



Clouddian HyperStore®

Technical Overview

About Clodian



- Hybrid cloud storage startup in Silicon Valley
 - Strong venture backing: Goldman Sachs, Intel Capital, INCJ, Fidelity
 - Solid management with storage, big data, enterprise software and telco expertise
 - 50 employees, offices in Foster City, Japan and China
- Production hardened product
- Target market: mid- to large-enterprises & regional service providers
- GTM: traditional storage distribution/VARs

CLOUDIAN PARTNERS

Channel Partners	                 
Technology Partners	                      

Clouidian Customers



Dai Nippon Printing Co.,Ltd.



@nifty

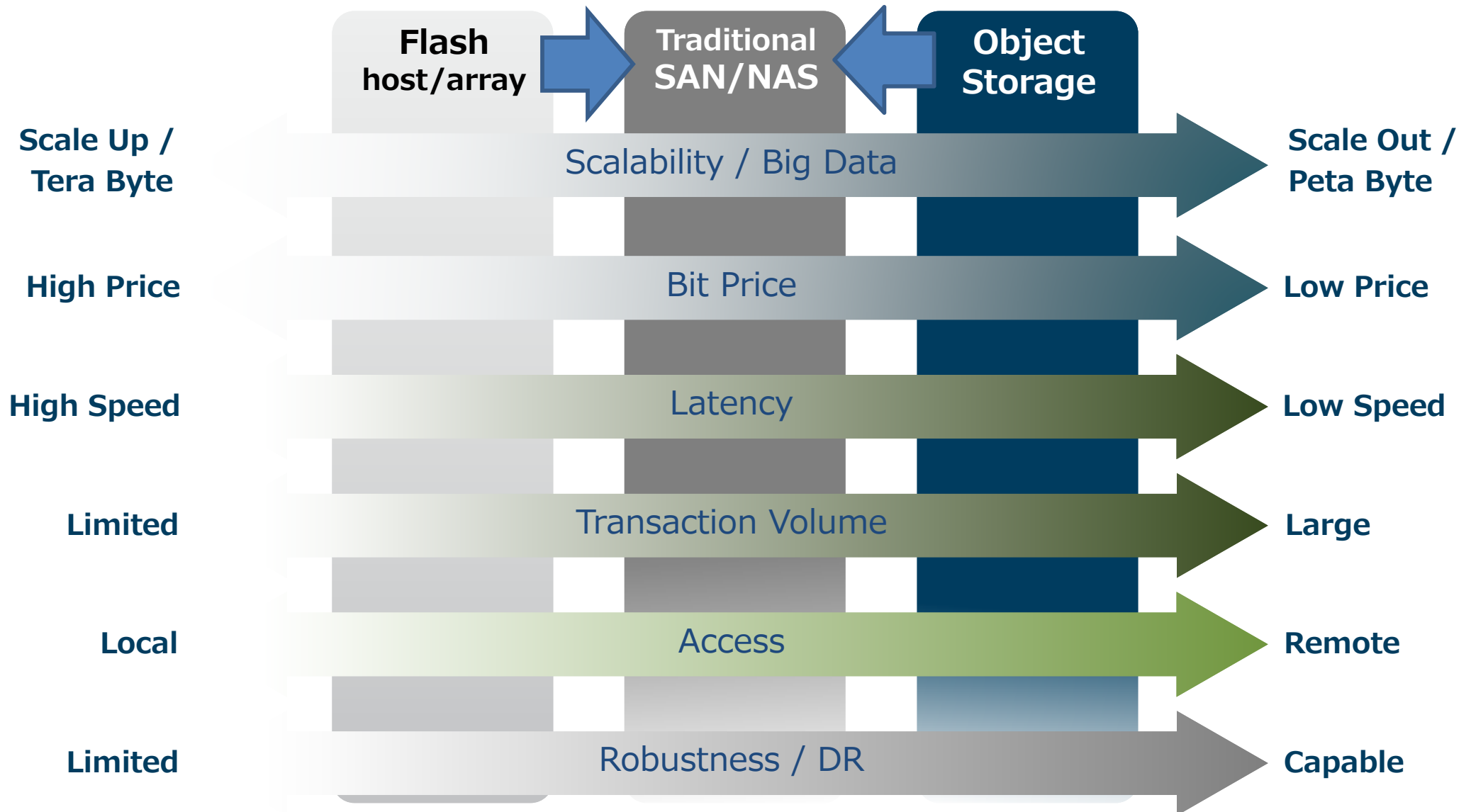


Ishikawa Computer Center Co.,Ltd.

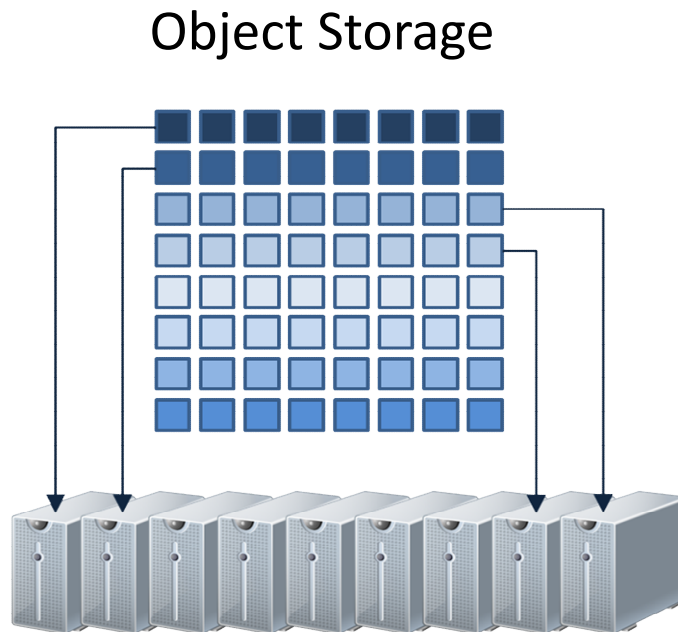


Over 45 Production Customers and 400+ Community Edition deployments

The Technology for Storage is changing...



Hybrid Cloud Object Storage



- Scale
- Reliability

AND

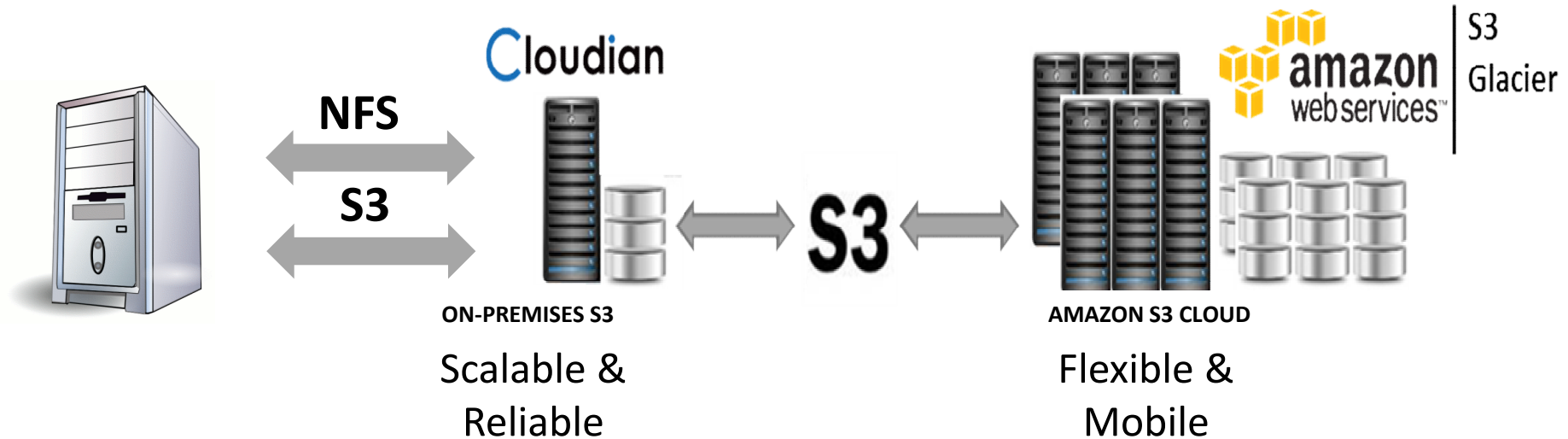


- Flexibility
- Mobility

Clouddian HyperStore



A HYBRID CLOUD



- ✓ S3 API and NFS interface
- ✓ Hybrid Cloud Ready (any S3 Cloud)
- ✓ 100s of Supported Applications
- ✓ Optimized for any Workload
- ✓ Unlimited Flexibility
- ✓ Multi-Tenancy (Chargeback) and QoS
- ✓ Multi Data Center Replication and Erasure Coding
- ✓ Scalable Peer-to-Peer Architecture
- ✓ Storage for OpenStack & CloudStack

Cloudian Product Offerings



- HyperStore Software
 - The software only version
 - Runs on commodity hardware
 - Runs on Linux (RedHat, or CentOS)
- HyperStore Appliance
 - Sold as an appliance by Cloudian or by a Cloudian Partner
 - Sold as a software image to Distributors or System Integrators, who will pre-install this image on their hardware (hardware to be approved by Cloudian)
 - End user will get a complete appliance product
 - No software installation needed
- 3 Models
 - HSA1024: 1U, 32GB RAM, 4xGigE NIC, 24 TB,
 - HSA1048: 1U, 32GB RAM, 4xGigE NIC, 48 TB
 - HSA2060: 2U, 64GB RAM, 2x1 GigE + 2x10GigE NIC, 60 TB, Flash Optimized



