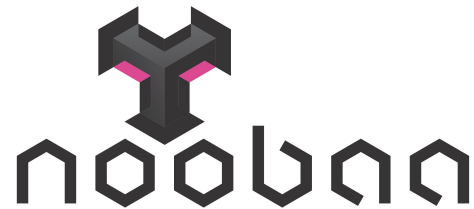




OpenShift Storage Foundation (OSF)

Behind The Upstream Technology



Persistent Volume

Block

- Primary for DB and Transactional workloads
- Low latency
- Messaging

Provided by Rook-Ceph

Shared File System

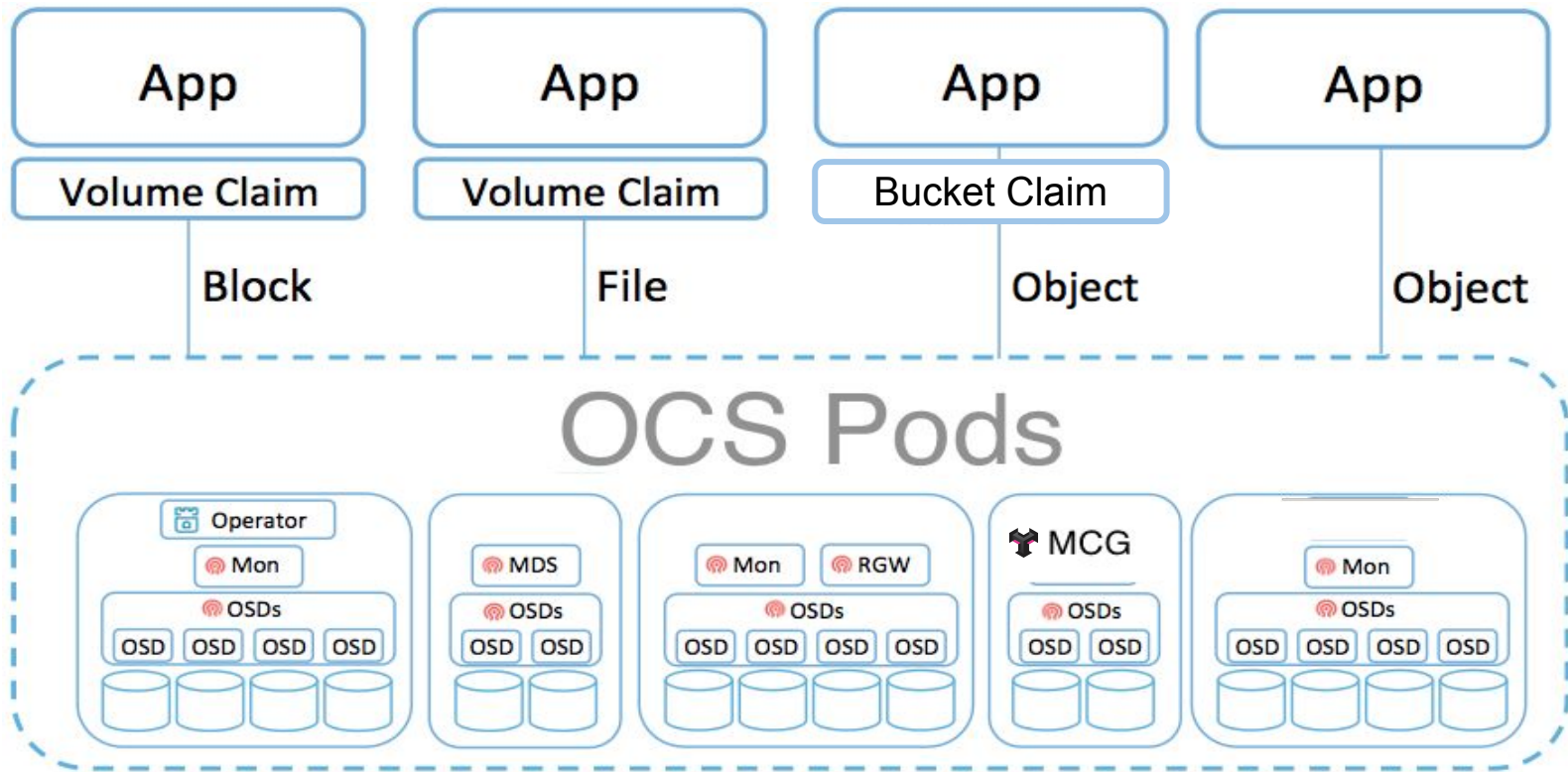
- POSIX-compliant shared file system
- Interface for legacy workloads
- CI/CD Pipelines
- AI/ML Data Aggregation
- Messaging

