MSys Technologies

Expanding Horizons

AN MSYS TECHNOLOGIES WHITEPAPER

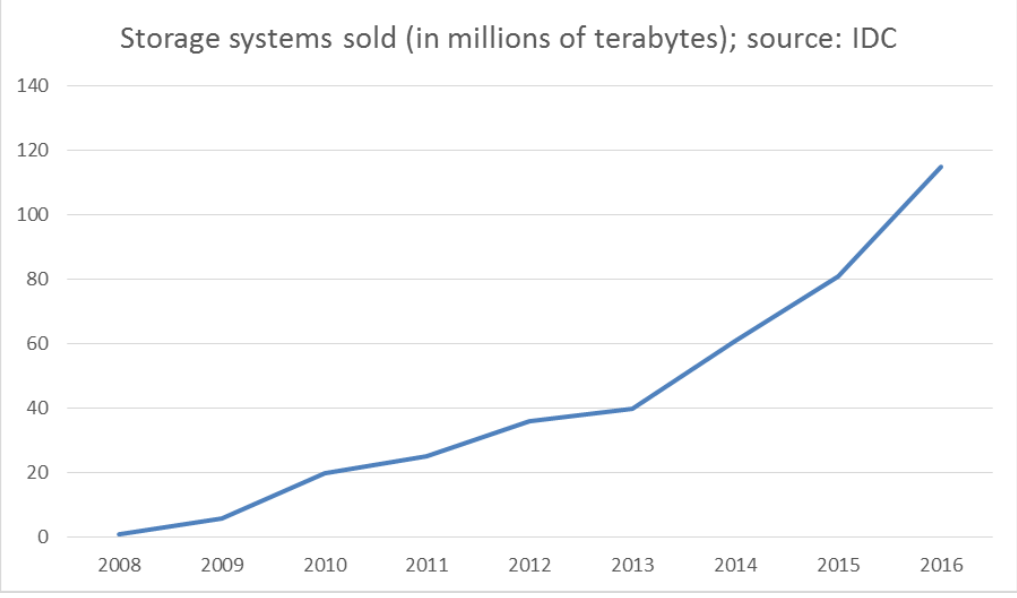
Software-Defined Storage Technology Architecture & Characteristics

Introduction to SDS

As more and more companies move digital, the demand for storage systems rises exponentially. As of 2014, around 60 million terabytes of storage systems have been sold, according to IDC.

Traditionally, enterprise storage systems depended on hardware to manage major operational aspects such as backup, archiving, disaster recovery, and high availability. For this, however, the enterprise requires to ensure that the hardware storage system has the homogeneity to work closely with the server environments and system software.

Today's enterprises are all about capturing and storing ever-increasing sea of information, which drives the need for high-tech storage architectures. For most today, software-defined storage may be a highly intuitive concept, the most important part of a virtualized software-defined data center (SDDC). SDDC involves virtualized SDS appliances, automated management, virtualized computing environment for all apps, and virtualized network for speed and efficiency.



In the recent times, industry experts realized the inefficiency of this hardware-driven approach. The unavailability of specific type of hardware for storage may be one reason behind this. But the idea of managing all kinds of storage hardware from one location using only the software was intriguing to many. This spawned the idea of software-defined storage. In this model, the entire storage infrastructure is automated and centrally managed by a smart piece of software, ensuring the pooled storage hardware resources are properly allocated based on application requirements.

With the help of SDS, enterprises can now go heterogeneous with storage hardware. They don't have to depend completely on SSD, NAS, or SAN for their requirements. They can have a mix of all different kinds of storage hardware and architectures, and SDS can ensure the entire management part.

Software-Defined Data Center (SDDC)

Traditional data centers have thousands of applications running in a heterogeneous hardware environment. They have multiple management tools, frequent application patching, complex workloads, and a multitude of software architectures. On the other hand, making the data center software-defined creates huge advantages for the enterprise. Homogeneous hardware environment, simple workloads, and minimal application maintenance activities can be achieved from a software-defined data center.

The key component of an SDDC is an SDS infrastructure. Modern enterprise storage systems offer highly improved storage capabilities. They can store, manage, and protect data with industry-standard backup and disaster recovery tools built in. However, they can be highly heterogeneous as different storage systems can have different capabilities, management models, and poor knowledge of application requirements, challenging the interoperability needs of the enterprise.