Clouidian HyperStore Storage Use Cases



Enterprise backup



Long term archiving



Secure Sync and share



Remote office file storage



Cloud Storage as a Service

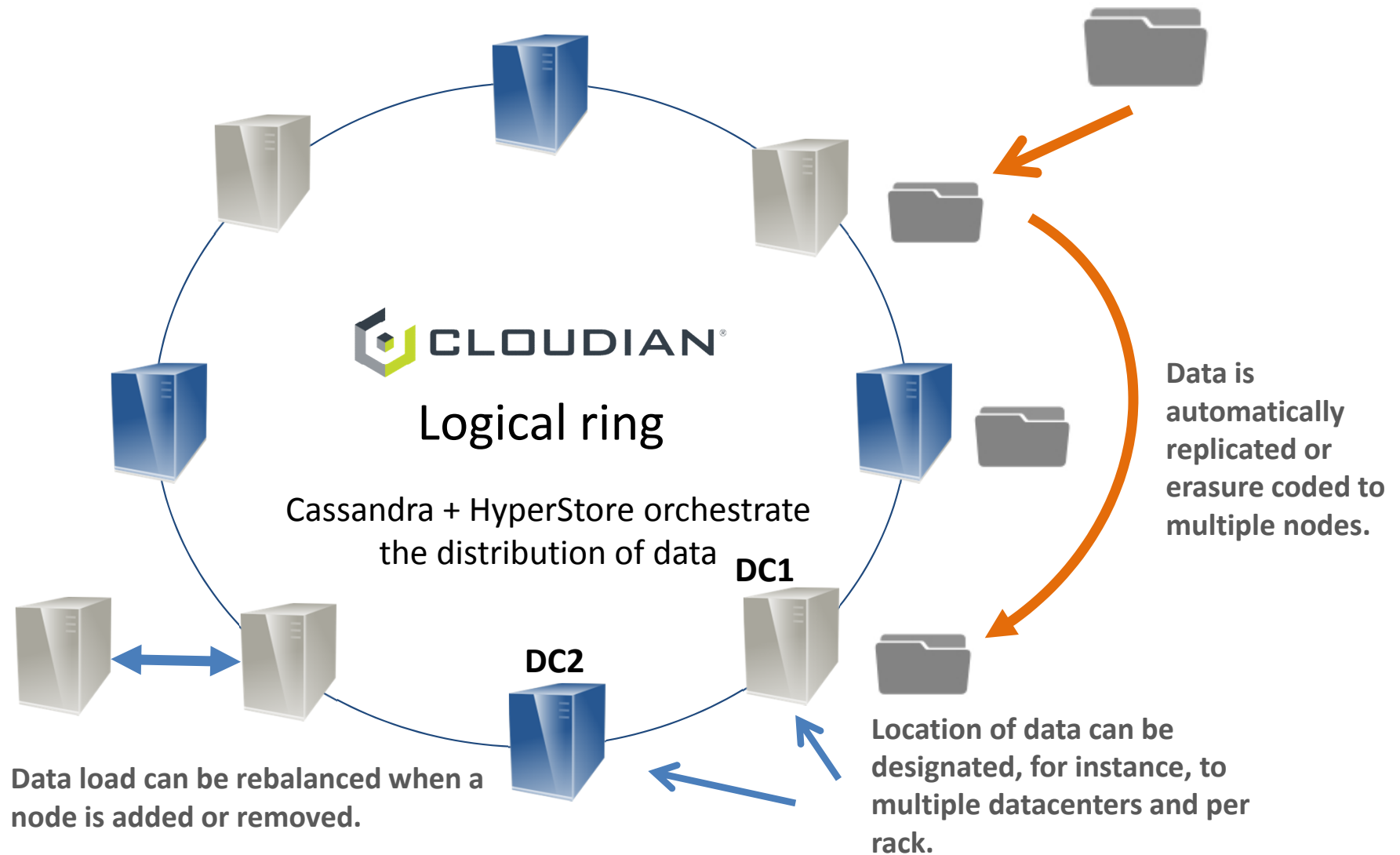


Enterprise NFS and CIFS



* Plus 350+ Applications that can be found on the Amazon S3 App Store

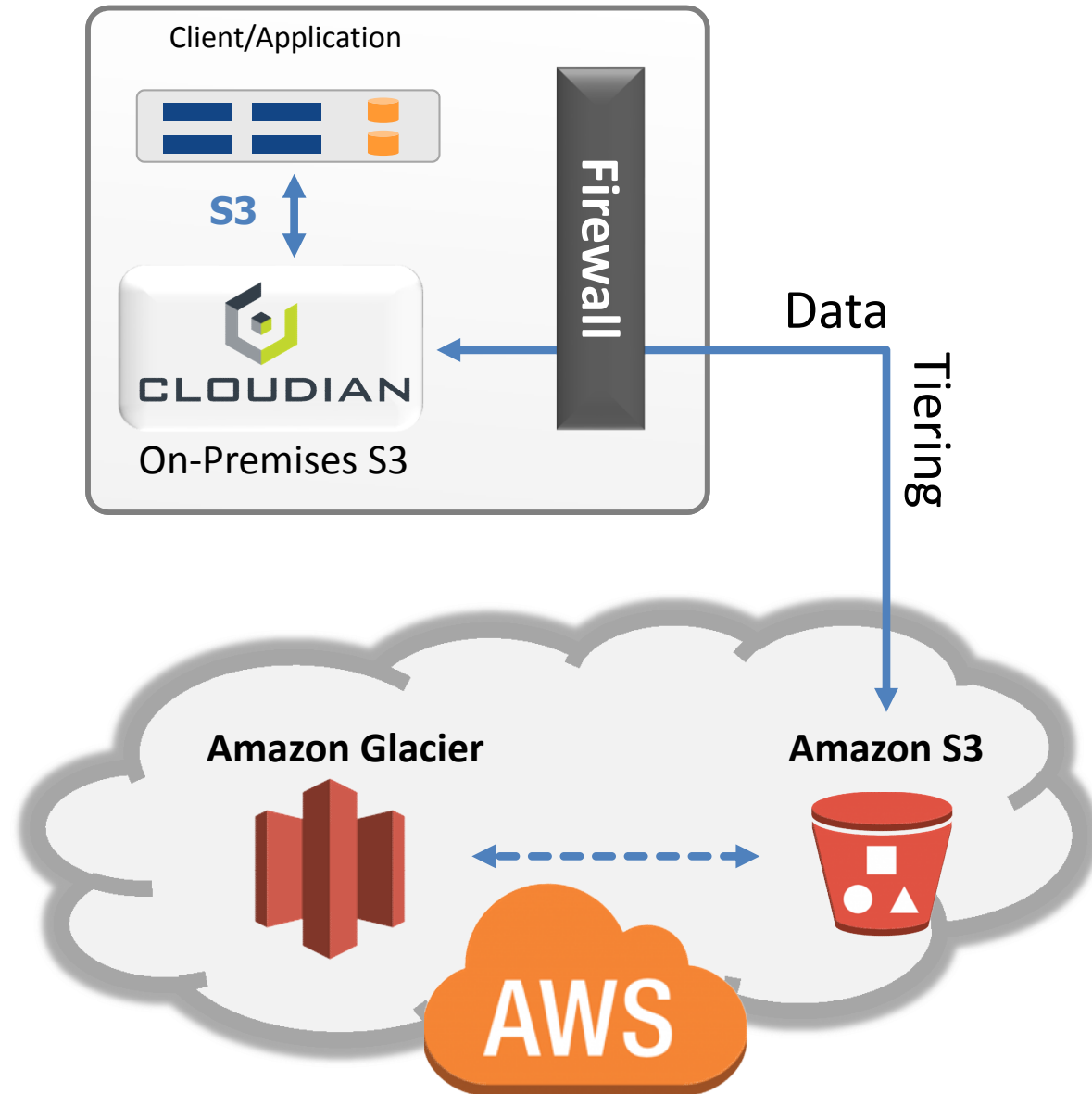
Elastic, distributed and reliable



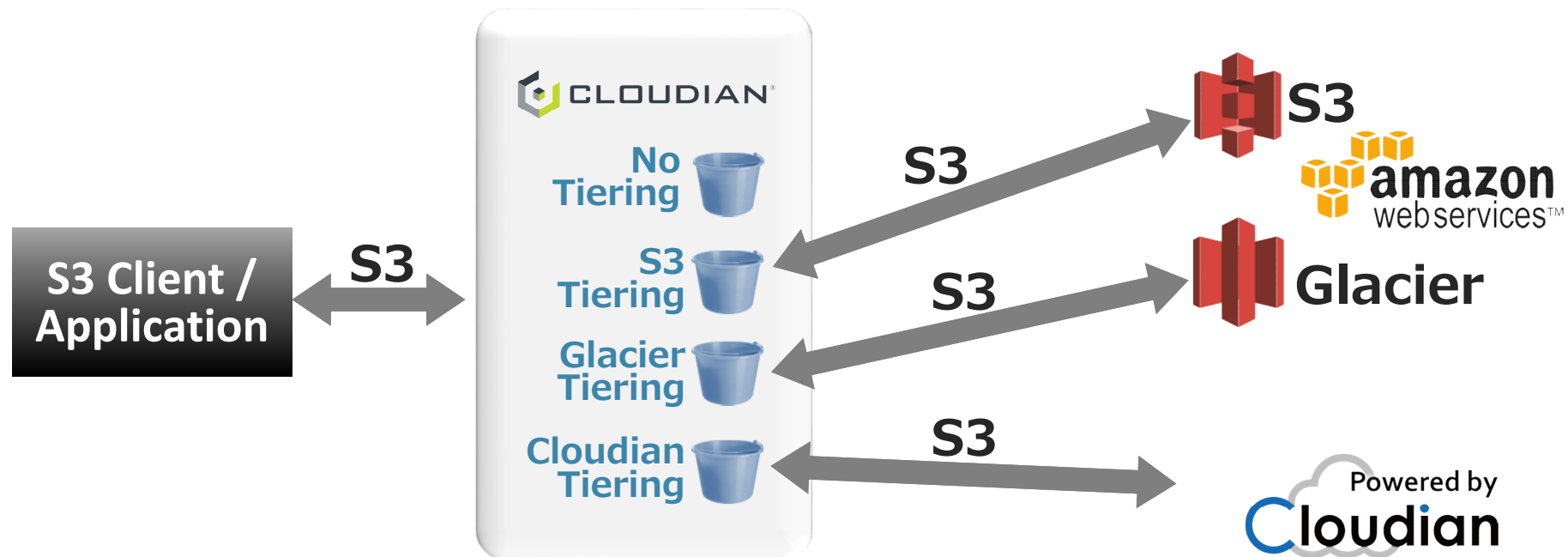
Hybrid Cloud Storage



- Cloudian deployed as On-Premises S3 cloud behind the firewall
- Bucket Lifecycle policies to migrate
 - Amazon S3 or Glacier
 - Other Cloudian HyperStore Clouds
 - Other S3 compatible service providers
- Global namespace with Metadata kept on premises for all objects
- Archiving option to move metadata and data to the Public Cloud