Provided by Rook-Ceph

Object Service

- Media, AI/ML training data, Archiving, Backup, Health Records
- Great Bandwidth performance
- Object API (S3/Blob)

Provided by NooBaa



The screenshot displays the Red Hat OpenShift OperatorHub interface. The left sidebar contains navigation links: Home, Catalog (Developer Catalog, Installed Operators), OperatorHub (selected), Operator Management, Workloads, Networking, Storage, Builds, Monitoring, Compute, and Administration. The main content area is titled 'OperatorHub' and includes a description: 'Discover Operators from the Kubernetes community and Red Hat partners, curated by Red Hat. Operators can be installed on your clusters to provide optional add-ons and shared services to your developers. Once installed, the capabilities provided by the Operator appear in the Developer Catalog, providing a self-service experience.'

Below the description, there are filters for 'All Items' (25 items) and a list of operators. The operators are categorized by 'INSTALL STATE' (Installed (0), Not installed (25)) and 'PROVIDER TYPE' (Red Hat (1), Certified (2), Community (22)). The operators listed include:

- AMQ Streams (provided by Red Hat, Inc.)
- Automation Broker Operator (provided by Red Hat, Inc.)
- OpenShift Container Storage Converged Mode (provided by Red Hat)
- OpenShift Container Storage Independent Mode (provided by Red Hat)
- CockroachDB (provided by Helm Community)
- Couchbase Operator (provided by Couchbase)
- Descheduler (provided by Red Hat)
- Dynatrace OneAgent (provided by Dynatrace LLC)

A hand cursor is pointing at the 'OpenShift Container Storage Converged Mode' operator card.

ROOK-CEPH



Rook: Automating Ceph for Kubernetes via an Operator

Platform Revolution: Kubernetes

- Kubernetes is the new platform for applications
- Based on containers
- <https://kubernetes.io/>

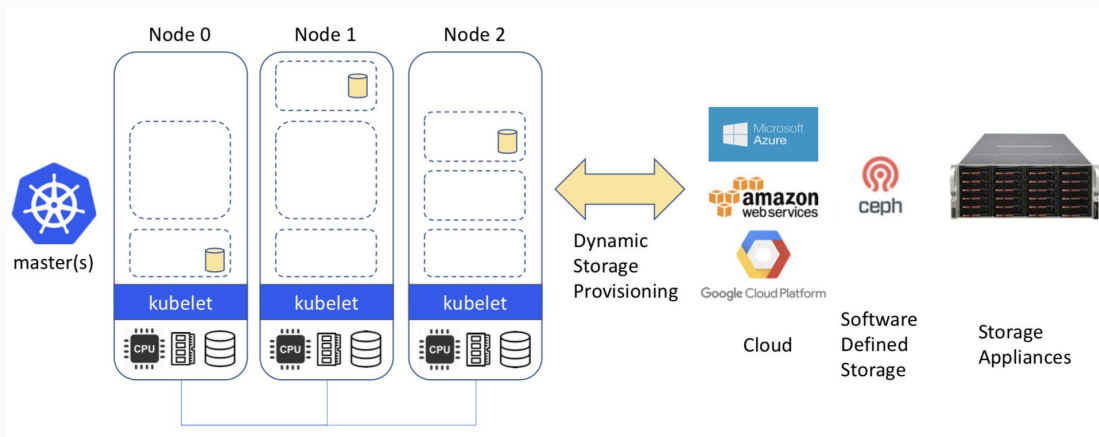
Platform Revolution: OpenShift

- Red Hat® OpenShift® is a comprehensive enterprise-grade application platform, built for containers with Kubernetes.
- OpenShift is Red Hat's distro of Kubernetes
- <https://www.openshift.com/>



Storage for Kubernetes

- Storage is traditionally external
- Volume plugins allow storage solutions to provide storage to your apps

