

SDS: Data Plane versus Control Plane

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Abstract: Excitement over software-defined storage (SDS) technology has created an interesting side effect; the term has been used so often and for such a wide variety of solutions that this enthusiasm has also led to confusion. Currently, the term SDS can refer to a myriad of different product types, each with its own set of benefits and considerations. While some storage vendors and industry experts have tried to define what SDS is, or more often what it isn't, the fact is that many of the solutions leveraging the SDS qualifier offer value, albeit in different ways. This brief offers a primer for how to think about SDS and evaluate the various solutions.

What Is SDS?

So what is SDS? Currently, the term refers to multiple product types, each with its own set of benefits and considerations. Solutions that leverage the SDS moniker target essentially every type of application workload, from high-performance transactional applications to long-term cold archives. Some SDS solutions endeavor to replace traditional storage systems while other solutions augment them. Despite the various definitions, the industry is starting to come to a consensus that SDS solutions share these two traits:

- **Storage software that is decoupled from the hardware:** There is a general industry consensus that SDS refers to storage technology that is architected as software decoupled from the hardware. It may, however, be procured with hardware as an integrated solution—the key distinction is in the architecture.
- **Software that is leveragable on hardware procured independently:** Often the hardware is referred to as “commodity” and tends to take the form of industry-standard server systems. While common, the ability to be run on industry-standard systems is not a prerequisite for SDS. For example, some SDS solutions run on public cloud infrastructure. In addition, some hardware component manufacturers have started to release products that are optimized to support SDS environments but that may not be classified as industry-standard.

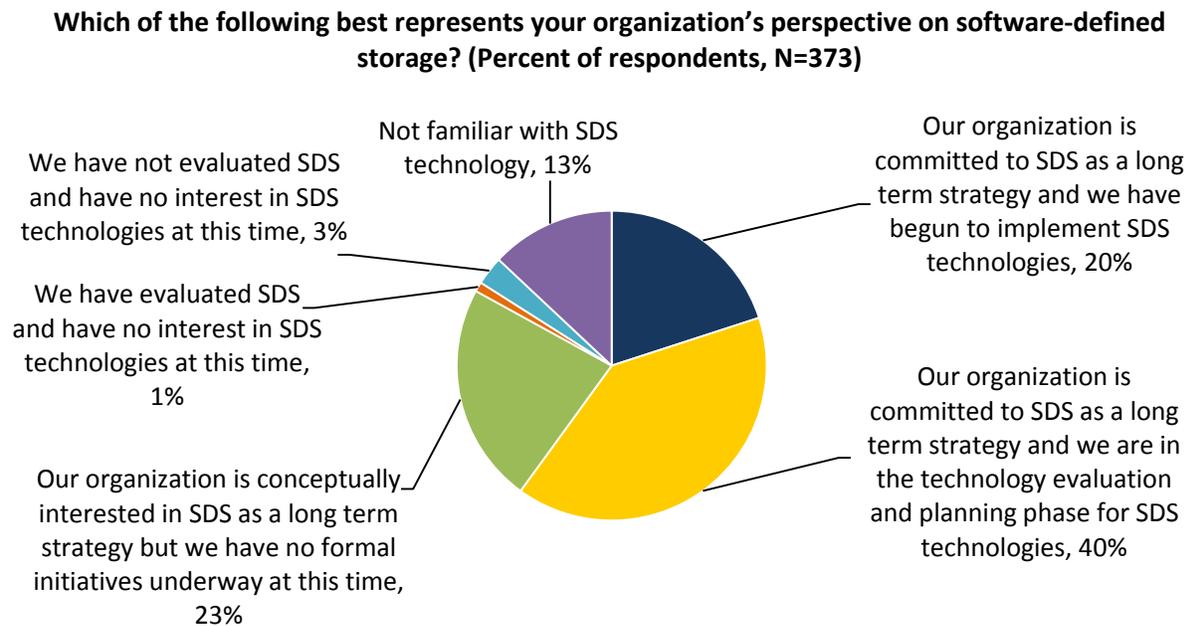
While the industry is trending toward some general agreement on the definition of SDS, the capabilities and benefits that it provides can vary based on the vendor and the solution. Despite this variation, ESG's research has revealed that the industry is currently enamored of the potential benefits that SDS can provide.

What Can SDS Do?