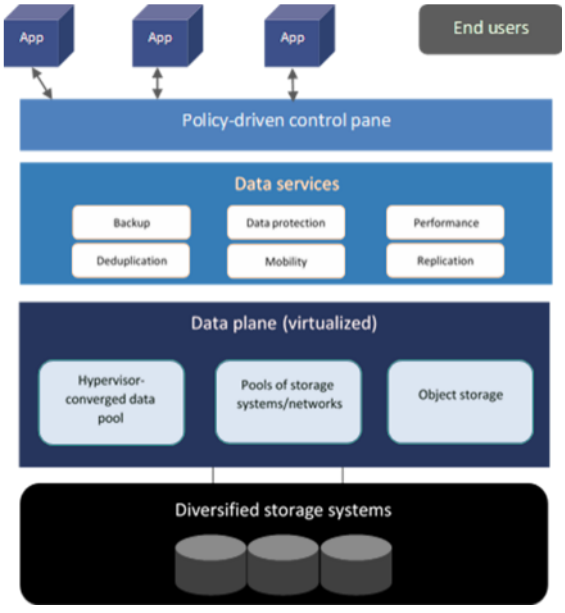
Broadly speaking, the enterprise storage systems sold today are detached from high-level application-specific services. When it comes to software-defined storage environment, a dynamic combination of storage services, aligned on application specifics and defined by policies, is implemented for better management.

The Components of a Software-Defined Storage System

Software-defined storage architectures defined by different companies follow different approaches. However, there are some critical components common in all architectures, although named differently by different providers. The components are as follows:

- A control plane that is defined by storage policies
- A data service
- A data plane

These three layers abstract the entire storage systems from to the end users. The general architecture of an SDS system will look like this:



1. The Control Pane

The control plane is what you see in a software-defined storage model. This is the primary interface that communicates with the applications and end users. In a virtualized environment, the applications may reside in a virtual machine or may be virtualized by other means.

The policies depend on the applications and application containers (VMs). The control plane, based on these policies, drives the composition of storage services. It also monitors the delivery from these storage services. The settings of the policies and the control plane are visible to specific IT roles, such as administrators, business operators, etc. This differs from regular storage systems in that the regular systems have independent management tools.

2. Data Services

The data service plane does all the mission-critical jobs of a storage system, such as cloning, encryption, backup, disaster recovery, mobility, performance, encryption, replication, etc. In essence, the data services plane encapsulates the entire intelligence of a storage system. The data services can be set up according to the type of application that interacts with the storage system. The data services are isolated from the underlying storage medium, making them virtual data services.

3. Data Plane

The data plane stores and retrieves the data as per application requirements. In SDS model, the data plane itself is virtualized. The data plane may contain a heterogeneous storage environment with different capabilities. All of these capabilities should be properly available at the control plane.

Critical Properties of SDS

As the major component of SDDC, SDS should have several attributes, as defined here.

1. Hardware independence: The SDS storage systems should be capable of running on any type of hardware independently. This allows redeployment of legacy storage systems and reuse of older equipment. It also enables enterprises to efficiently use the new components and technologies of their storage systems.

2. Virtual machine agnosticism: The SDS system depends on a hypervisor to deliver its key aspects. However, an enterprise cannot be dependent on a particular virtual machine for a long time. The SDS system should have a proper abstraction system that ensures that the system is agnostic of the hypervisor being used.

3. Scalability in data services: Capacity growth is an essential aspect of any organization, as the requirements grow and the organization grows in terms of revenue and business models. Isolated silos of storage without the fundamental interaction between each other is not in the best interest of any organization. SDS architecture should be able to provide infinite scalability in data services.

Conclusion

Data storage systems are changing radically today, and SDS is at the very helm of this drastic movement. Storage virtualization, the use of virtualization to provide better functionality and advanced features in storage systems, is the basic building block of software-defined storage. In this, the amalgamation of multiple storage systems to appear as a virtualized, single storage unit happens. This is essentially what SDS is all about. Also, in this simple front-end view, everything is better managed.

About MSys

MSys Technologies delivers solutions in Datacenter domains such as Storage, Virtualization, Cloud, Networking, UX/UI engineering, and FinTech. MSys' gamut of service offerings spans across Product Engineering, DevOps, Maintenance and Support, Predictive Analytics and Test Automation. MSys is based out of Chennai, India, and Alpharetta in Georgia, USA. The company also maintains offices in Vietnam, and in the Indian IT cities of Bangalore and Pune.

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