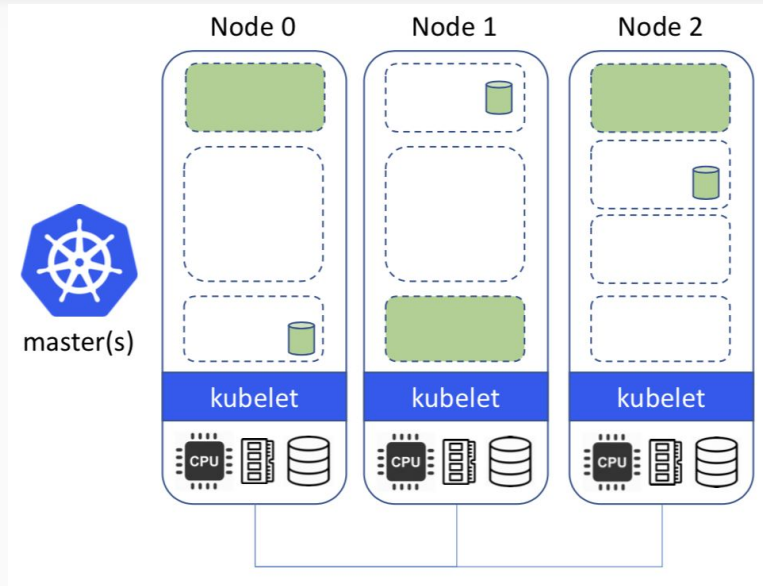


Traditional Storage Limitations

- Not portable: requires these services to be accessible
- Deployment burden of external solutions
- Vendor lock-in due to using provider managed services

Storage ON Kubernetes

- Kubernetes can manage our storage solution
- Highly portable applications (including storage dependencies)
- Dedicated K8s storage cluster also possible



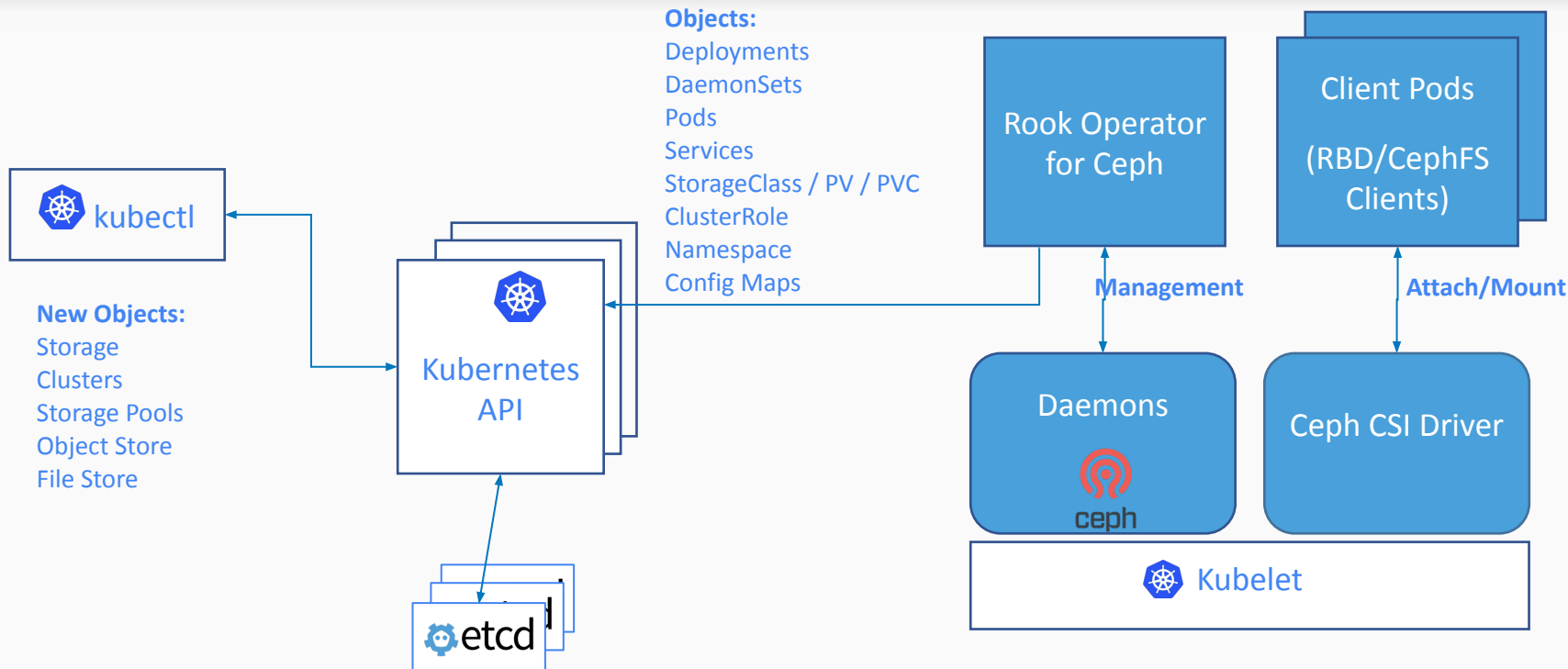
What is Rook?

