



ESG BRIEF

Software-defined Architecture—The Foundation of IT Infrastructure Transformation

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ABSTRACT: Software-defined storage promised freedom from hardware lock-in. It has delivered, in part, on that promise. However, procuring enterprise storage technology as software separate from hardware creates new complexities. When IT organizations are aiming to add infrastructure agility and flexibility, the architecture becomes more important than the delivery model. Solutions featuring a software-defined architecture will provide the greatest value, whether they are deployed and delivered as software, as an array, as hyperconverged infrastructure, or as something else.

Overview

Software-defined storage (SDS) emerged in the industry poised to replace the traditional storage array. It was intended to appeal to IT organizations that are tired of data silos and tired of being forced to migrate all their data off of an old array when new hardware became available or when the warranty was up. Also, the increased freedom to choose hardware offered a potential opportunity for IT organizations to reduce their hardware costs.

As SDS adoption has grown, however, IT organizations have found both new benefits and new complexities. A nontrivial level of work is involved in ensuring that hardware is validated and optimized for the storage software, and that the solution stays optimized and validated over its lifetime. Storage administrators need low-touch, or ideally, no-touch, levels of management for their storage solutions. Combining multiple separate pieces of storage technology (e.g., software and hardware) and then ensuring that those pieces continue to work together is the opposite of low touch.

While “software” is a central element of SDS, reaping the benefits of SDS does not require the storage technology to be actually delivered as software. What matters is whether the architecture of the storage solution is designed to be software-defined, or in other words, hardware-agnostic. When seeking to modernize their IT infrastructure, organizations shouldn’t get hung up on ensuring their SDS solution is delivered as software. Rather, they should choose the storage option that delivers the optimal mix of agility, flexibility, simplicity, performance, and capability. That might mean storage technology as software, but it also might not.

Why IT Needs to Shift from Seeking SDS to Focusing on Software-defined Architecture

Modern IT organizations are being required to become the digital leaders of their businesses. Right now, however, only 6% of the line-of-business executives ESG surveyed reported viewing their company’s IT group as a competitive facilitator/differentiator for the business, and 25% actually said that they regard IT as a business *inhibitor*. Among executives who believe IT inhibits business success, 43% say it’s because IT services take too long to deploy.¹ In order to

¹ Source: ESG Master Survey Results, [2019 Technology Spending Intentions Survey](#), March 2019.

expedite service delivery and become the differentiator the business needs, IT needs more flexible infrastructure technologies, including storage with software-defined attributes.

COVID-19 Has Increased the Demand for Data Center Flexibility

This need for flexible storage infrastructure has increased in recent months, with the COVID-19 pandemic radically altering businesses worldwide. For IT organizations, COVID-19 introduces a new risk factor that must be accounted for and mitigated. To better understand the impacts of COVID-19 on IT, ESG conducted a research study of 500 senior IT decision makers employed at organizations with more than 100 employees across a wide variety of industries. Among the findings, IT decision makers are prioritizing flexible IT infrastructure solutions that are better able to adjust to major shifts in digital demand. Consider, when IT decision makers were asked to identify the future actions that they believe their organization will take based on COVID-19, 38% identified implementing a software-defined data center strategy to better share, abstract, and automate infrastructure.²

Risks Integrating Storage Software and Hardware

As business pressures increase, IT organizations do not need to add new responsibilities that involve ensuring that storage software and hardware will work together. The goal of IT infrastructure innovation should be to reduce burdens on administrators, not create new ones.

Over time, however, component firmware revisions change, and new options emerge, which results in extra management time and increased risk. When things don't work right, finger pointing often occurs between vendors. Though hardware may be classified as "industry-standard," different systems are typically not interchangeable, causing issues, when they occur, to be significant.

Some businesses may willingly sign up for this level of responsibility; for others, it is simply too much work. In other words, instead of just looking for software-defined *storage*, organizations should broaden their searches to focus on solutions with software-defined *architectures*.

