Cleversafe Overview Presentation

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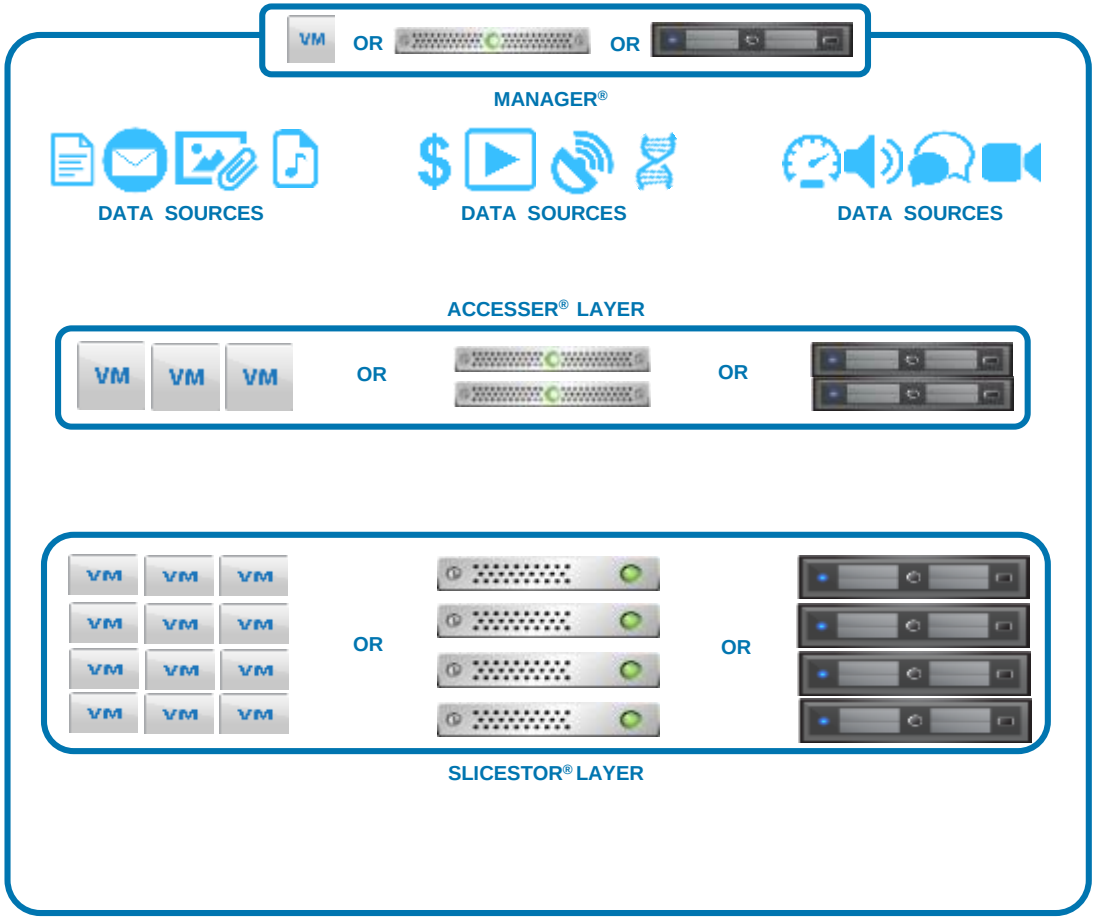
Private cloud built on Cleversafe dsNet®