- <https://rook.io>
- Storage Operator for Kubernetes
- Uses Kubernetes patterns (custom types and controllers)
- Automates deployment, bootstrapping, configuration, provisioning, scaling, upgrading, and resource management
- Open Source (Apache 2.0)
- Hosted by the Cloud-Native Computing Foundation (CNCF)
- Framework for several storage providers
 - Ceph: <https://www.ceph.com>

Rook Project

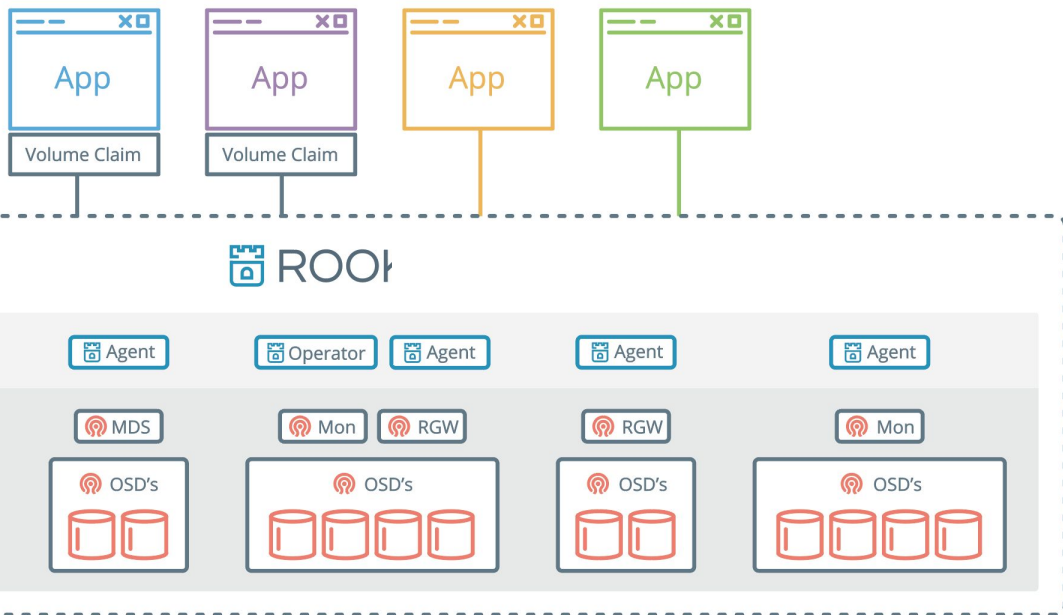
- Upstream
 - v1.1 is targeted for release on Sept 10th
 - <https://www.operatorhub.io/>
- Downstream
 - Integration in progress: RHHI Next and OCS 4.2
 - Today: Feature complete

Rook Architecture



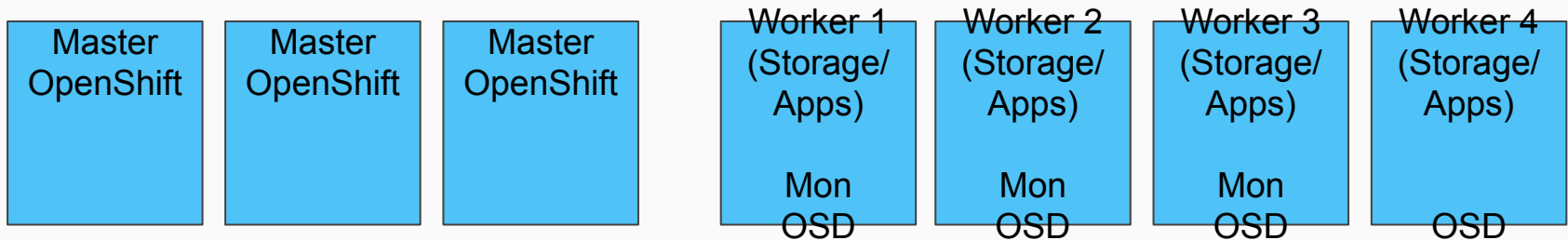
Ceph on Kubernetes with Rook

Rook Architecture



DEMO: Rook Walkthrough

Start a Ceph cluster on OpenShift



Operator Pattern

- OpenShift strategy: Operators are the future of automation
- Codifies domain expertise to deploy and manage an application
 - Automates actions a human would normally do
- Apply user's desired state
 - Observe - discover current actual state of cluster
 - Analyze - determine differences from desired state
 - Act - perform operations to drive actual towards desired

Rook Ceph Operator

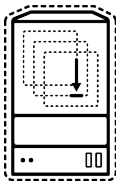
- The Operator leverages the full power of K8S
 - Services, ReplicaSets, DaemonSets, Secrets, ...
- Contains all the logic to manage storage systems at scale
 - Handle stateful upgrades
 - Handle rebalancing the cluster
 - Handle health and monitoring tasks
- Not on the data path – can be offline for minutes