What Defines a Software-defined Architecture?

Multiple storage solutions, whether delivered as software, arrays, hyperconverged infrastructure (HCI), or cloud services, have adopted a software-defined design. This design philosophy allows for the resulting solutions to deliver the benefits of SDS, while offering a deployment model that can be tailored for the environment, resulting in a simpler solution. Storage technologies with a software-defined architecture include SDS, but the definition is not limited to SDS solutions. Essentially, storage technologies with a software-defined architecture deliver all of the following benefits:

- **Flexibility of storage media:** This is simple. If your data set requires higher-capacity, lower-cost storage and you don't require low-latency performance, then an option such as HDDs should be available. If you need low-latency performance, then flash storage is an option. These capabilities should be available within the same solution. In other words, if you want to use flash or disk storage, then you should not have to purchase a separate silo. Technologies with a software-defined architecture should also be able to incorporate emerging media types, such as storage class memory, as they become available. The goal should be to leverage the right media types for your workloads without needing separate systems or silos.

² Source: ESG Master Survey Results, [Technology Impact of COVID-19: IT Decision Maker \(ITDM\) View](#), May 2020.

- **Flexibility in hardware generation:** While some traditional storage systems do offer storage media flexibility, hardware generation flexibility, such as the ability to seamlessly mix and match hardware generations, is found almost exclusively in solutions with software-defined architectures. Being forced to migrate data from one generation of hardware to the next is essentially the definition of the traditional storage silo. Technologies with a software-defined architecture, in contrast, allow the storage solution to either integrate with or transition to the latest generation technology seamlessly and invisibly to applications. Here, latest-generation technology extends beyond media to include processor and memory (the technology often associated with the storage controller). The goal is that, unless you decide to switch vendors, the application(s) that the storage supports should never have to be disrupted by a migration again.
- **Flexibility of deployment location:** Adoption of public cloud services has led to hybrid cloud IT becoming the de facto standard for IT infrastructure. Storage systems that feature a software-defined architecture need to be able to span both on-premises data centers and public cloud infrastructures. That's because isolating data in one location, even if the solution being used offers media and generational flexibility, still creates a silo that ultimately hinders the business. Simplifying hybrid cloud environments is one of the top five most commonly identified benefits of SDS.³ For any other software-defined architecture to offer the same value, it must also provide simplicity in where it will be deployed.

Architecture versus Deployment Model

One key difference between systems with a software-defined architecture and SDS is that, in order to be defined as having a “software-defined architecture,” these solutions are *not* required to deliver complete freedom of choice when it comes to hardware vendors. Some may argue that systems with a software-defined architecture do not provide the same potential cost savings as SDS. I argue that, with hardware, there is often little difference in price between vendors (assuming the components are the same) and that the simplicity-related benefits easily outweigh any delta in the purchase price. Hardware vendor choice, though, would be a benefit of selecting a software deployment model.

Solutions that have a software-defined architecture, then, may offer one or more deployment models and can be procured as software, as an array, as hyperconverged infrastructure, and/or as a public cloud service. The deployment model selected should be based on specific need. Do you already own hardware you want to use? Then procuring the technology as software might be the right option. Do you have workloads in the cloud? Then selecting storage technology on a public cloud service might be the best option. Is this for a data center environment? Then an array or hyperconverged option might be the best deployment model for your organization. It is the architecture that matters; the deployment model should be based on what will best help to accelerate business responsiveness in a digital economy.