Hybrid Cloud Storage

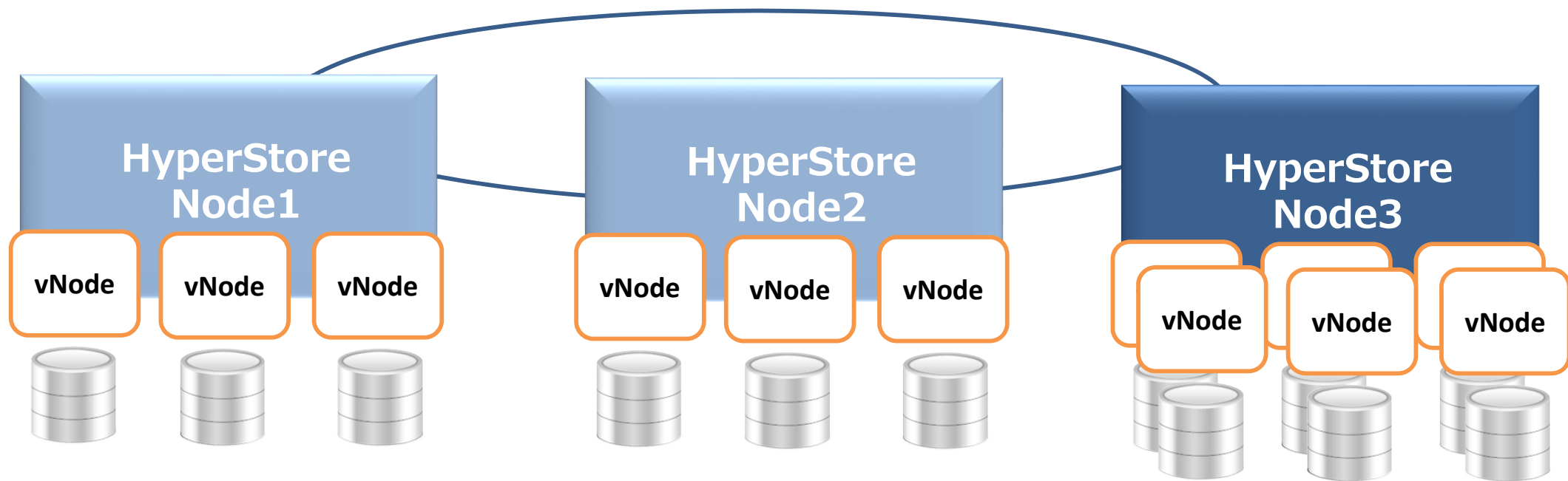


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Deep Dive

STORAGE TECHNOLOGY

The vNode (new in the 5.0 release)

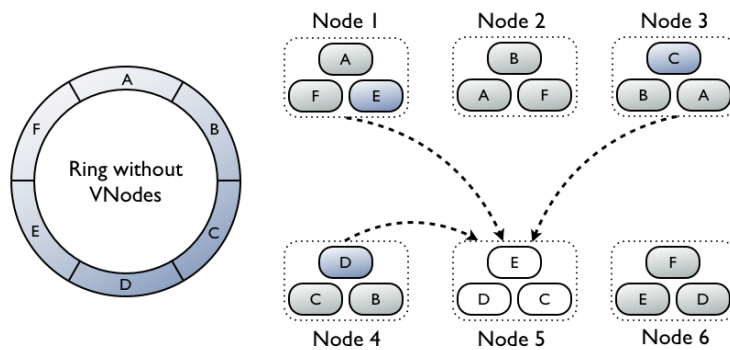


- ✓ Get optimal performance from disks with independent I/O drivers (vNodes) per disk
- ✓ Efficiently Store Data without the overhead of RAID
- ✓ Increased repair speed in case of disk or node failure
- ✓ Allows heterogeneous machines in a cluster

Increased Repair Speed

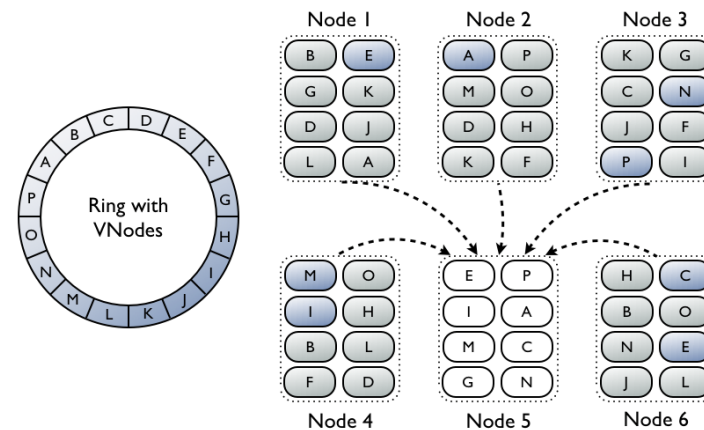
Without vNodes

Only few nodes have the data



With vNodes

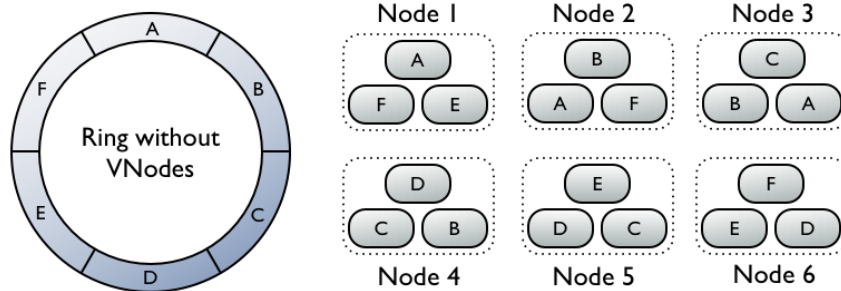
Data comes from a higher number of nodes