1 dsNet® Manager Is deployed to configure and manage the infrastructure

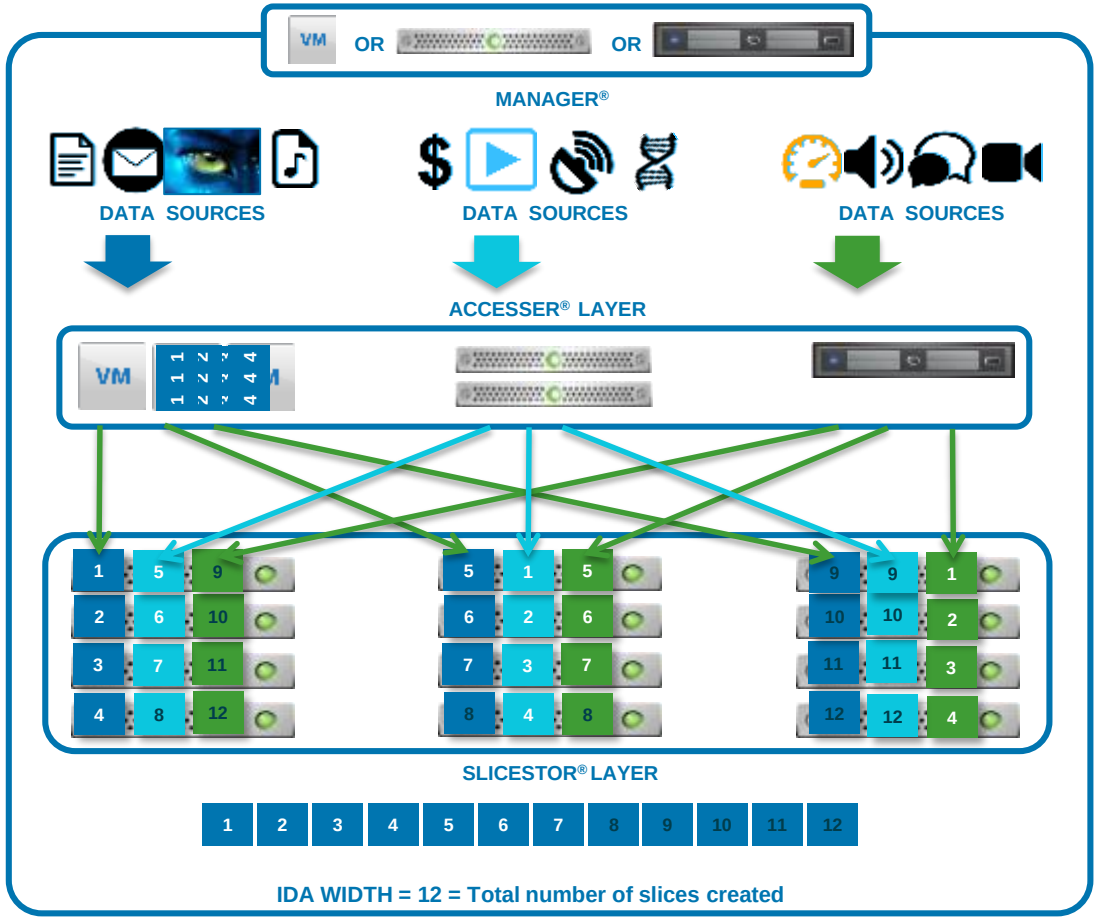
2 Accessers are deployed to access the underlying storage