Can Storage with a Software-defined Architecture Deliver on the Promise of SDS

In a recent research study, ESG asked IT decision makers who were using or evaluating SDS technology to identify what benefits they realized or expected to realize from leveraging SDS. Among the top five most common benefits reported were capabilities in line with those one would expect from a technology that promises greater infrastructure flexibility (see Figure 1).⁴

For instance, by using a technology designed to be software-first, an organization can simplify a hybrid cloud environment by implementing the same technology both on- and off-premises. This same flexibility also makes it easier to select the

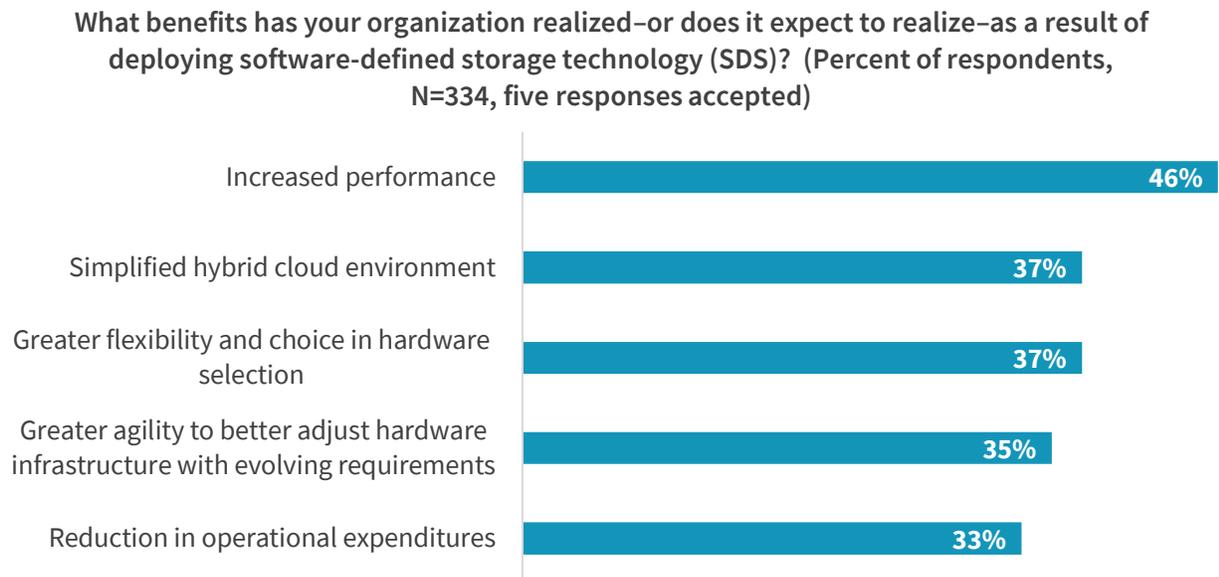
³ Source: ESG Master Survey Results, [2019 Data Storage Trends](#), November 2019.

⁴ Source: ESG Master Survey Results, [2019 Data Storage Trends](#), November 2019.

right hardware, and then adjust that hardware when demands change. That capability subsequently can simplify IT management, which in turn will help reduce operating expenses.

Somewhat surprisingly, however, increased performance was the most commonly identified benefit, surprising given that performance is often determined mainly by hardware. With its ability to offer greater freedom in the choice of hardware, SDS could support performance improvements, as high-performance components could be more easily integrated into the system.

Figure 1. Top Five Realized/Expected Benefits of SDS



Source: Enterprise Strategy Group

The benefits identified in Figure 1 are highly valuable, but each of these benefits are also delivered by solutions that fall under the definition of those storage solutions leveraging a software-defined architecture. Given the increasing demands from line-of-business groups and the pressure to become the competitive differentiator the business needs, IT does not need to add new responsibilities that involve ensuring that storage software and hardware will work together. The goal of IT infrastructure innovation should be to reduce burdens on administrators, not create new ones.

The Bigger Truth

With a wealth of new technology always emerging from an increasingly diverse variety of IT vendors, it is difficult to stay on top of everything. The business needs its IT leaders to empower the business digitally. This takes time and effort.

Freeing valuable administrator time from the day-to-day minutia of IT infrastructure management is one way to balance the increase in workload. This definition of software-defined architecture can help you differentiate progressive, innovative storage technology providers from their more traditional counterparts, while providing a distinction between what provides the value—the architecture—and what can be adjusted to suit your needs—the deployment model.



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