Allows Heterogeneous Machines

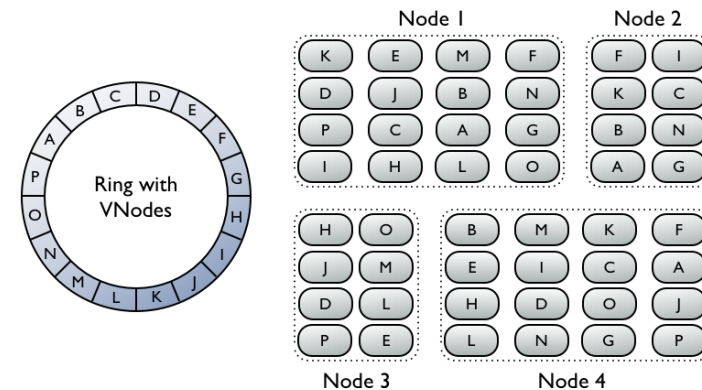
Without vNodes

Nodes should be of the same size

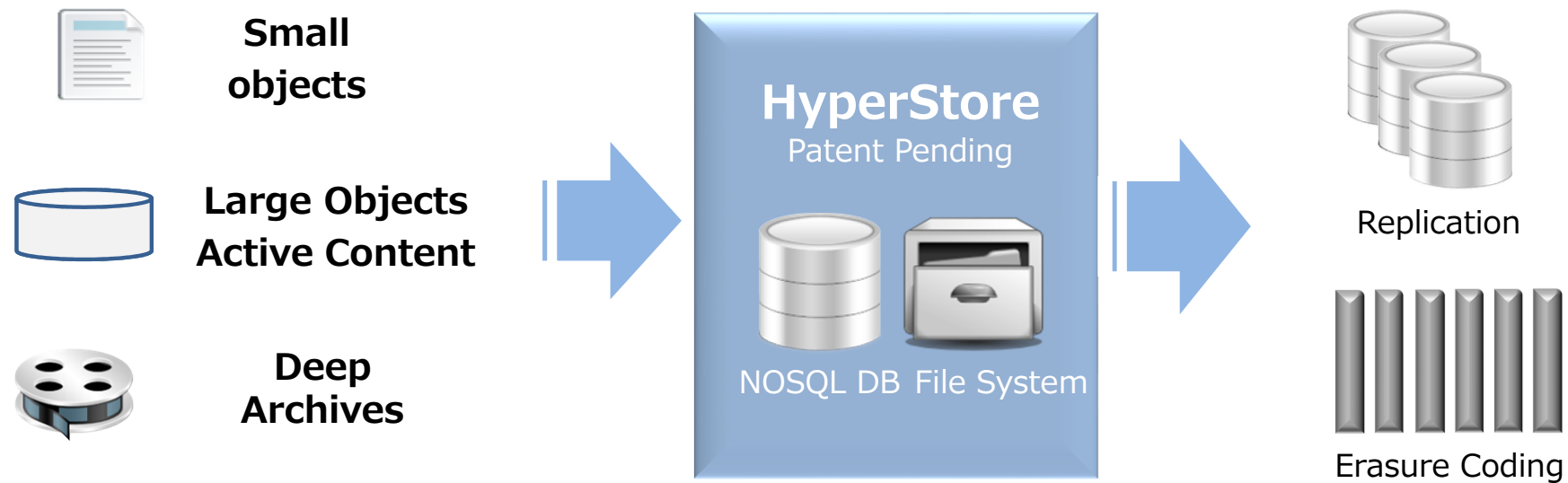


With vNodes

Nodes can have different sizes

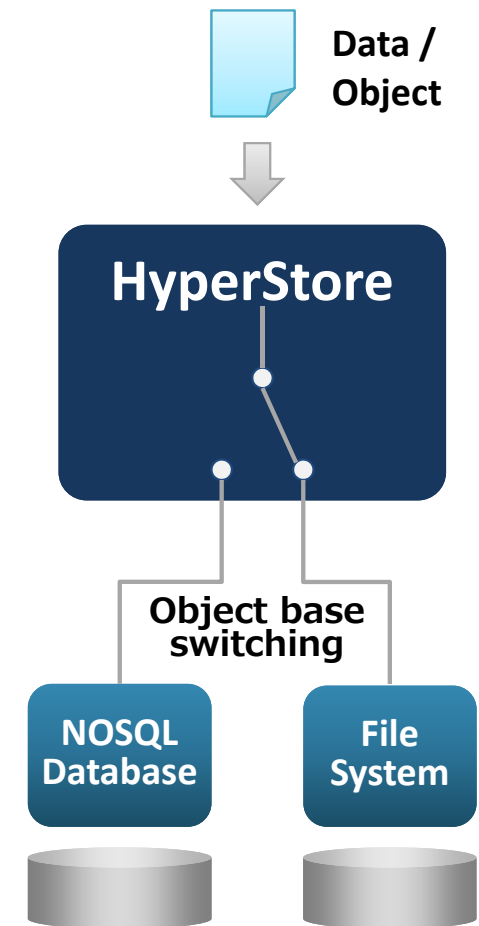
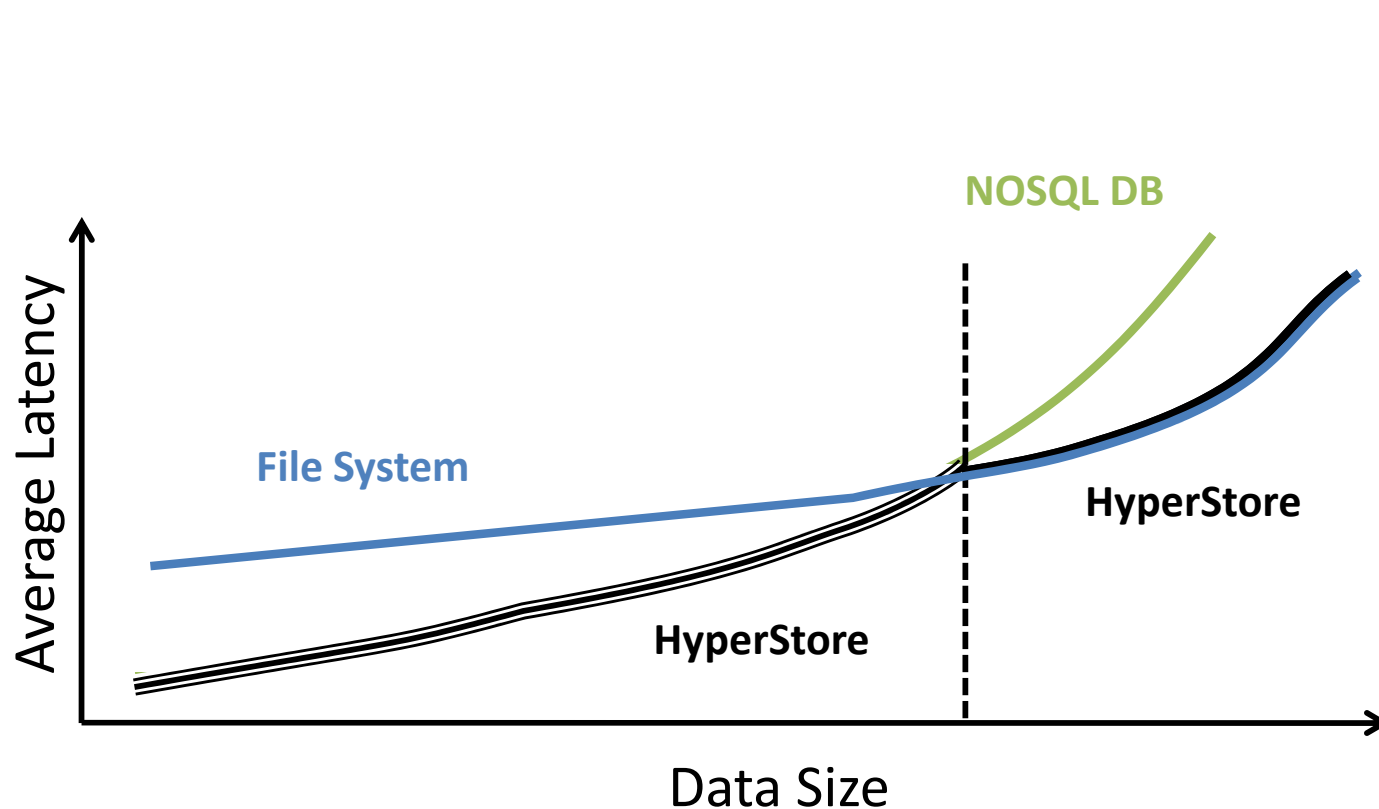


HyperStore Data Store Technology



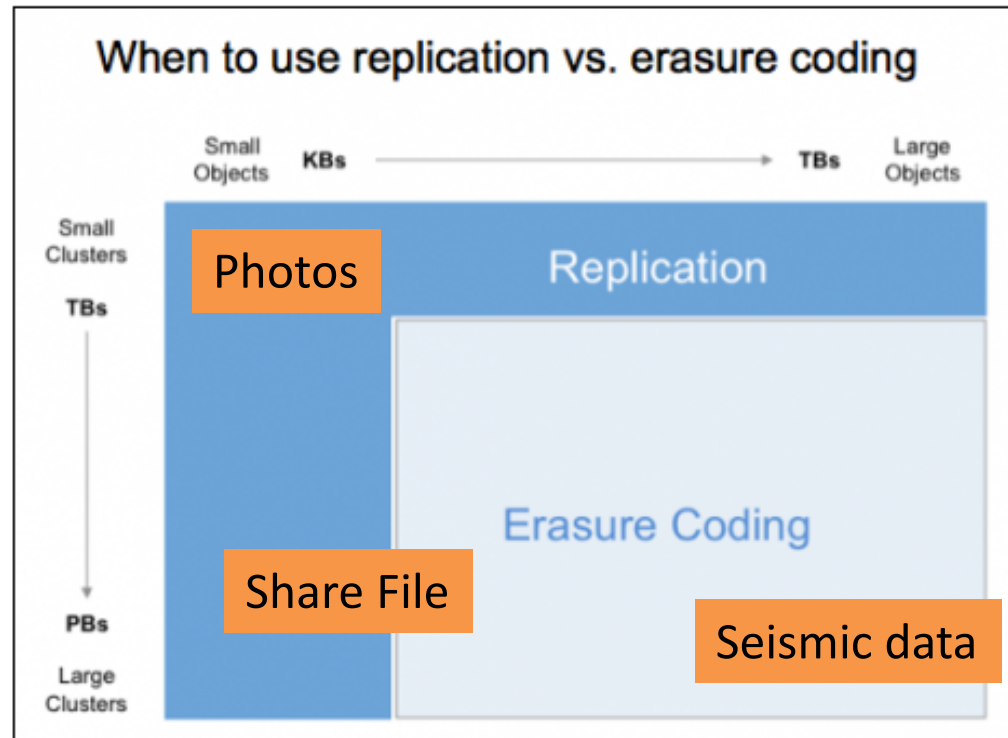
- ✓ Optimized for all data types
- ✓ Chunking of large objects for better performance
- ✓ Per object data protection selection
 - ✓ Replication
 - ✓ Erasure Coding

HyperStore Auto Storage Technology



- Optimal data management to minimize latency and optimized performance

Replication and Erasure in one system



Cloudian Differentiators

- Per object data protection selection
- Flexible redundancy based on business need
- Choose the best protection for each particular use case
- No limits on the # of Replicas or (K,M) Erasure Code settings

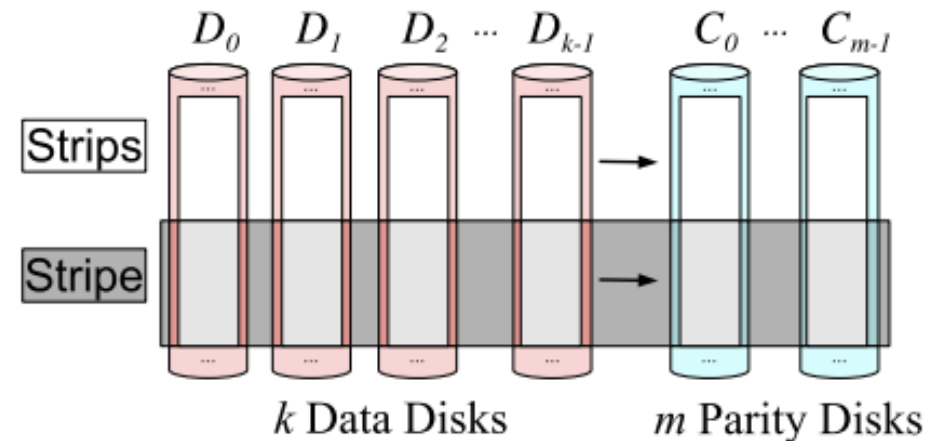
Configurable HyperStore Erasure coding

- Based on Vandermonde-Reed-Solomon error correction
- Geographical protection against failure at a lower footprint cost
- Suitable for archive data, backup, large content and multimedia