3 Slicestors are deployed to store data

Software Defined

Information dispersal in Cleversafe dsNet®

Erasure Coding
2005



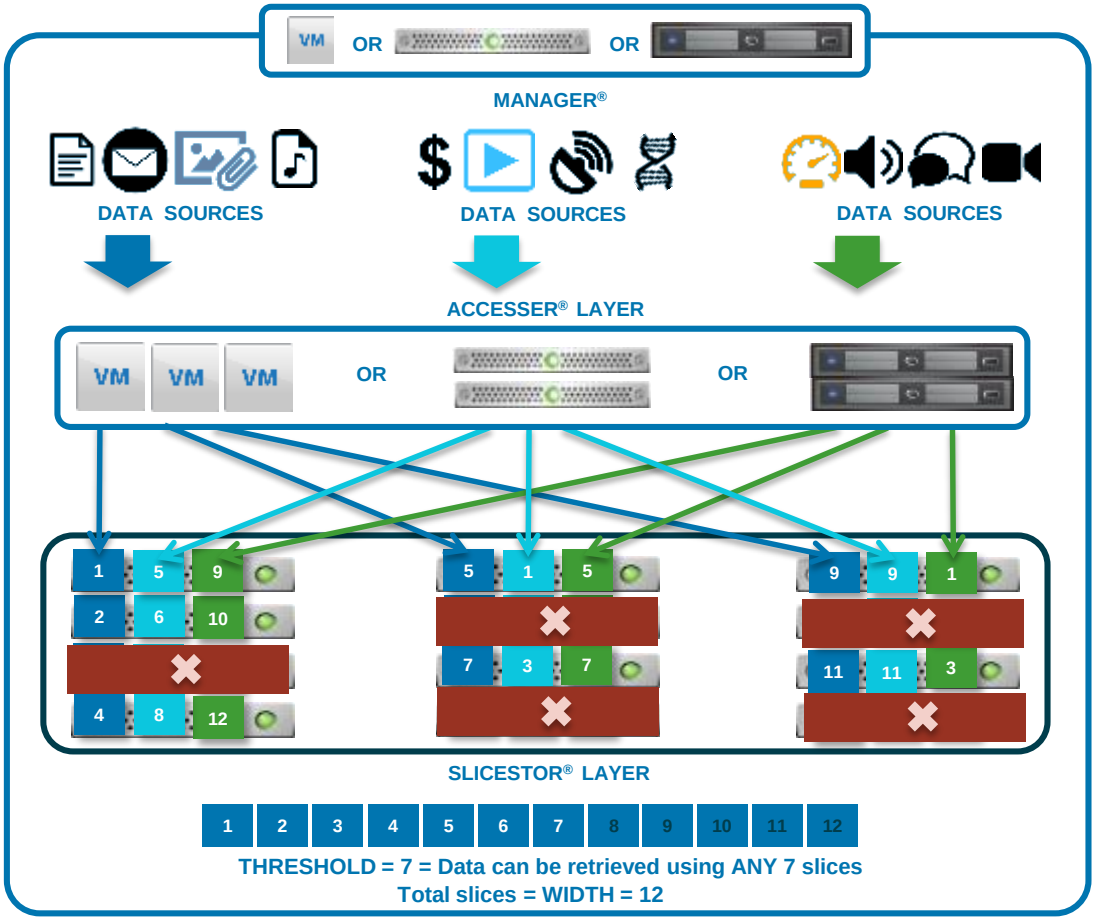
1 Data is encrypted, and sliced using Information Dispersal Algorithms (IDA).