MULTI-CLOUD OBJECT GATEWAY



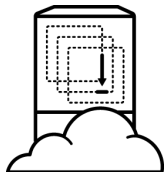
Start lean

A single lightweight pod for basic development and tests



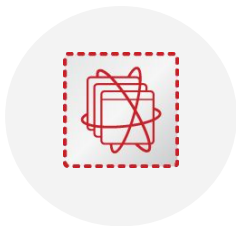
Scale locally

Scale with local volumes or Red Hat Ceph Storage



Workload portability

Easily mirror data to other cluster or native cloud storage



NOOBAA CORE

Managing the data flow
Providing the object service



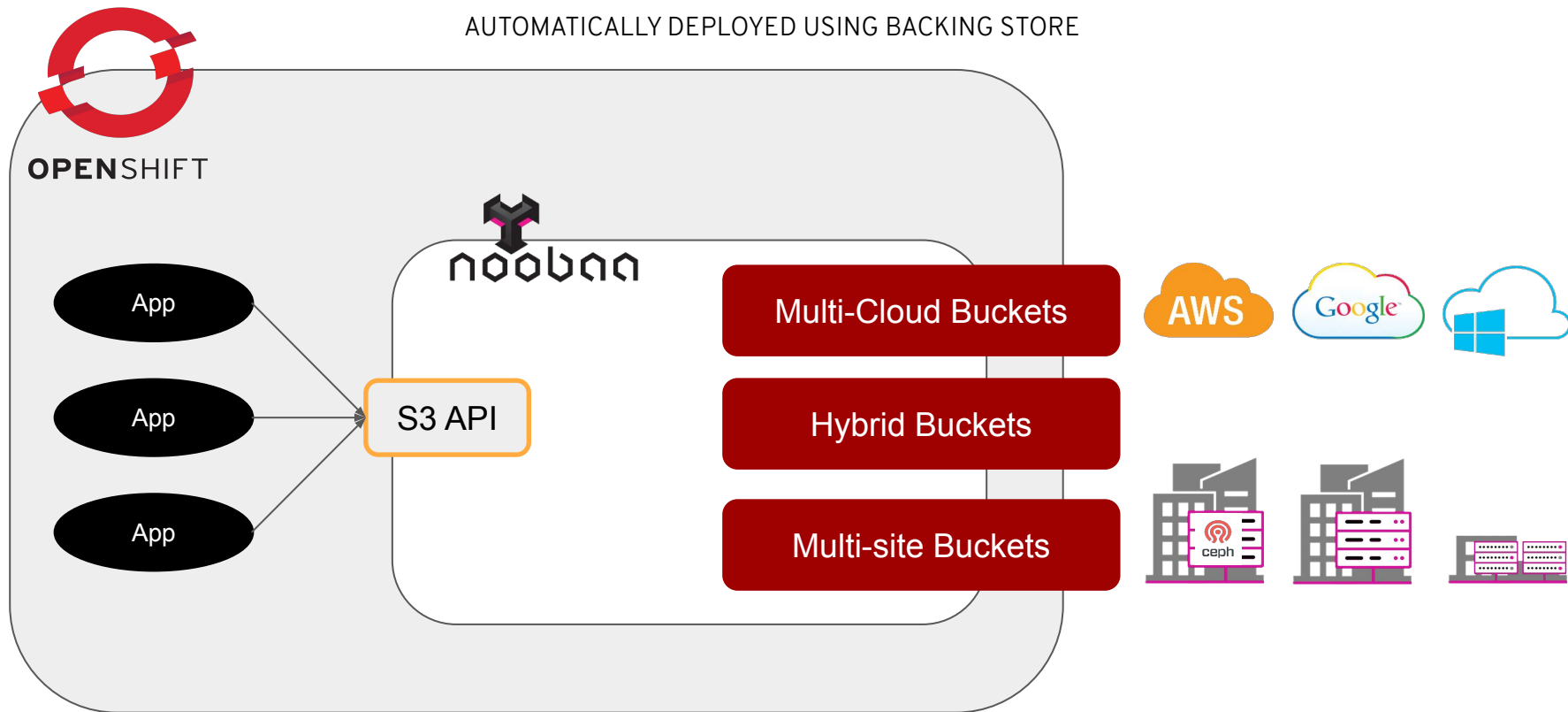
NOOBAA OPERATOR

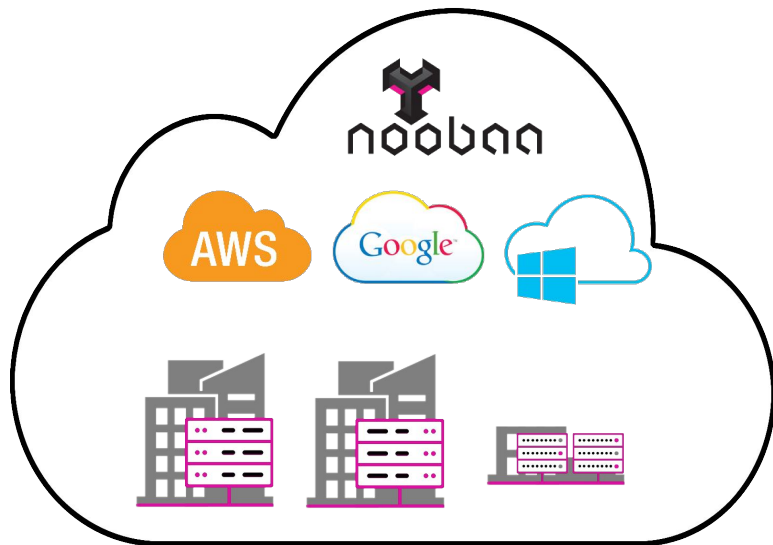
Deployment and second day
operations



COMMAND LINE

