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Software defined storage in the context of software defined data centers

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SOFTWARE DEFINED STORAGE in the Data Center represents a new evolution in the storage industry that changes how storage will be managed and deployed in the future. SNIA has created a vendor independent industry reference model to help educate end users and to promote adoption and enablement of Software Defined Storage in the context of Software Defined Data Centers.

Software Defined Storage (SDS) is an integral component of the Software Defined Data Center. A Software Defined Data Center (SDDC) includes a virtualized data center with a service management interface. Application requirements determine the service levels provided. More broadly, the DMTF (www.dmtf.org) defines SDDC as "a pool of compute, network, storage and other resources that can be dynamically discovered, provisioned and configured based on workloads. SDDC provides a programmatic abstraction that enables policy-driven orchestration of workloads as well as measurement and management of resources consumed".

More specifically for SDS, the SNIA dictionary defines SDS as virtualized storage with a service management interface. SDS includes pools of storage with data service characteristics that may be applied to meet the requirements specified through the service management interface.

Historically in storage, as in networking, the control plane and the data plane have been intertwined within the traditional storage solutions that are deployed today, making abstraction and virtualization more difficult to manage in complex virtual environments. An SDS environment makes the separation of the control plane and the data plane explicit.

This approach abstracts and simplifies the management of storage into virtual services. It is a building-block approach that uses a consistent API, incorporates data mobility and management automation and includes a self-service interface for users and applications. SDS allows administrators to set policy for managing the storage and data services and includes forms of service level management. At the same time, SDS enables DevOps (best thought of as a role that blends tasks performed by a organisations's application development and systems operations teams) to use a variety of data management tools to communicate their storage requirements through interfaces such as SNIA's Cloud Data Management Interface (CDMI).

As a result, it is much easier and simpler for storage consumers to get the storage they need when they need it.

SNIA's platform independent definition of SDS allows for both proprietary and heterogeneous platform that offers a self-service interface for provisioning and management. Data Services can be executed either in servers, storage appliances, or both, removing the historical boundaries as to where they execute. To manage the resulting diversity, SDS requires a standardized storage management interface, such as SNIA's Storage Management Initiative Specification (SMI-S), in order to automate the management of the storage resources and discovery of their capabilities for use in various pools. It's important to note that SDS is more than storage virtualization. Storage Virtualization provides a capacity pool that can be structured into tiers and presented over an appropriate medium and protocol. Software Defined Storage builds on that foundational storage virtualization to provide several additional capabilities.