Cloudbian Differentiators

- Configurable per object
- Configurable per bucket (storage pool)
- Fully configurable, by default (4,2) 4 data fragments +2 checksum

Divide objects into k data parts and m encodes

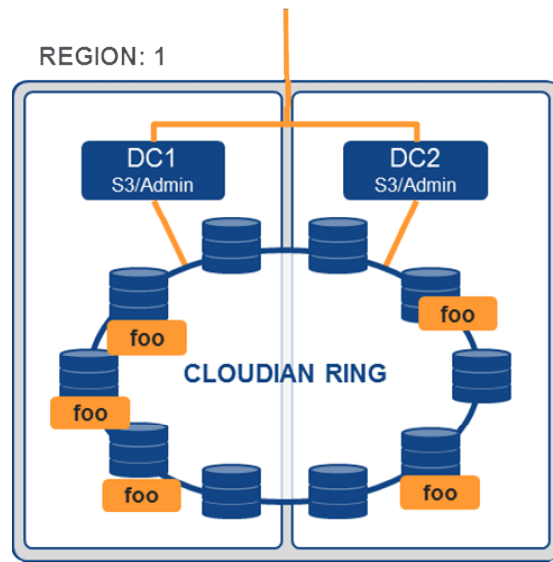


Spread objects across 6 servers

For example a 4+2 Scheme can survive a 2 disks or nodes failure

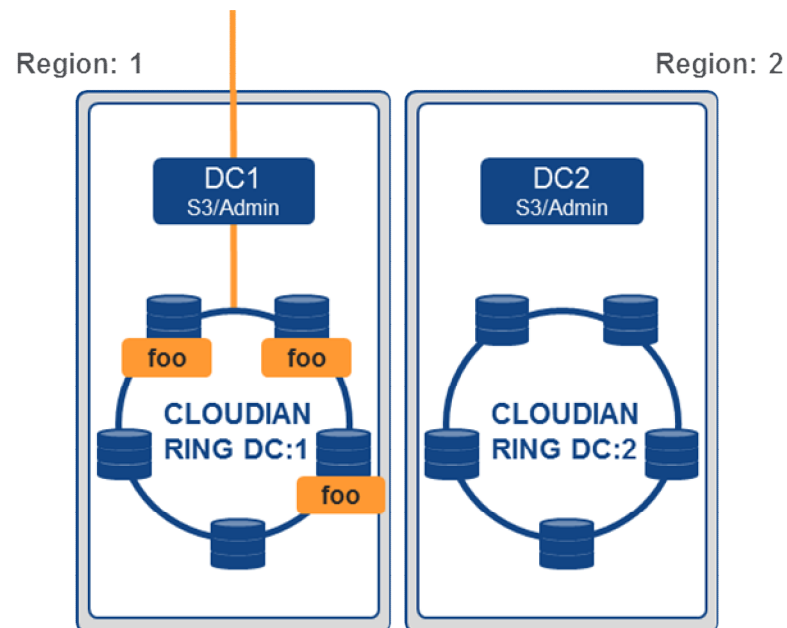


Configurable Replication Policies



Multi Data Center, Single Region

- 2 DCs, 1 Region, 5 replicas
- Replicas stored across Data Center
- Dynamically Configurable Consistency



Multi Data Center, Multi Region

- 2 DCs, 2 Regions, 3 Replicas
- Replicas stored within Data Center
- Apply location constraints to buckets
- Span buckets across regions (virtual buckets)
- QoS & Billing based on region
- Dynamically Configurable Consistency

Replication with Dynamic Consistency



WRITE

Level	Description
ONE	A write has been written to at least 1 replica's commit log and memory table before responding to the client.
QUORUM	Ensure that the write has been written to $N / 2 + 1$ replicas before responding to the client.
LOCAL_QUORUM	Similar to QUORUM but replicas are in same data center as coordinator node.
EACH_QUORUM	Ensure that the write has been written to a quorum of replicas in <i>each datacenter in the cluster</i> before responding to the client
ALL	All replicas must have received the write, otherwise the operation will fail.

READ

Level	Description
ONE	Returns the response from the first replica causing a consistency check in a background thread.
QUORUM	Returns the record with the most recent timestamp once $(N/2 + 1)$ replicas has responded.
LOCAL_QUORUM	Returns the record with the most recent timestamp once $(N/2 + 1)$ replicas in the same data center as the coordinator node has reported.
EACH_QUORUM	Returns the record with the most recent timestamp once $(N/2 + 1)$ replicas in each data center of the cluster has responded.
ALL	Returns the record with the most recent timestamp once all replicas have responded. The read operation will fail if a replica does not respond.

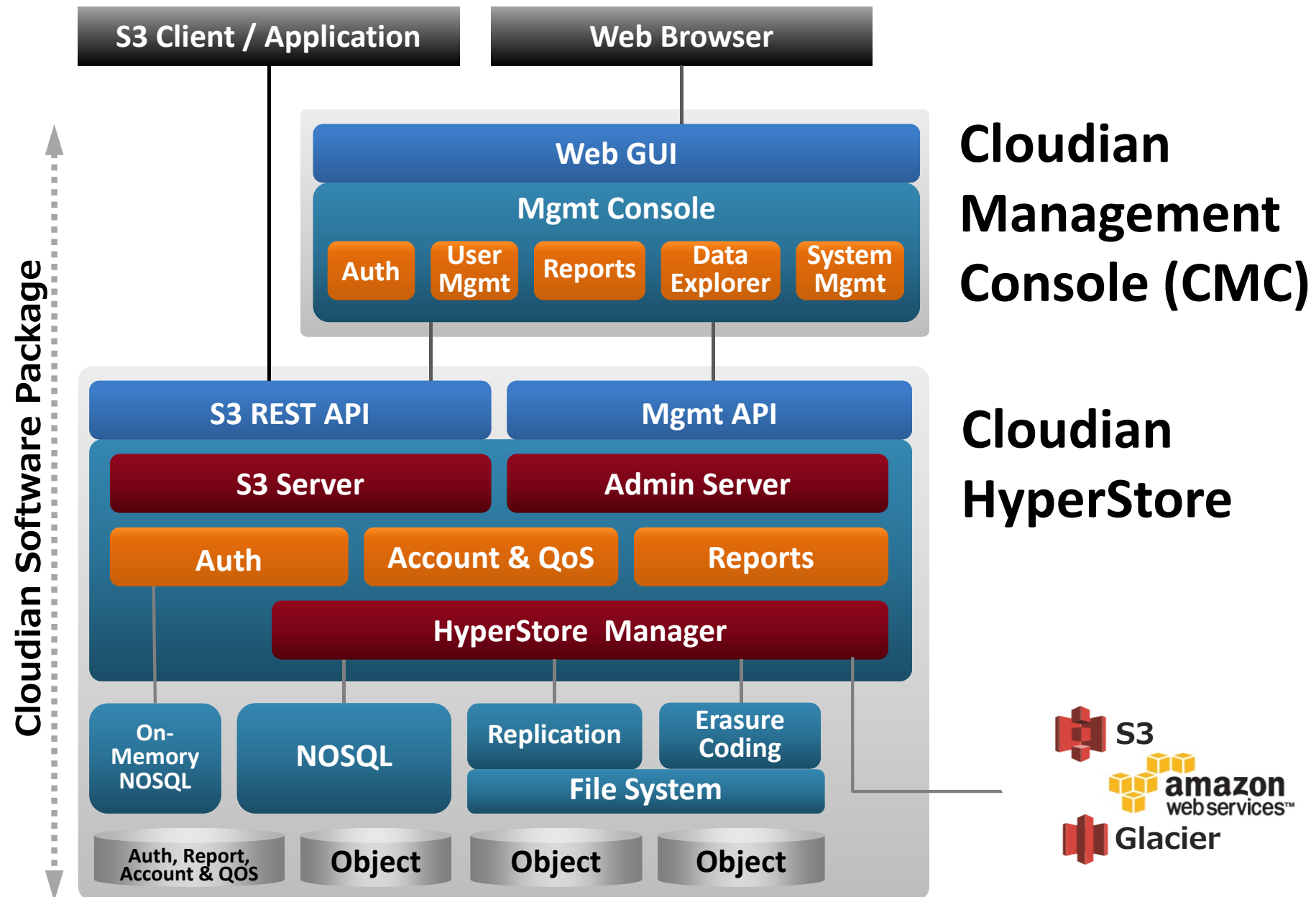
HyperStore Encryption



- HyperStore Server Side Encryption handles all encryption, decryption, and key management in a totally transparent fashion
- Uses AES-256
- Bucket or Object level



HyperStore Logical Architecture



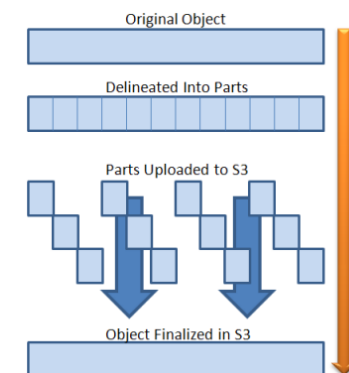
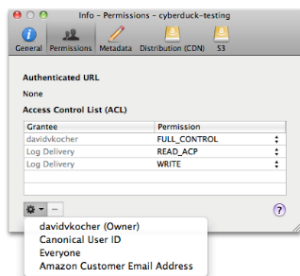
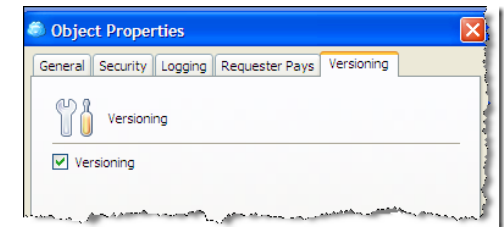
Deep Dive

INTERFACES AND MANAGEMENT SERVICES

HyperStore advanced features:



- Multi-part uploads: allows uploading large objects in multiple parts
- Versioning: multiple versions of same object
- Bucket Lifecycle: auto-expiration using rules
- Server side encryption: enhance confidentiality
- Location constraint: Assign data to specific region (eg for HIPAA Compliance)
- Bucket Website: Create buckets as websites to host web content
- Access control lists (ACLs) define access rights to bucket and object
- And more...

