to balance price, performance and system management with the scale-out simplicity of modular, HCI-based storage.

- Steven Hill, Liam Rogers, 451 Research

DataCore, the SANsymphony supplier, has gone supersonic, launching a hyperconverged appliance, cloud-based predictive insights and a subscription licensing scheme.

- Chris Mellor, Blocks & Files

Today, the company is announcing a series of measures designed to highlight its vision of software-defined storage, and how it intends to make DataCore a dominant player in the space.

- Mark Cox, ChannelBuzz

They're serious about pushing toward the future, with the new CEO, new brand, new pricing model and this push to fulfill more of the software-defined stack down the road, adding more long-term archive type storage.

- Jeff Kato, Taneja Group





REQUEST A DEMO

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*The Future of Software-Defined Storage in Data Center, Edge and Hybrid Cloud. Gartner. Julia Palmer. May 3, 2019. ID G00354839

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