- **Automation** – Simplified management that reduces the cost of maintaining the storage infrastructure
- **Standard Interfaces** – APIs for the
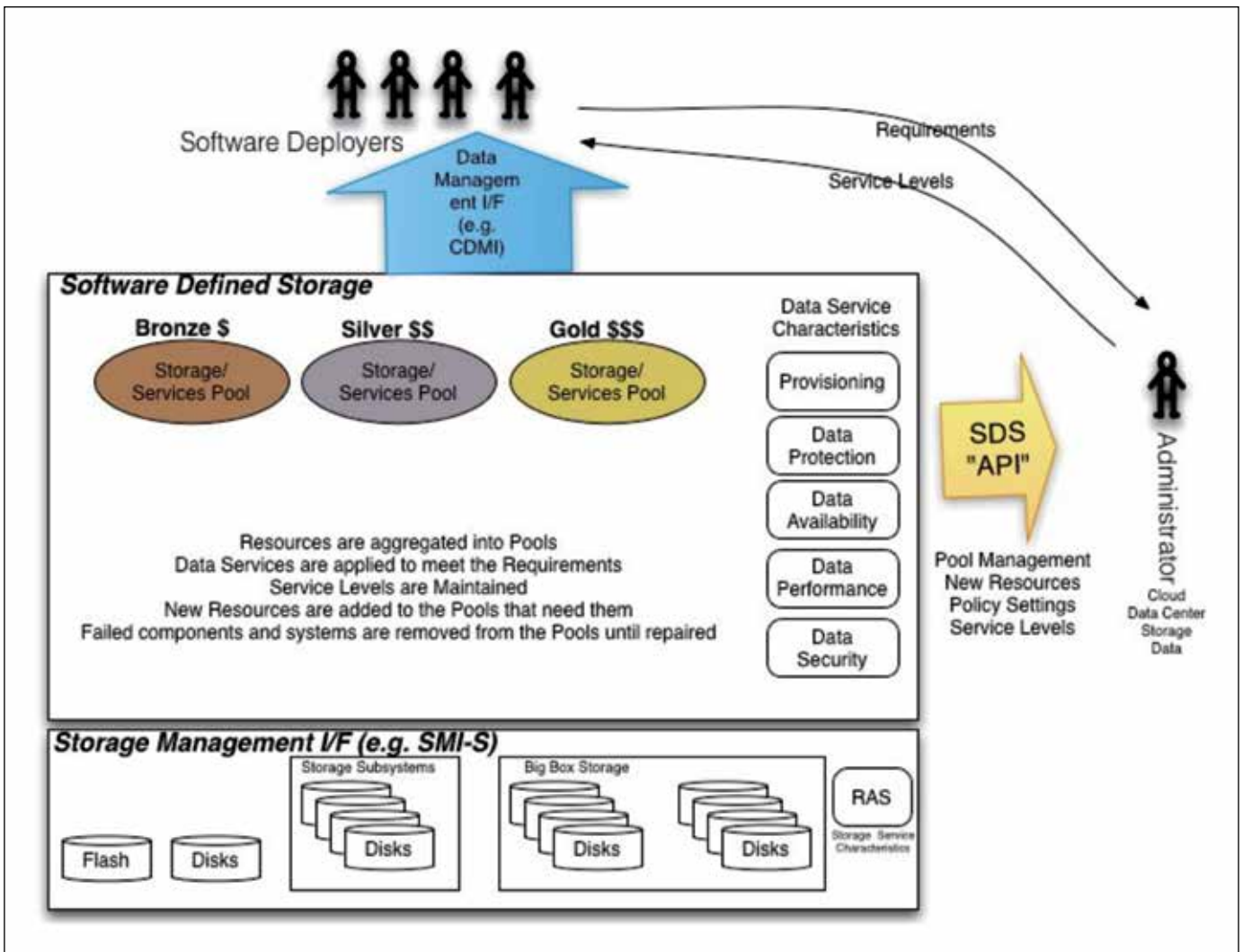
management, provisioning and maintenance of storage devices and services

○ **Virtualized Data Path –** Block, File and/ or 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

○ **Transparency –** The ability for storage consumers to monitor and manage their own storage consumption against available resources and costs.

The above figure illustrates the components of SNIA's SDS reference model. To review and download SNIA's whitepaper that includes a detailed description of this reference model, please visit www.snia.org

Software defined data centers are enabled by many standards from many standards bodies. SNIA's SDS standards, such as

CDMI, LTFS and SMI-S, in combination with other storage, networking and compute standards make software defined data centers possible. For example, SNIA works in close collaboration with the DMTF industry organization and its Open Software Defined Data Center Incubator group to identify standards required to describe the emerging technologies expected to revolutionize the future of the IT infrastructure.

To realize SDS as part of an overall SDDC, data center resources, such as compute, network, and storage, need to be expressed as services. They also need to have certain characteristics, such as multi-tenancy; rapid resource provisioning; elastic scaling; policy-driven resource management; shared infrastructure; instrumentation; and self-service, accounting, and auditing. This ultimately entails a programmable infrastructure that enables valuable resources to be automatically

cataloged, commissioned, decommissioned, repurposed, and repositioned.

In summary, SDS is largely a management component for the data services, storage and hardware infrastructure in either the cloud, or as part of a more traditional data center.

For additional detail on this positioning, please refer to SNIA's Technical Council white paper on Software Defined Storage at www.snia.org We welcome your feedback.

Incorporated in December 1997, SNIA is a non-profit trade association that is committed to leading the storage industry worldwide in developing and promoting standards, technologies, and educational services to empower organizations in the management of information community. The ability to accomplish its goals is directly attributed to the dedication and hard work of hundreds of volunteers from our member companies.