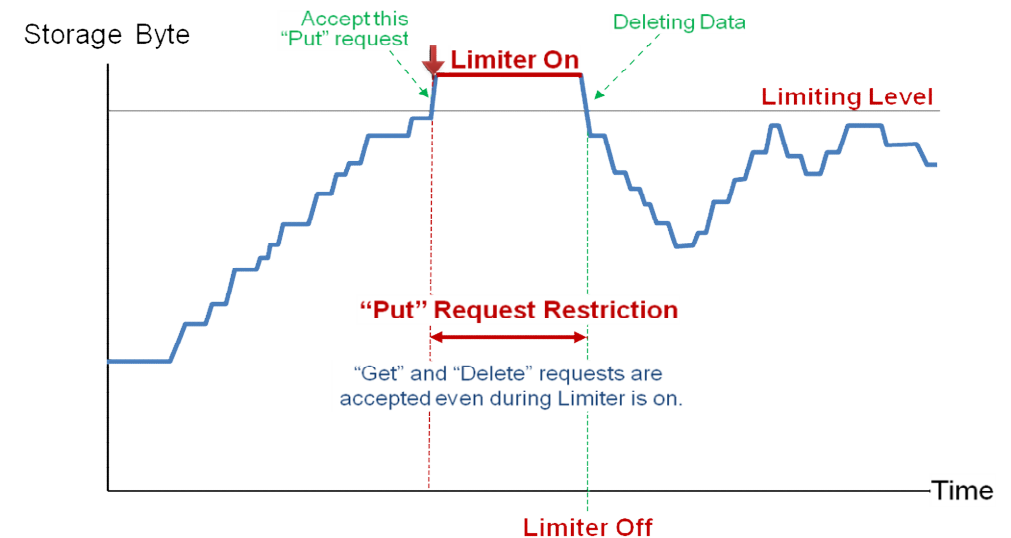


QoS Controls

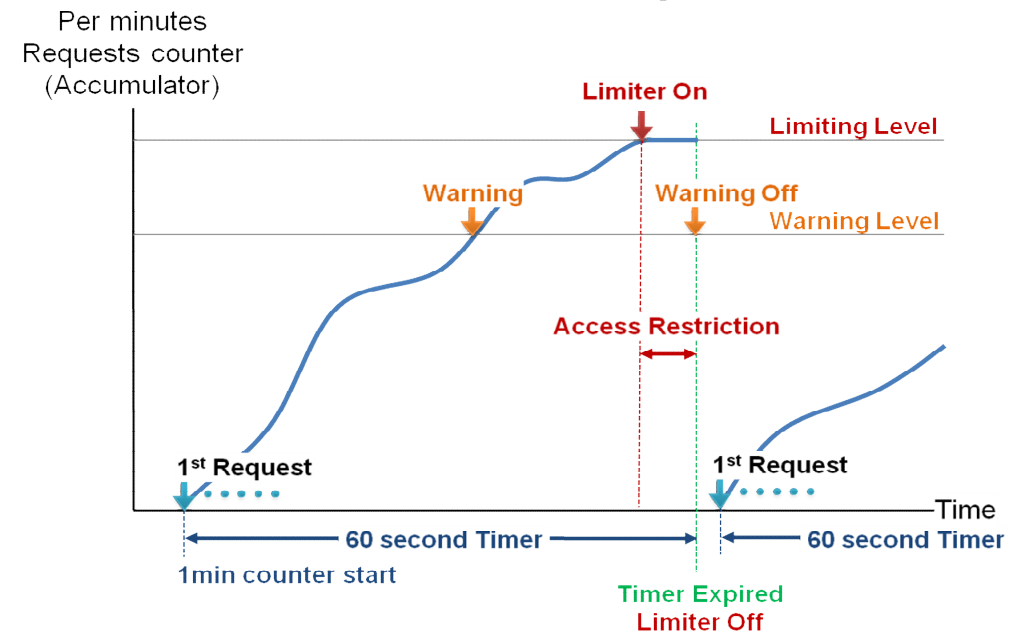


- Configurable maximum limits per-region at per-user, per-group, system level
 - Requests/minute
 - Storage bytes
 - Storage objects
 - Data Bytes Inbound/minute
 - Data Bytes Outbound/minute
- When limit is reached, future requests are rejected