2 Slices are dispersed to separate disks, storage nodes and/or geographic locations.

Software Defined

Private cloud built on Cleversafe dsNet®

Erasure Coding 2005

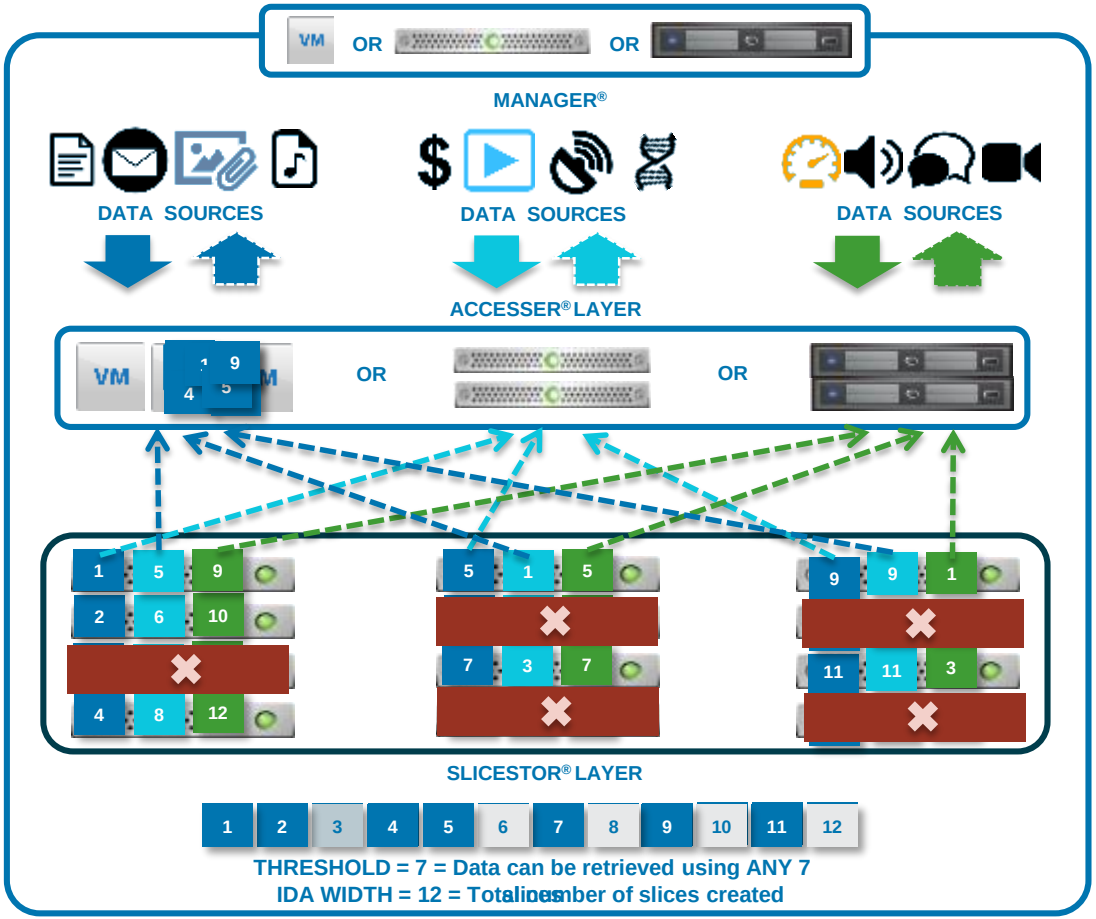


1. Data is encrypted, and sliced using Information Dispersal Algorithms.
2. Slices are dispersed to separate disks, storage nodes an/or geographic locations.
3. dsNet can be configured to handle multiple failure scenarios