Bringing user experience to data
management





HIGH STACK - DATA MANAGEMENT

- ❖ Active Active – Keep your data available
- ❖ Flexible – Any resource, on premises or cloud
- ❖ Secured – All data encrypted, managed

LOW STACK - DATA EFFICIENCY LAYER

- ❖ Compression
- ❖ Inline Deduplication

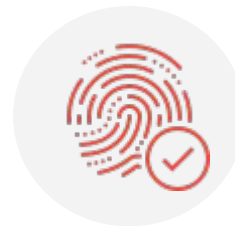
ENABLING THE OPEN HYBRID CLOUD

**ENCRYPTION AT REST AND IN MOTION**

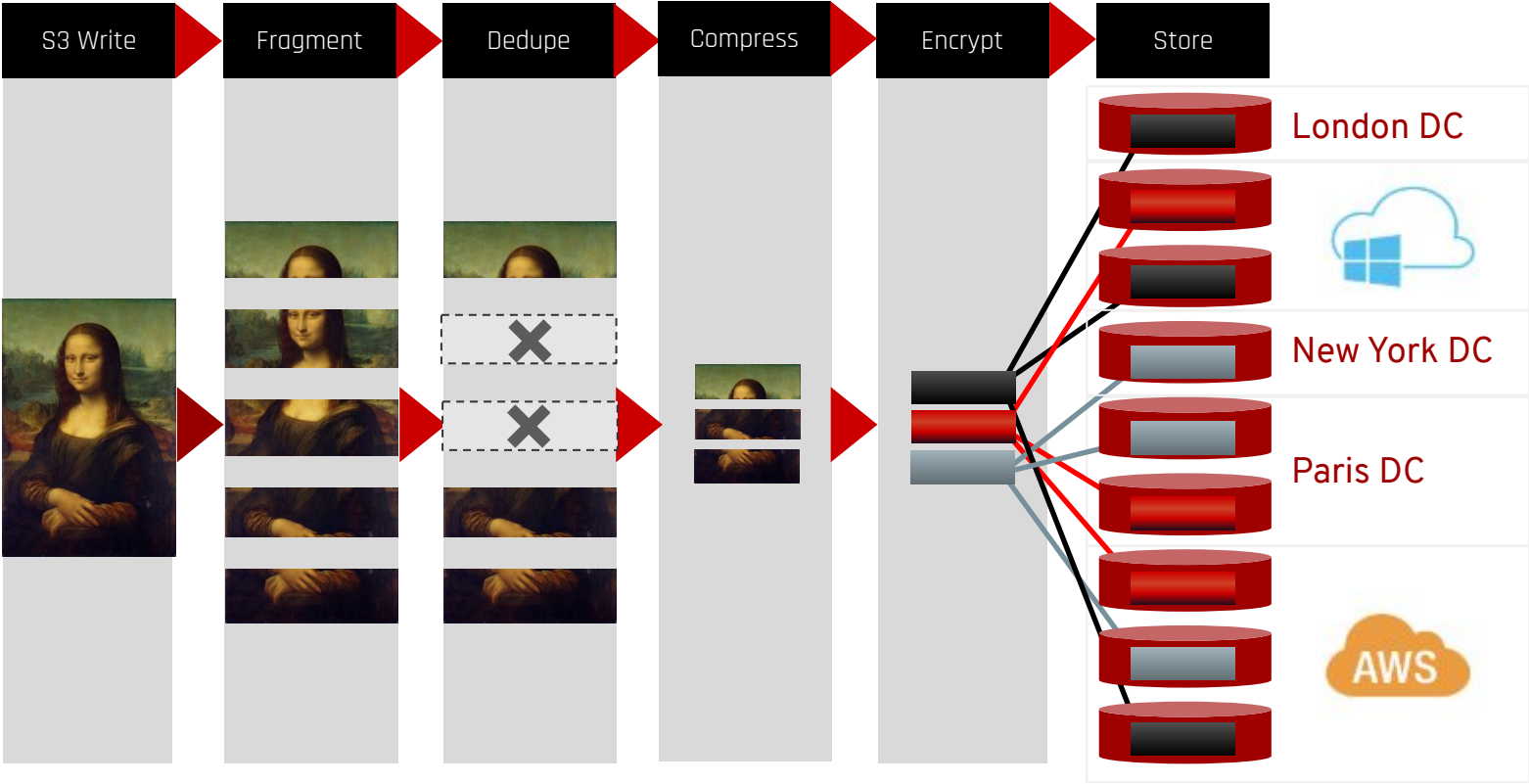
Every chunked data is encrypted with its own key using AES 256. Separation between the key management and the data.