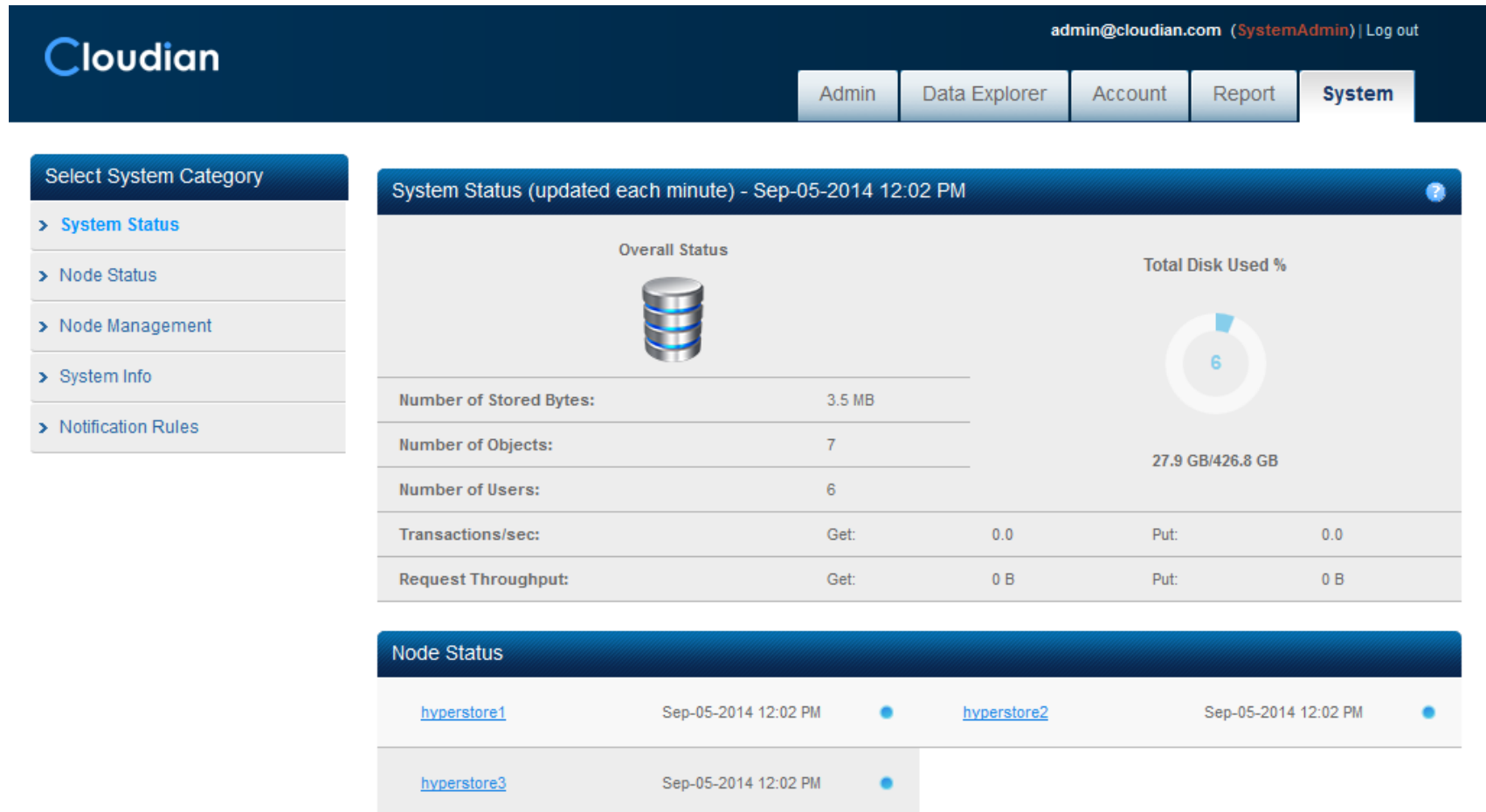
Storage Byte Limiter



Inbound/Outbound Requests Limiter

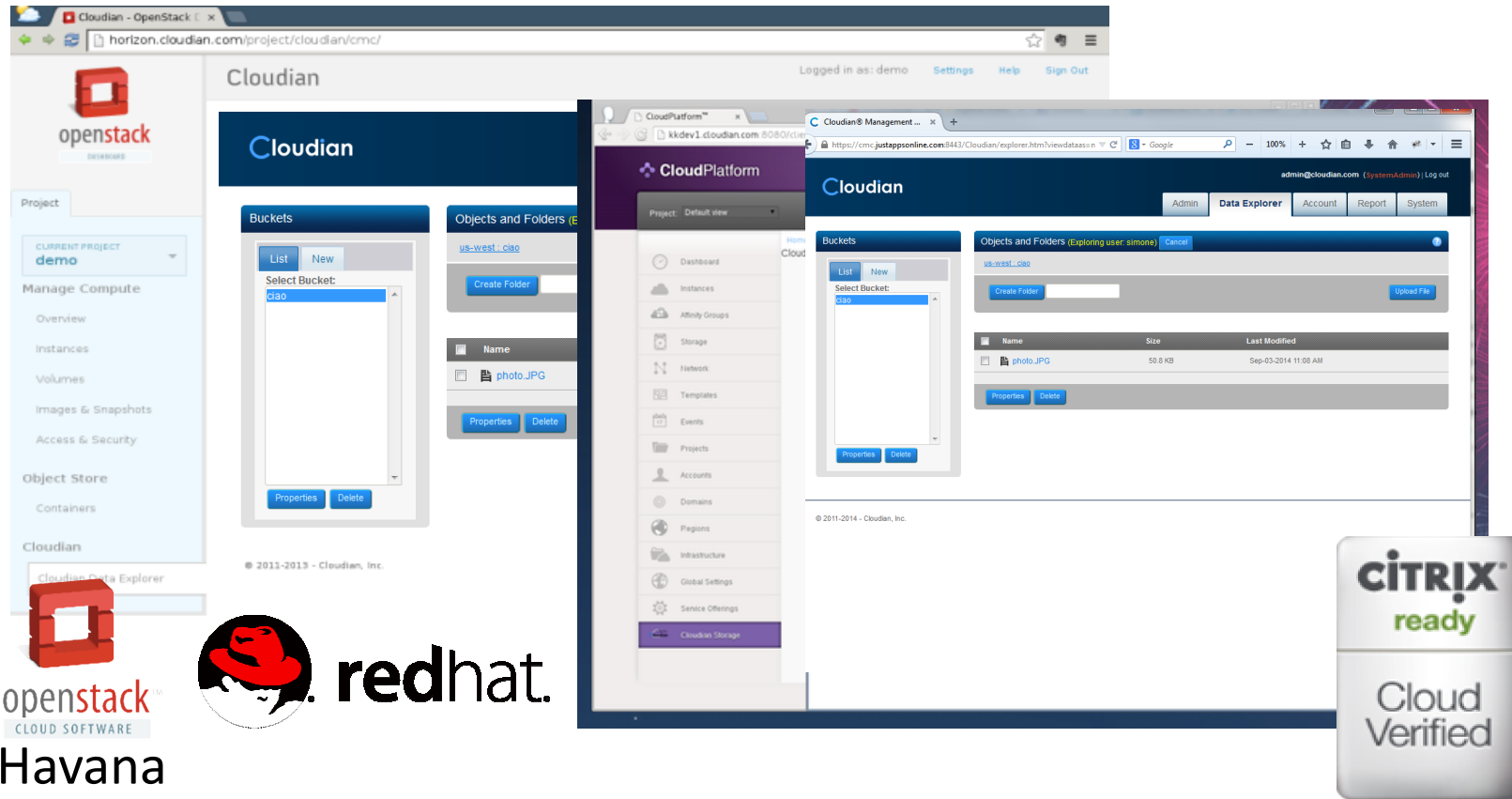


Graphical User Interface and REST APIs:



- Management (start/stop services, diagnostics)
- Monitoring (dashboards, notifications)
- Provisioning (add/remove nodes)
- Billing
- Quality of Service
- Administration

OpenStack & CloudPlatform Integration



- Integrated Management GUI
- Integrated provisioning
- Store OS images & snapshots
- Single Sign-on

Multi-Tenant Platform



Cloudian admin@cloudian.com (SystemAdmin) | Log out

Admin Data Explorer Account Report System

Select Admin Category

- > Manage Users
- > Manage Groups
- > Rating Plan

Users

Group Name: marketing

User ID starts with:

User Type: All

User Status: All

Search New User User QOS Default

User List

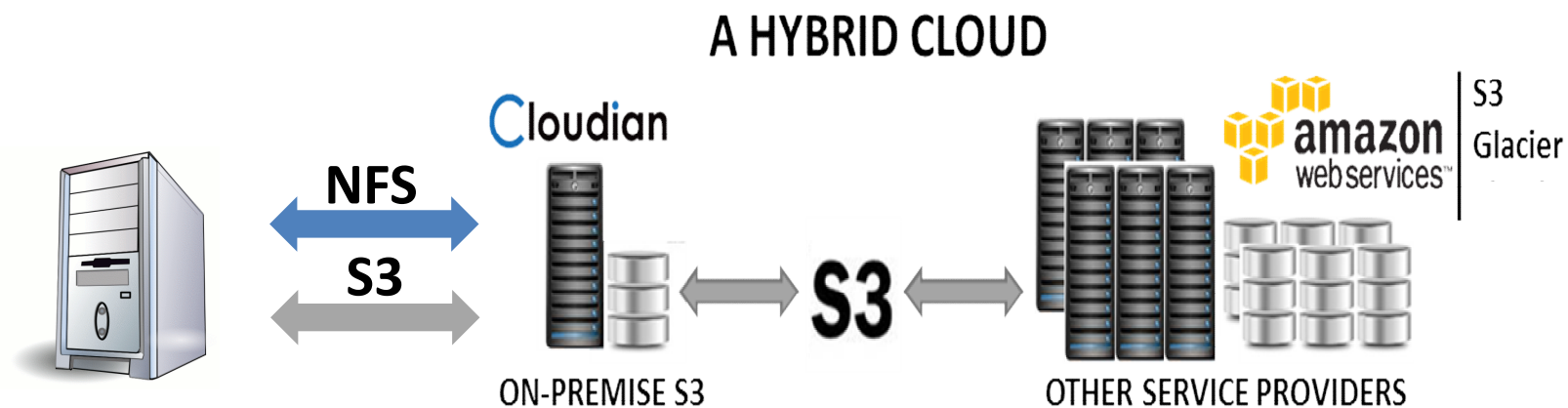
User ID	User Name	User Type	Group Name	Status	Actions
anna		User	marketing	Active	Edit View User Data Delete
antonette		User	marketing	Active	Edit View User Data Delete
charles		User	marketing	Active	Edit View User Data Delete
gary		User	marketing	Active	Edit View User Data Delete
gladdes		User	marketing	Active	Edit View User Data Delete
mike		User	marketing	Active	Edit View User Data Delete
paul		User	marketing	Active	Edit View User Data Delete
ptribble		User	marketing	Active	Edit View User Data Delete
simone		User	marketing	Active	Edit View User Data Delete

- Role-based Access
 - System Administrator
 - Group Administrator
 - User
- Group Level
 - Quotas
 - Reports
 - Billing
- Self-Provisioning

NFS v3 Support

Use cases:

- Secondary Storage
 - VM templates/snapshots storage
 - Backup workloads (reading/writing large files)
- Enterprise Cloud Gateway
 - Mount buckets as shared drives



Next steps



- Visit our website and request free trial:
<http://www.cloudian.com/>
- Ask us for a demo or proof of concept
- Follow us on Twitter: @CloudianStorage
- Like us on Facebook:
<https://www.facebook.com/cloudian.cloudstorage>



“Amazon S3 delivered”



Thank You!

Questions?

www.cloudian.com

“Cloud Storage for Everyone”

What is new

5.0 RELEASE

HyperStore 5.0 Release



Think Big

- Increased Availability with vNodes
- Inline Compression
- Configurable Erasure Coding
- Add/remove nodes on the fly

Think Safe

- Certified Appliance Configurations
- Optimized Linux install
- Admin Management Console
- Quick fault detection & alerting

HyperStore 5.0 Appliances and Software



At a glance



Appliance

- ISO with OS, software

Monitoring (CMC)

- System dashboard page
- Per-node information page
- Monitoring rules and notifications

Management (CMC)

- System O&M page.
- Start/stop services
- Get diagnostics
- Add/remove a node

New Features

- HyperStore vNodes: Virtual nodes / multiple mount points.
- Auto-tiering: GET object streaming.
- CMC: Multiple file upload
- Redhat Openstack Havana integration

Bug Fixes, Improvements

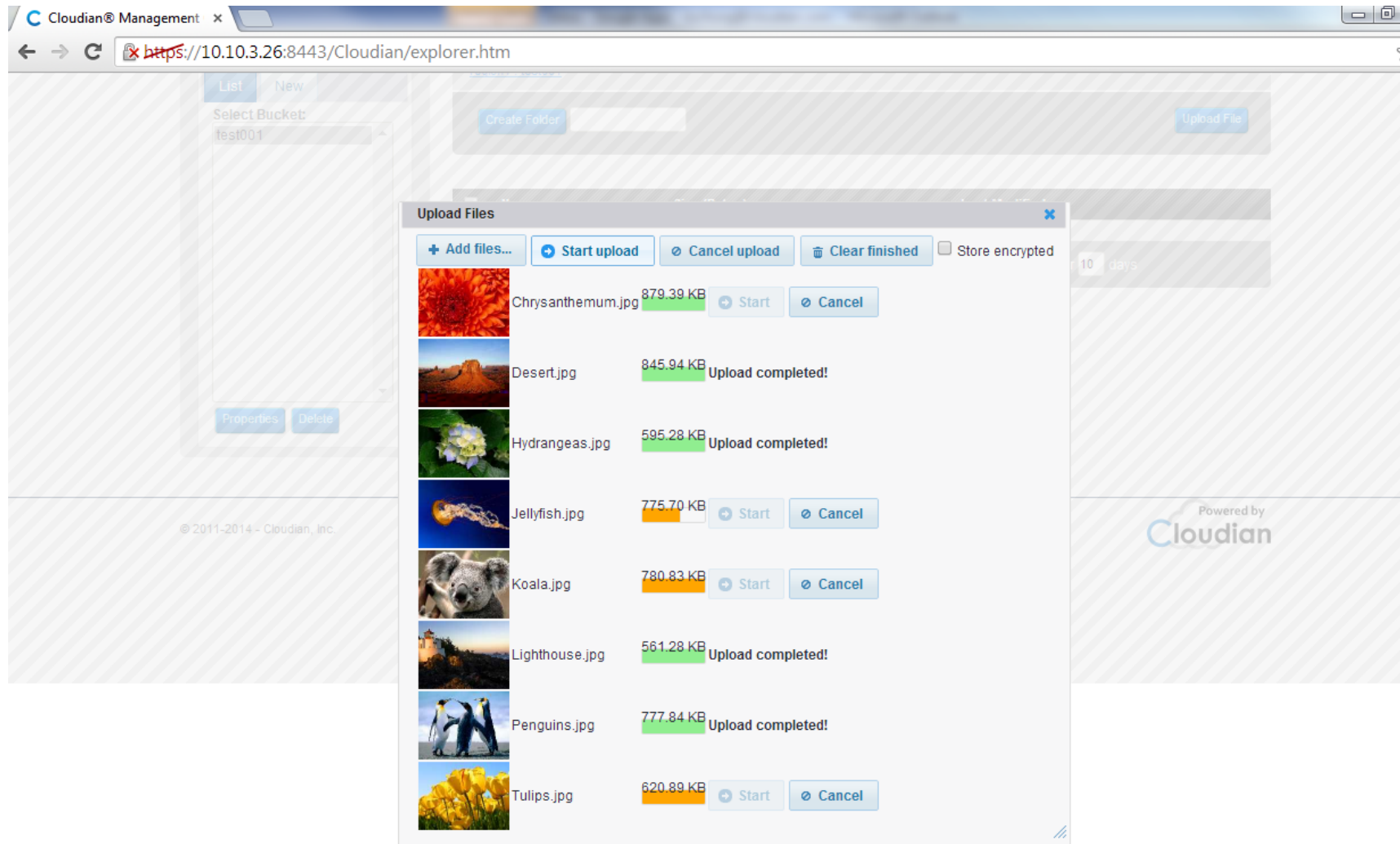
- Erasure coding.
 - Configurable k, m.
 - Metadata check
- S3 batch deletes
- Performance improvements