Always On

Data retrieval from Cleversafe dsNet®

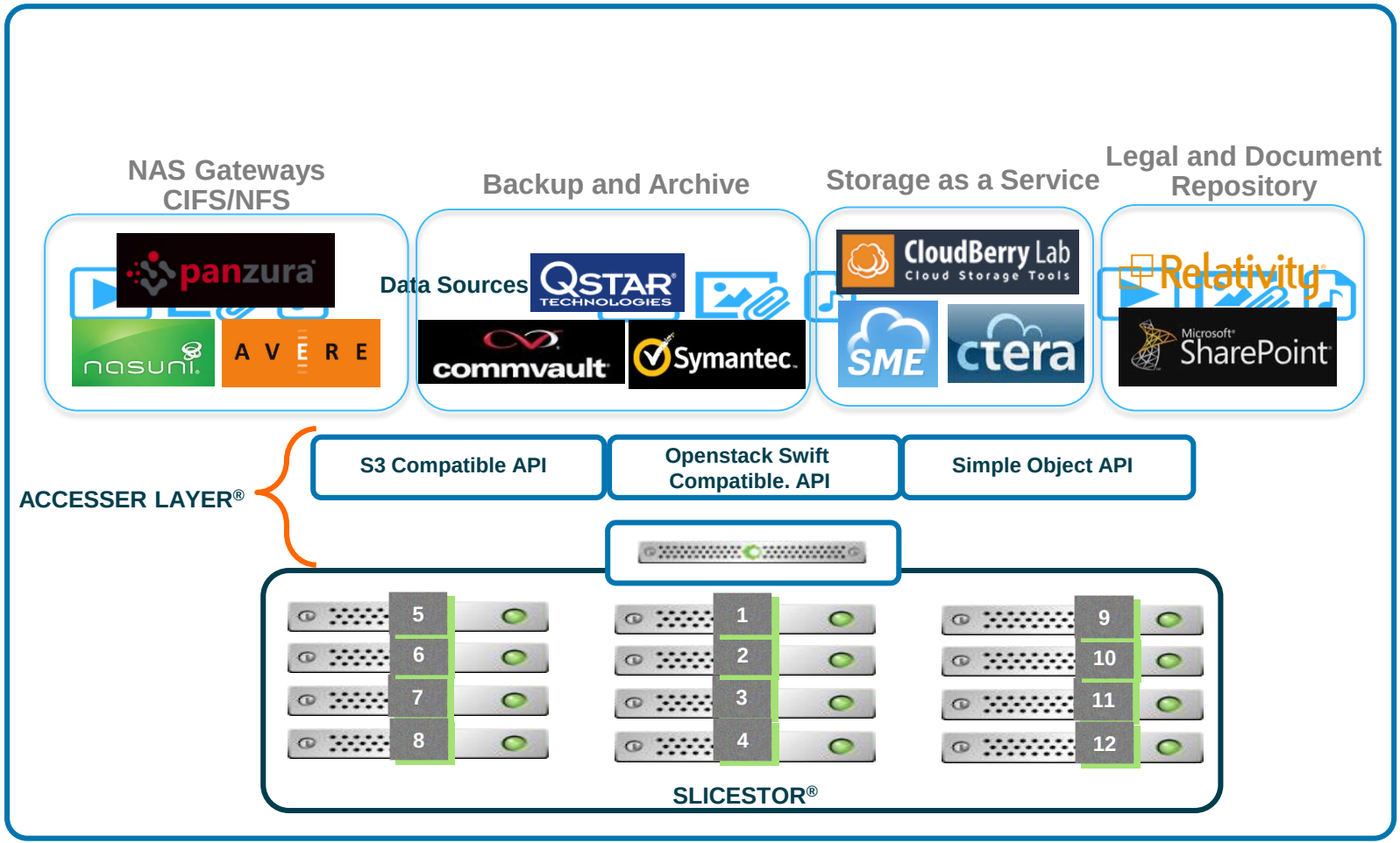
Erasure Coding 2005



1. Data is encrypted, and sliced using Information Dispersal Algorithms.
2. Slices are dispersed to separate disks, storage nodes and geographic locations.
3. In case of failures, real time bit perfect data is retrieved from threshold number of slices.

Always On

Data Access



Gateways can be added to satisfy a variety of use cases

The Accesser exposes 3 REST APIs for ingest and retrieval

dsNet® Technical Capabilities

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Cleversafe Strengths

Scalability – Scale performance and/or capacity at any time with no downtime to operations

Security - Government grade security, no single disk, node or site contains enough information to constitute a data breach. Inherent key management.

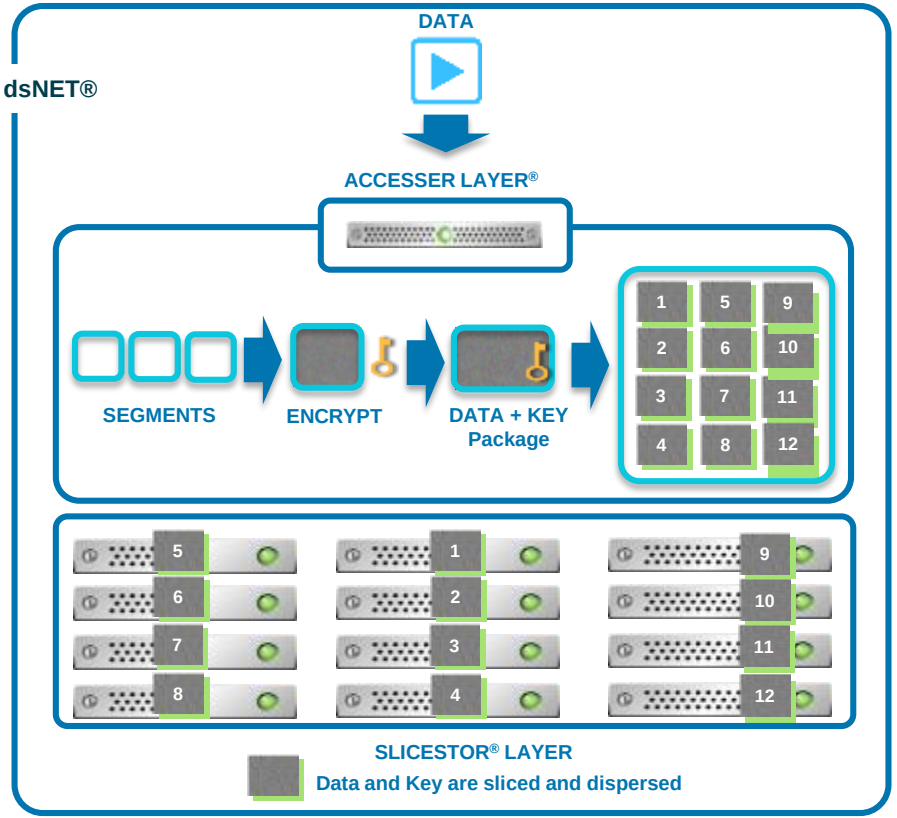
Availability – No downtime during software upgrades, hardware refreshes, and in the face of disk, node, and site failures.

Manageability– No RAID sets or replication schemes to manage. Manage upwards of 25PBs with a single Full Time Employee.

Efficiency – Less raw storage means less power, cooling and floors pace resulting in lowest TCO

SecureSlice™ encoding – data at rest encryption

Software based. No external Key Management required. SecureSlice™ combines All Or Nothing (AONT) encryption with IDA to form a computational secret sharing scheme.