**ANONYMIZATION & MASKING**

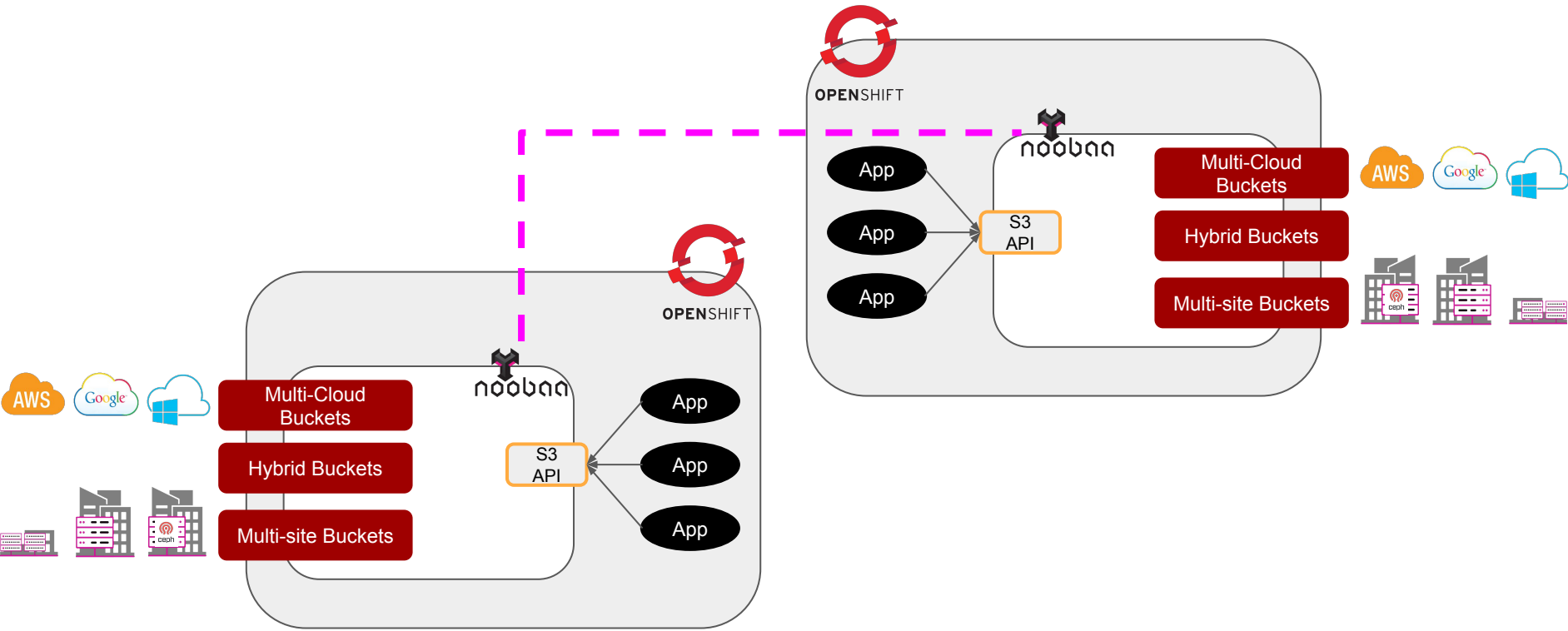
Unique customizable data flow, that can anonymize or mask your own data before storing or collaborating