In order to assess the current state and future direction of the data storage technology market, in 2015, ESG surveyed 373 North American-based IT and data storage professionals representing midmarket (100 to 999 employees) and enterprise-

class (1,000 employees or more) organizations. As part of the survey, respondents were asked about their organizations' plans for SDS, which ESG defined as the abstraction of storage features and functionality from physical arrays to a centralized software layer. Despite the confusion surrounding the definition of SDS, the interest in SDS technology among survey participants was dramatic. A combined 60% of respondent organizations reported being committed to SDS as a long-term strategy, with one in five respondent organizations having actually begun their implementations (see Figure 1).¹

FIGURE 1. Organization's Perspective on Software-defined Storage



Source: Enterprise Strategy Group, 2016

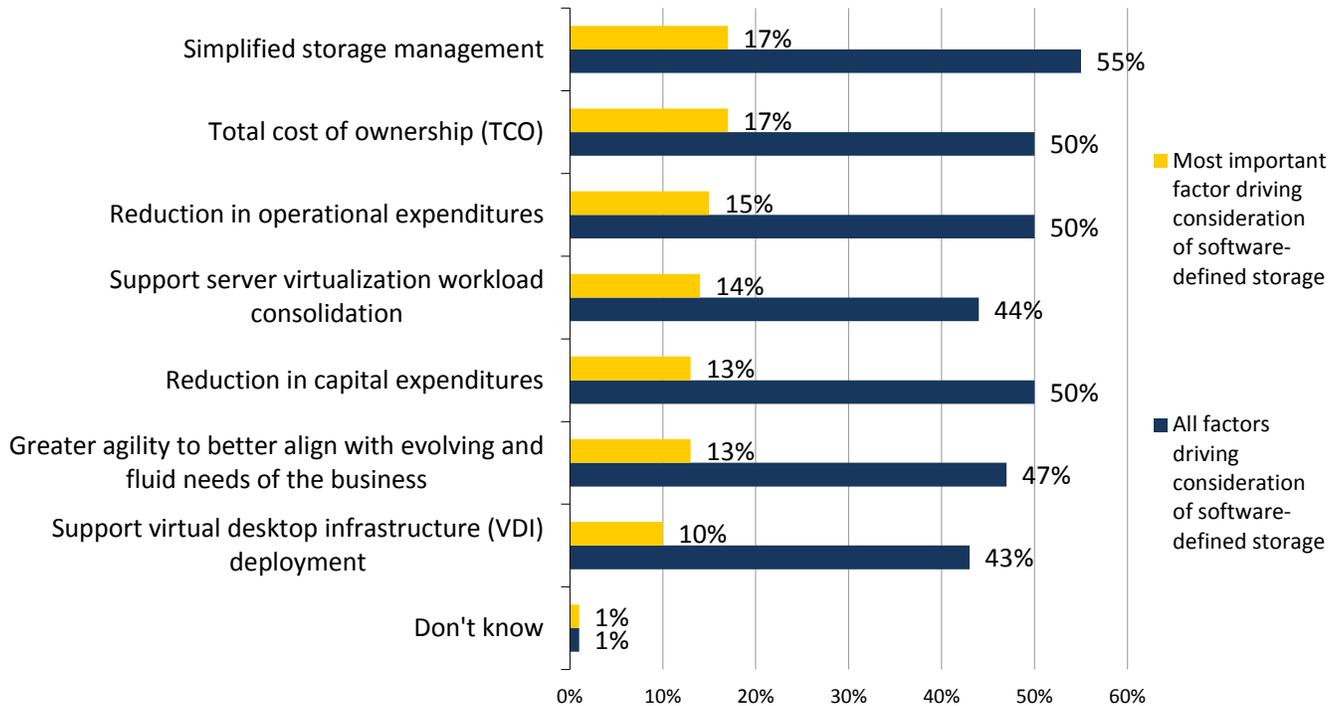
When study participants were asked to identify the drivers for consideration of SDS technology, more than half (55%) of current and potential users identified simplified storage management as a factor in the decision to consider SDS (see Figure 2). There is, however, also a clear economic element to SDS as evidenced by the fact that nearly half (a combined 45%) of current and potential users cited total cost of ownership (TCO) (17%), reduced operational expenses (15%), or reduced capital expenses (13%) as the most important factor driving SDS consideration at their organizations.² This seems to indicate that the technical understanding of the potential benefits of SDS is in the process of evolving. When the concept of software-defined technology was initially introduced, the conversation was often dominated by the potential reduction in capital expenditures through the usage of commodity hardware. However, this data shows that a greater number of respondents are focused on simplified storage management and the accompanying economic benefits in the form of TCO and/or reduced operational expenses.

