The Meaning and Value of Software Defined Storage

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The SNIA Technical Council is a group of industry experts elected by SNIA members to oversee the technical work of the SNIA. We also sponsor the annual Storage Developers Conference and occasionally produce position papers on current storage architecture topics such as SDS.

The current TC members are Don Deel (chair), Bill Martin (vice chair), Craig Carlson, Mark Carlson, Bruno Guiet, Chin-Fah Heoh, Arnold Jones, Fred Knight, Carlos Pratt, Yukinori Sakashita, Leah Schoeb, Udayan Singh, Dave Thiel, Doug Voigt, Steve Wilson and Alan Yoder
Defining Software Defined Storage (SDS)

SDS is often defined by describing a set of attributes:

- Dis-aggregated
- Policy Based
- Incremental
- Commodity
- Automated
- Pooled
- Self-service
- Service Levels
- Build It Yourself

What is the underlying value of SDS?
How can SDS be structured as an ecosystem to deliver this value?
SDS Value

- Flexible construction of services
- Separation of control and data planes
- Deployment Simplicity
Flexible construction of services

- SDS spans the boundaries between servers and storage
  - Data services can be executed in servers or storage
  - This has potential impacts on security and reliability
SDS Value

» Flexible construction of services
  » SDS spans the boundaries between servers and storage
    › Data services can be executed in servers or storage
    › This has potential impacts on security and reliability

» Separation of control and data planes
  » SDS builds on Virtualization of the Data Path
    › Data Path Virtualization alone is not SDS
SDS Value

❖ Flexible construction of services
  ❖ SDS spans the boundaries between servers and storage
    › Data services can be executed in servers or storage
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❖ Separation of control and data planes
  ❖ SDS builds on Virtualization of the Data Path
    › Data Path Virtualization alone is not SDS

❖ Deployment Simplicity
  ❖ Storage service interface
    › Expresses Requirements for the Cloud/DC/Storage/Data Administrator
    › Receives Service Levels from the Cloud/DC/Storage/Data Administrator
    › Automates the matching of services to requirements
SDS Value Map

- **Flexible construction of services**
  - Works with standard hardware as well as specialized hardware
  - Works with scale out or scale up architectures
  - Enables incremental building of storage/data services solutions

- **Separation of control and data planes**
  - Includes pooling of resources
  - Includes Service Level Management (metadata tagging)
    - Large grain “Labels” for your storage/data containers
    - Fine Grain “Knobs” on individual data objects
  - Enables dis-aggregation of storage and data services

- **Deployment Simplicity**
  - Includes self-service interface that supports provisioning
  - May include policy based management automation
  - Simplifies management of scale
What is needed: Virtualized Data Path

- File, Block, Object
- Without a virtualized data path the “hardware” is defining the storage
What is needed: Management APIs

- Preferably Standardized
- Must be programmatic
- Storage services include capacity, performance, availability, security, data paths
What is needed:
Data Services

- Data services provide containers for files, objects, blocks
- Data services are deployed dynamically
What is needed: Policy Driven Service Levels

- SDS API is used to define service levels
- Metadata is used to match requirements with capabilities
A storage services pool specifies storage that may be used and data services that are applied to meet certain ranges of requirements.

- Requirement granularity depends on implementation: Volume, File, Object, Container.
- Resources are aggregated into pools.
- Data services are added to meet service level requirements.
- New resources are added to pools that need them.
- Failed resources are removed from pools until repaired.
What is needed: Data management API

- Gives SW developers easy access to data services
- Metadata controlled service selection
How are requirements conveyed traditionally?
How are requirements conveyed with SDS?

- Requirements flow through the data storage interface
Control Plane Flow:
Discuss Requirements

Software Defined Storage

- Bronze $:
  - Storage/Services Pool

- Silver $$:
  - Storage/Services Pool

- Gold $$$:
  - Storage/Services Pool

Data Service Characteristics:
- Provisioning
- Data Protection
- Data Availability
- Data Performance
- Data Security

Storage Management I/F (e.g. SMI-S)

- Flash
- Disks

- Big Box Storage
  - Disks

Pool Management
New Resources
Policy Settings
Service Levels

SDS "API"

Administrator
Cloud Data Center
Storage Data

Requirements
Service Levels

Software Deployers
Data Management I/F
(e.g. CDMI)
Control Plane Flow
Define Storage/Services Pools

Software Defined Storage

- **Bronze $**: Storage/Services Pool
- **Silver $$**: Storage/Services Pool
- **Gold $$$**: Storage/Services Pool

Data Service Characteristics
- Provisioning
- Data Protection
- Data Availability
- Data Performance
- Data Security

**SDS "API"**

Storage Management I/F (e.g. SMI-S)
- Flash
- Disks
- Storage Subsystems
- Big Box Storage
- RAS
- Storage Service Characteristics

Requirements
- Service Levels

Administrator
- Cloud Data Center
- Storage Data
- Pool Management
- New Resources
- Policy Settings
- Service Levels

Software Deployers
- Data Management I/F (e.g. CDMI)
Control Plane Flow: Choose Storage/Services Pools
Software Defined Storage

Resources are aggregated into Pools
Data Services are applied to meet the Requirements
Service Levels are Maintained
New Resources are added to the Pools that need them
Failed components and systems are removed from the Pools until repaired

Storage Management I/F (e.g. SMI-S)

- Storage Subsystems
  - Flash
  - Disks

- Big Box Storage
  - Disks
  - Disks

Data Service Characteristics
- Provisioning
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SDS "API"

Pool Management
New Resources
Policy Settings
Service Levels

Administrator
Cloud
Data Center
Storage
Data
Thank You