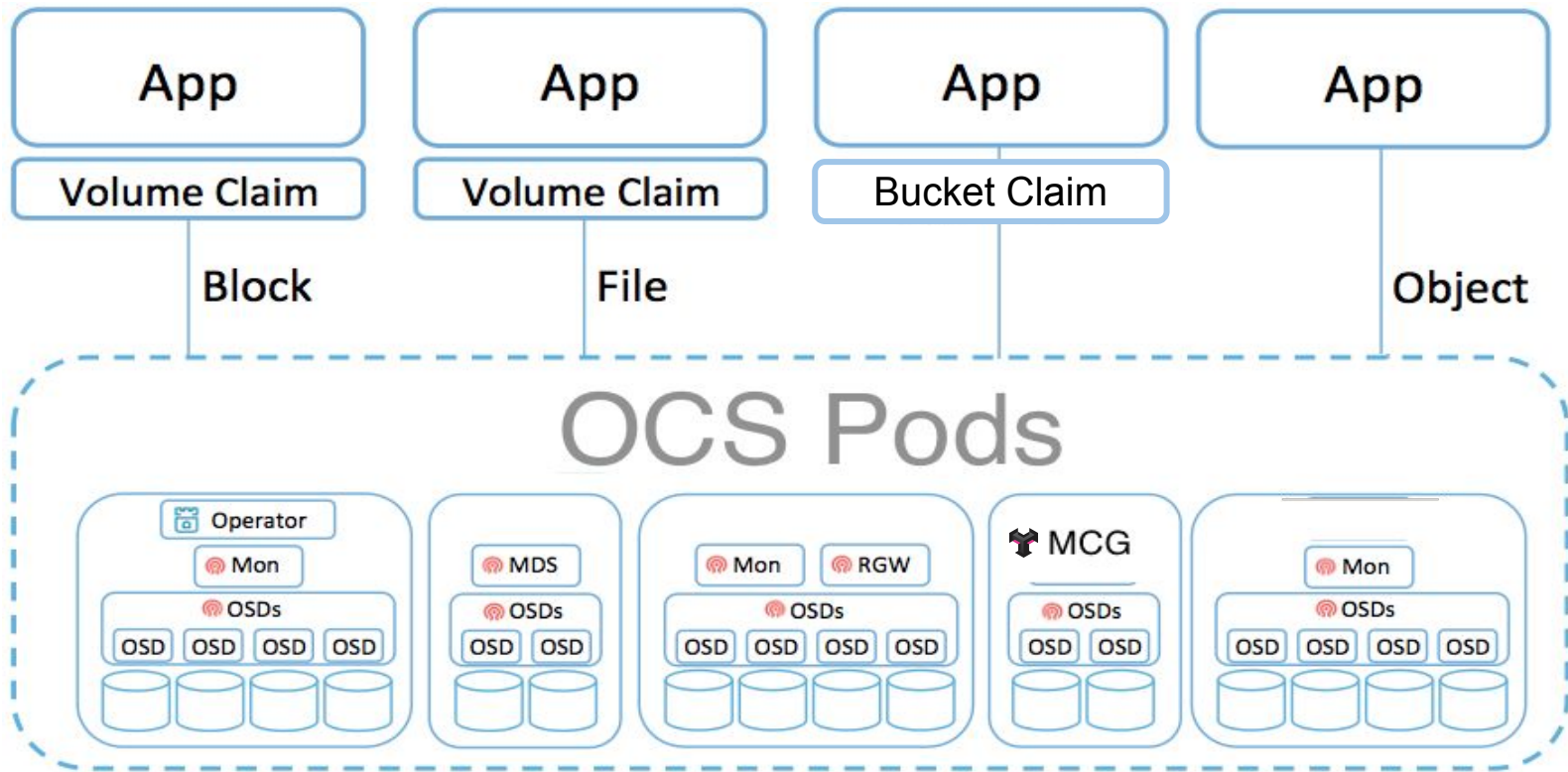
**FINGERPRINTING**

Automatic data fingerprinting with self-healing and trust management of the storage nodes



MULTI-CLUSTER ENVIRONMENT





OPEN SOURCE

- <https://github.com/noobaa>
- Open issues for any question you have.
- Follow <https://twitter.com/NooBaaStorage>

Thank you

Red Hat is the world's leading provider of
enterprise open source software solutions.
Award-winning support, training, and consulting
services make
Red Hat a trusted adviser to the Fortune 500.



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