User Benefits



Category	Feature	User Benefit
Monitoring (CMC)	System dashboard	“Single pane”. Monitor system health and performance, events/alerts.
	Per-node information page	Drill-down for node-specific information.
	Monitoring rules and notifications	Allow definition of custom monitoring rules. Pre-configured rules.
Management (CMC)	System O&M page	“Single pane”. Manage system by UI.
	Start/Stop services	Per-node services on node can be started/stopped.
	Get Diagnostics	Diagnostics info is then analyzed or sent to support.
	Add/Remove nodes	Manage cluster from UI.
New Feature	HyperStore: vNodes	Single disk failure does not impact entire node. Repair and other operations are more efficient.
	Auto-tiering: GET object streaming	Object is streamed from AWS S3. No need to restore object.
	CMC: Multiple file upload	Easy to upload multiple files at once.
	ISO with OS and software	Matched versions of OS, prerequisite software, HyperStore software.
Bug Fixes/Improvements	Erasure coding (configurable k,m. Metadata check).	Can change the EC replication level. Metadata check is for performance gain to make sure operation can proceed.
	Performance improvements	Improve performance of multi-part upload, repair.

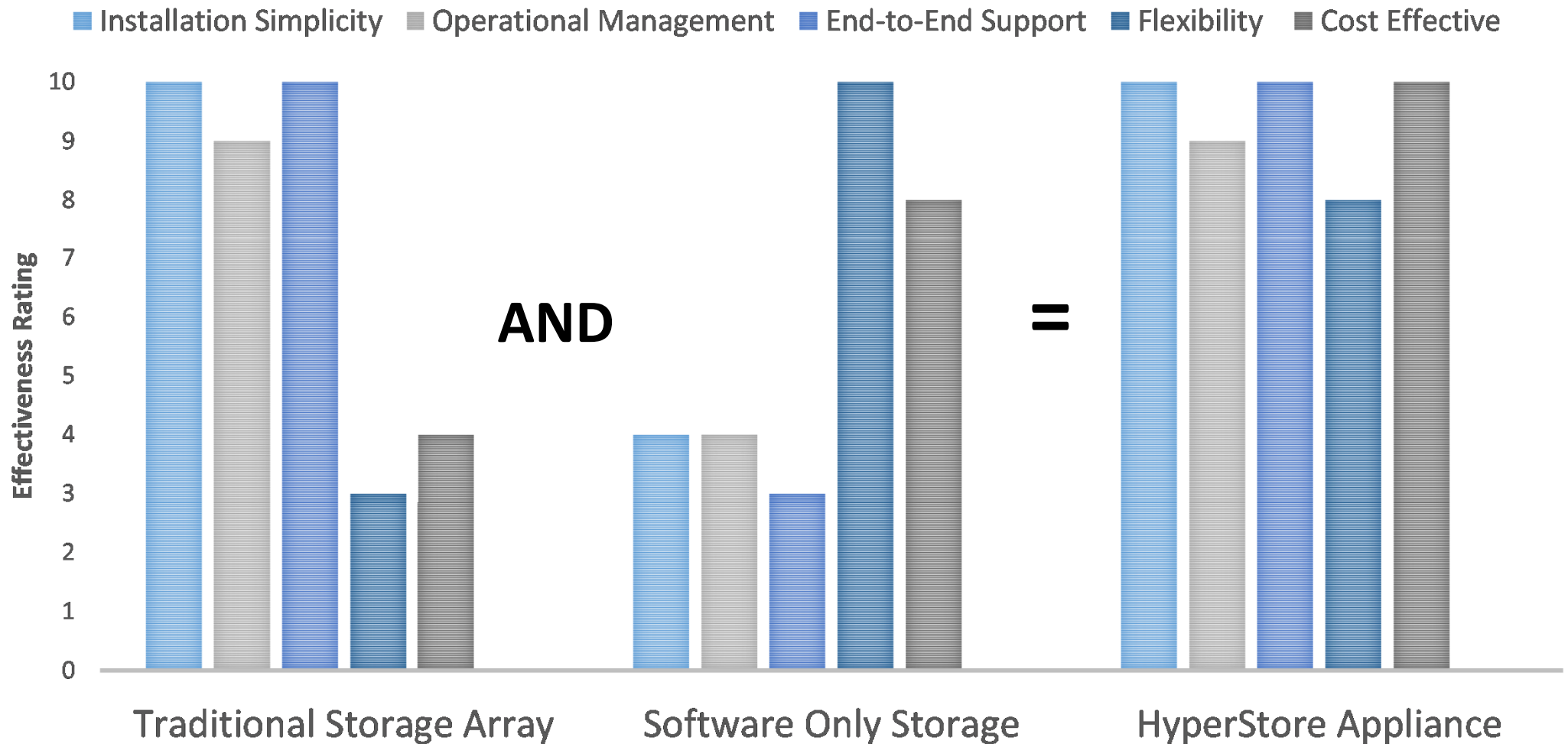
CMC: Multiple Files Upload



Deep Dive

THE HYPERSTORE APPLIANCE

Meeting the Needs of the Enterprise



Tech Specs 1/2



	HSA1024	HSA1048	HSA2060
Use Case	Entry	High Density	Enterprise
Performance/Capacity/Availability Factor	Low	Medium	High
Drives	12	12	12
Drive size	2TB	4TB	5TB
Storage Capacity	24TB	48TB	60TB
Flash Optimized	No	No	Yes
Redundancy and High Availability	Fixed drives Single power supply	Fixed drives Single power supply	Hot pluggable drives Dual Hot pluggable power supplies
Protocols Support	NFS, S3 API	NFS, S3 API	NFS, S3 API
Expansion Slot (SAS expander)	No	No	Yes
Network Interfaces	2x1Gb (optional 2x10Gb)	2x1Gb (optional 2x10Gb)	2x1Gb Standard 2x10Gb
Form Factor	1U Rackmount	1U Rackmount	2U Rackmount

Tech Specs 2/2



	HSA1024		HSA1048		HSA2060	
CPU	1x Intel® Xeon® processors E3-1200		1x Intel® Xeon® processors E3-1200		2x Intel® Xeon® processor E5-2600	
Memory	32GB		32GB		64GB	
SSD	No		No		2 x 300GB	
Monitoring/Management	CLI, GUI, API, IPMI		CLI, GUI, API, IPMI		CLI, GUI, API, IPMI	
Power Supply	650W High-efficiency Power Supply		650W High-efficiency Power Supply		920W Redundant Power Supplies	
Dimensions	Height	1.7" (43mm)	Height	1.7" (43mm)	Height	3.5" (89mm)
	Width	17.2" (437mm)	Width	17.2" (437mm)	Width	17.2" (437mm)
	Depth	35.75" (908mm)	Depth	35.75" (908mm)	Depth	25.5" (648mm)
	Gross Weight	38 lbs (16.5kg)	Gross Weight	38 lbs (16.5kg)	Gross Weight	61 lbs (27.7kg)
Front Panel	Buttons	Power On/Off	Buttons	Power On/Off	Buttons	Power On/Off button
	button	System Reset	button	System Reset	button	System Reset button
	button	Power LED	button	Power LED	button	Power LED
	LEDs		LEDs		LEDs	Hard drive activity LED
						Network activity LEDs
						System Overheat LED
						Power fail LED
System Cooling	8x Heavy duty fans w/ optimal fan speed control		8x Heavy duty fans w/ optimal fan speed control		3x 8cm 9.5K RPM, 4-pin PWM fans	
RoHS	Compliant		Compliant		Compliant	

Enterprise Grade at 1C per GB per Month

ENTRY HSA 1024



Pricing 24TB (5year)

\$12.9K List Appliance
\$1.29k Support/yr (10% List)

1.25c/GB/Month



CAPACITY HSA 1048



Pricing 48TB (5year)

\$17.9K List Appliance
\$1.79k Support/yr (10% List)

0.85c/GB/Month



ENTERPRISE HSA 2060



Pricing 60TB (5year)

\$29.5K List Appliance
\$2.95k Support/yr (10% List)

1.03c/GB/Month