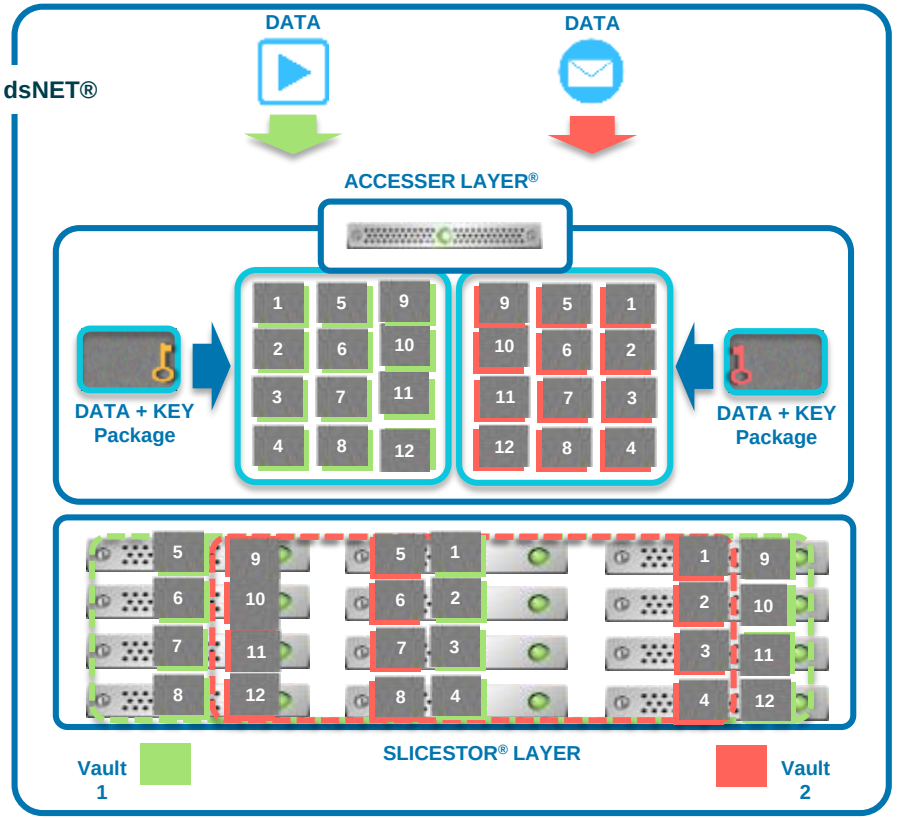


1. Large data files ingested into dsNet are first sliced into segments. Max. segment size is 4MB
2. Accesser encrypts data using randomly generated key
3. The hash of the encrypted segment is calculated and XOR with random key. The result is appended to create AONT package
4. Data is packaged using RC4-128 encryption with MD5-128 hash for data integrity Also supported: AES-256 encryption with SHA-256 hash.
5. The Accesser creates the slices by splitting the AONT package. The slices are written to the Slicestors.
6. AONT: Data CANNOT be recovered from a single slice, or any number of slices less than the IDA threshold

Security

Secure multi tenancy in the dsNet® – data at rest encryption + vaults

Multiple Vaults can be created in the same dsNet to provide access and data separation.



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Up to 1000 Vaults can be created within a dsNet.

Encryption + Vaults can meet the most stringent of security requirements

Multi Tenancy

PerfectBits™ Data Integrity

At Rest Integrity Checking

- Slice Integrity Check – Slicestors are checking themselves for corrupt slices
- Missing Slice Check – Slicestors are checking with each other to ensure all slices have been written
- If Slices are found to be corrupt or missing they are added to the rebuild queue and rebuilt