¹ Source: ESG Research Report, [2015 Data Storage Market Trends](#), October 2015.

² *ibid.*

FIGURE 2. Factors Responsible for Consideration of Software-defined Storage

To the best of your knowledge, which of the following factors are responsible for your organization’s consideration of software-defined storage? (Percent of respondents, N=307)



Source: Enterprise Strategy Group, 2016

These benefits offer IT organizations a much needed opportunity to escape the confines of the more traditional storage silos that still comprise much of the enterprise storage landscape. The term SDS, however, covers a broad range of technologies, and the benefits achieved can vary based on the type of solution. Prior to evaluating an SDS technology, it is important to understand how SDS fits into the existing storage landscape and the differences between the SDS options. There has been commentary throughout the industry claiming SDS as a new storage market. That is simply not accurate. Technologies under the SDS umbrella cover a wide range of storage, workload, and customer types. SDS solutions compete against traditional storage solutions as often or more often than they compete against other SDS solutions. SDS is more accurately a new delivery mechanism of storage technology seeking to disrupt a wide range of storage types, including block, file, and object. It is this breadth of the SDS solution landscape that can make evaluating solutions so difficult. A helpful method to better understand the specific benefits of an SDS solution is to classify it into one of a couple of different categories.

The Data Plane and the Control Plane

A couple of terms commonly used throughout the industry to describe the differences between SDS solutions are “data plane” and “control plane.” Rather than attempting to redefine industry terminology, it may be more beneficial to simply leverage the existing vernacular. The use of “planes” as a term is commonly attributed to the networking industry and has been recently adopted to help better define SDS. However, as with many things that have been recently adopted, data plane and control plane also have differing definitions based on which vendor is doing the talking. While different definitions of these planes exist, the following section presents a guideline for using these terms to better understand the SDS landscape.

Control-plane SDS Technologies Focus on How the Storage Resource Is Managed

Solutions that fall into the control-plane category do not seek to replace a traditional SAN or NAS arrays. Rather, they seek to ease the management or orchestration of these systems.

- These solutions often enable heterogeneous storage platforms to be combined and presented as a single storage pool.
- These solutions are often designed to make it easier to manage data and migrate across media types, including public cloud services, and can include functionality such as multi-tenancy and chargeback.
- These solutions also can offer orchestration-level benefits and are able to tie storage resources directly to application deployments for superior manageability.

Data-plane SDS Solutions Focus on How the Storage Resource Is Accessed

Solutions that fall into this category are intended to provide the capabilities available from a traditional storage system.

- The storage architecture may be block, file, or object, and may offer a combination of protocols.
- These solutions may be deployed in hyperscale fashion as a scale-out external storage solution, or in a hyperconverged fashion for a hyperconverged infrastructure deployment.
- These solutions offer storage capabilities found in traditional storage arrays including, but not limited to, high availability and the ability to recover from a hardware component failure while leveraging the internal storage located inside the industry-standard, often server, hardware.
- When coupled with industry-standard hardware procured from a third party, these SDS solutions are designed to eliminate the need for a traditional SAN or NAS array.

While multiple solutions exist that combine some level of data-plane and control-plane elements, the benefits SDS solutions provide can vary depending on whether the solution intends to replace a traditional storage array or virtualize it. Regardless of the architecture type, SDS is seeing strong interest across the industry.

The Bigger Truth

The storage industry is in the middle of a massive upheaval. New technologies, such as SDS, are disrupting the way IT organizations procure, deploy, and manage storage. When considering SDS, it is important to remember to think of it as a deployment model rather than its own segment of the storage market. There is an SDS option that addresses almost every enterprise storage data type whether it is block, file, or object-based. ESG research has revealed the potential of SDS to deliver greater simplicity and much needed TCO savings. For the categories outlined in this paper, both data-plane and control-plane solutions deliver value to IT organizations. Control-plane solutions tend to focus more on reducing the cost of operations and simplifying management and orchestration, while data-plane solutions tend to focus on reducing the capital cost of storage while reducing hardware “lock-in” by easing the integration of new technologies to the storage pool. It is these benefits that may one day lead SDS to become the standard in how storage technology is procured and deployed.

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