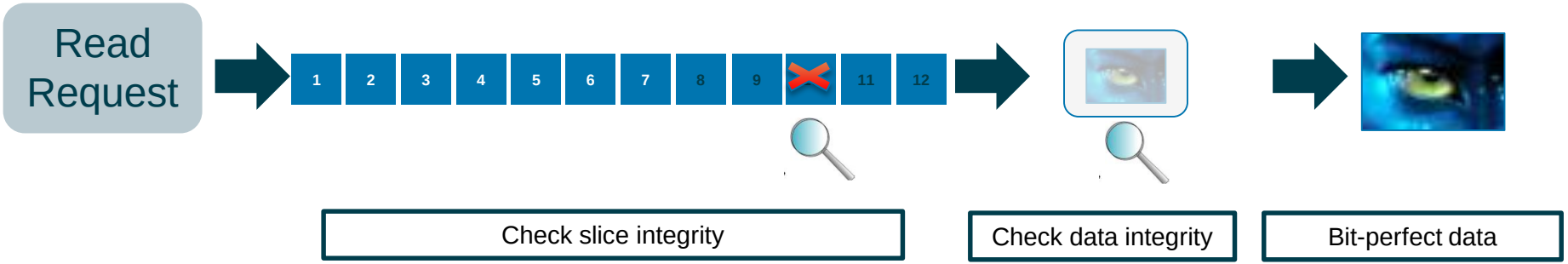
Cleversafe uses a distributed rebuilder model

- Rebuild events are distributed across Slicestors
- Rebuilding becomes more powerful as Slicestors are added to the system
- Predictability – Rebuilder is “always on” (at a moderated rate) making I/O performance much more predictable

Benefits: No single point of failure or choke point for performance and highly scalable reliability

PerfectBits™ Data Integrity

Inline Integrity Check



- If, during a read, a Slice is found to be corrupt, missing or otherwise unusable, that Slice is added to a rebuild queue and the Accesser picks a Slice from a different Slicestor to satisfy the read.

dsNet® management

Single Pane of Glass

Comprehensive management via a single web UI

APIs and Interfaces

Manager REST APIs, SNMP, and syslog

Full Featured

Health and Performance Monitoring

No Downtime

Upgrades and Appliance Moves

Security

RBAC
LDAP/AD Integration
Certificate Authority
PKI

dsNet® management, web-based access

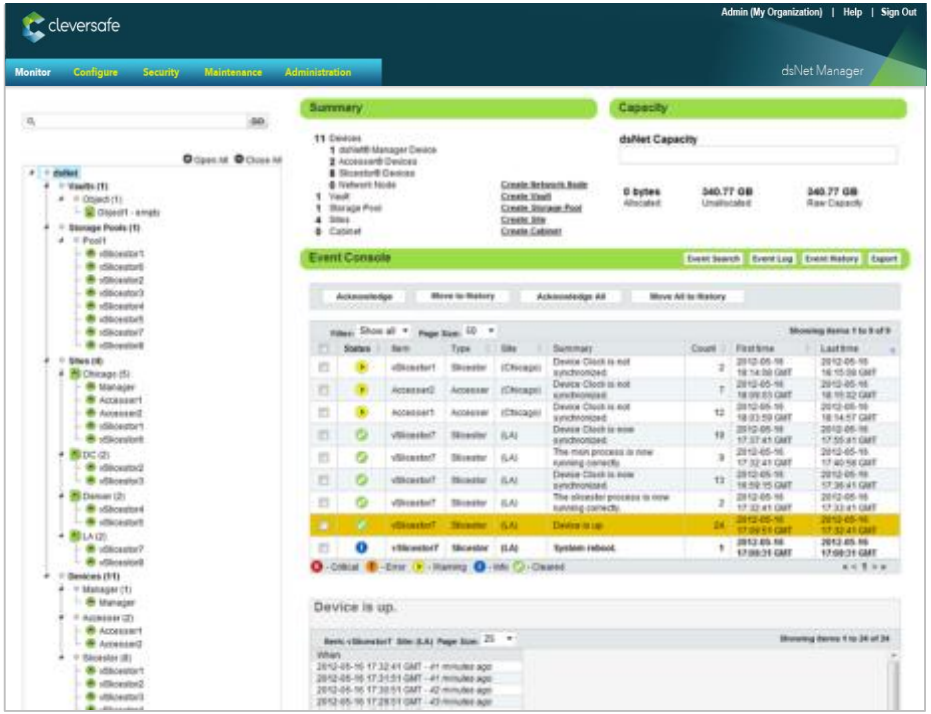
Monitor
- Event monitoring via SNMPv3, email alerts or event console

Configure
- Create Storage containers
- Select different IDAs to meet SLA requirements

Security
- RBAC Support

Maintenance
- ‘Rolling Upgrade’ with no downtime
- Individual component maintenance

Administration
- AD Integration
- LDAP
- Access Key
- IP Restrictions



Web-Based Access

Thank You!

Storage Beyond Scale™

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