Red Hat Storage

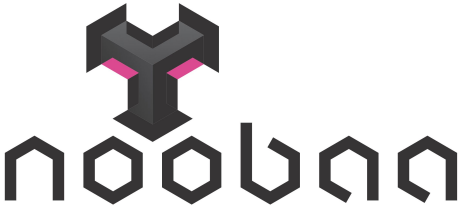
# OpenShift Container Storage (OCS)

Behind The Upstream Technology



Red Hat

# TECHNOLOGY STACK



## 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**

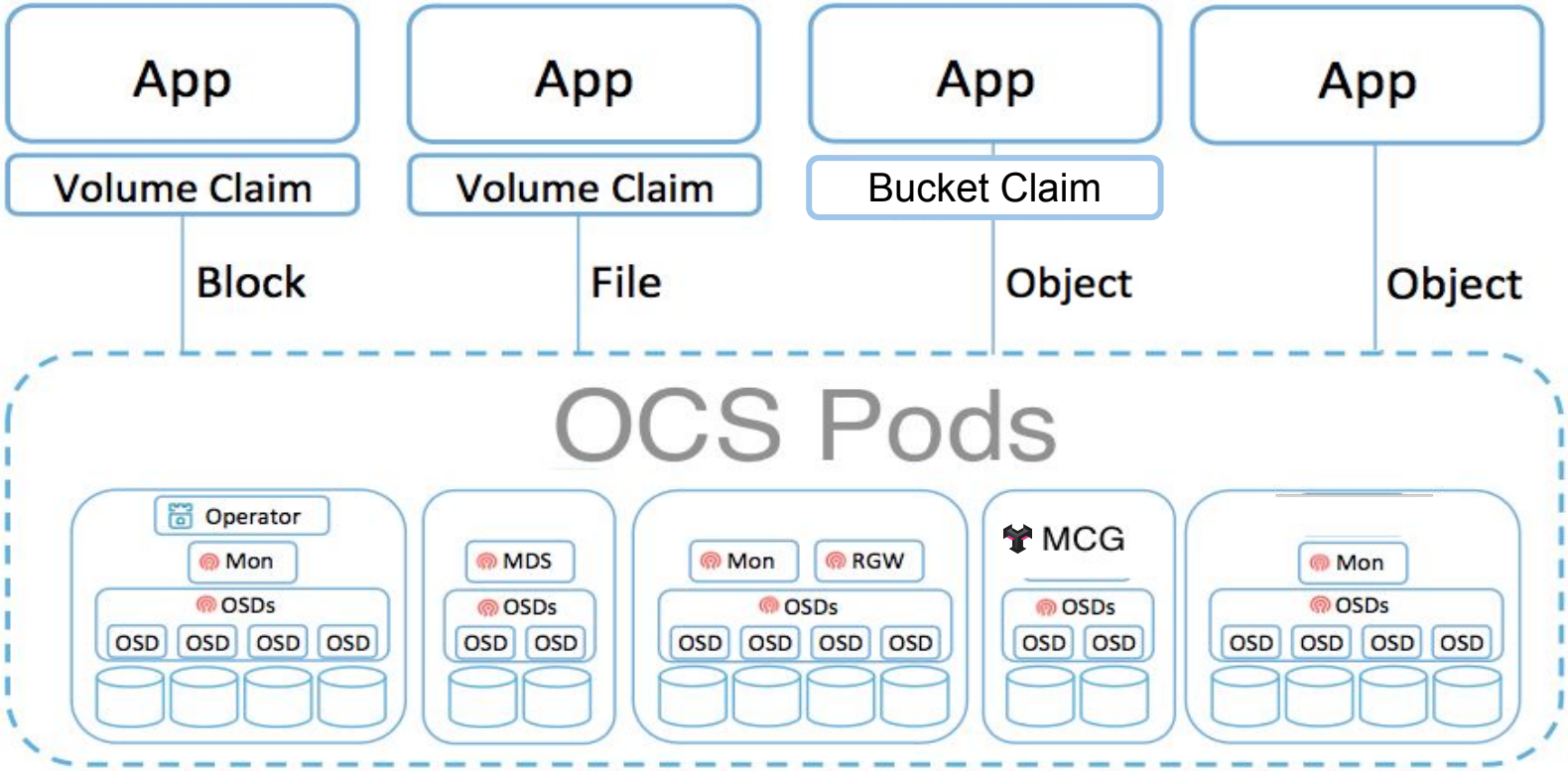
## Object Service

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

**Provided by NooBaa**

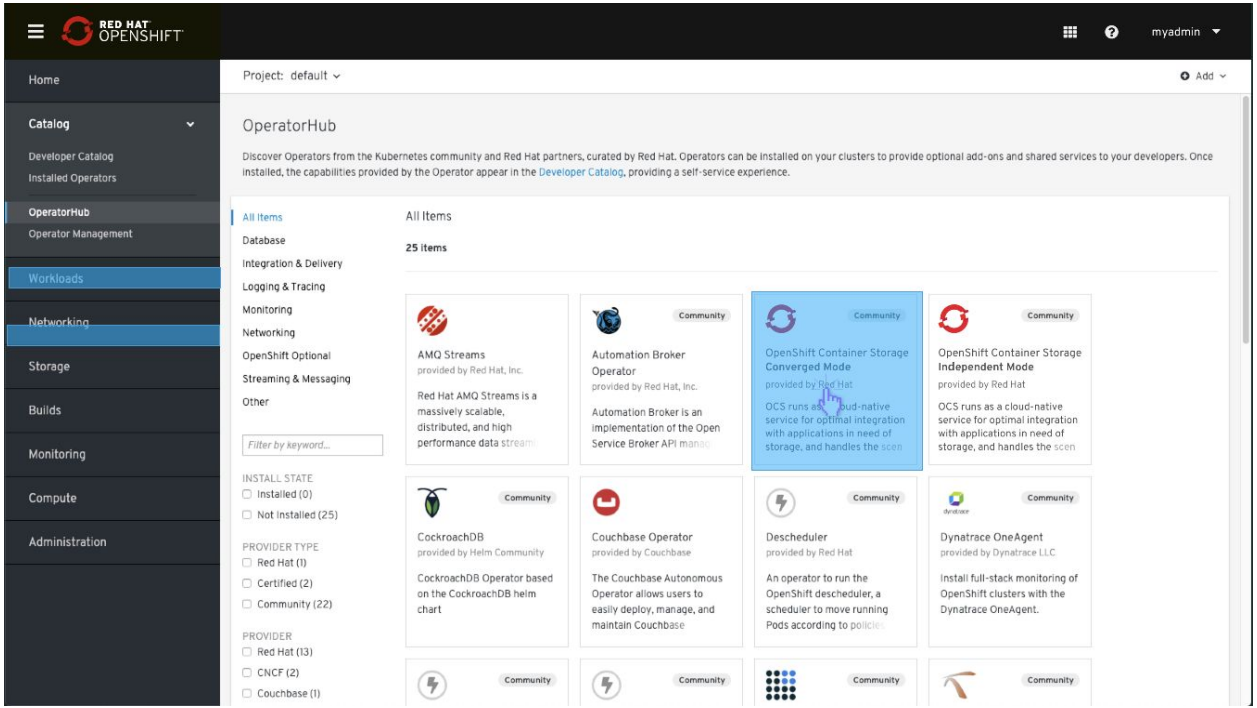
# OCS Operator





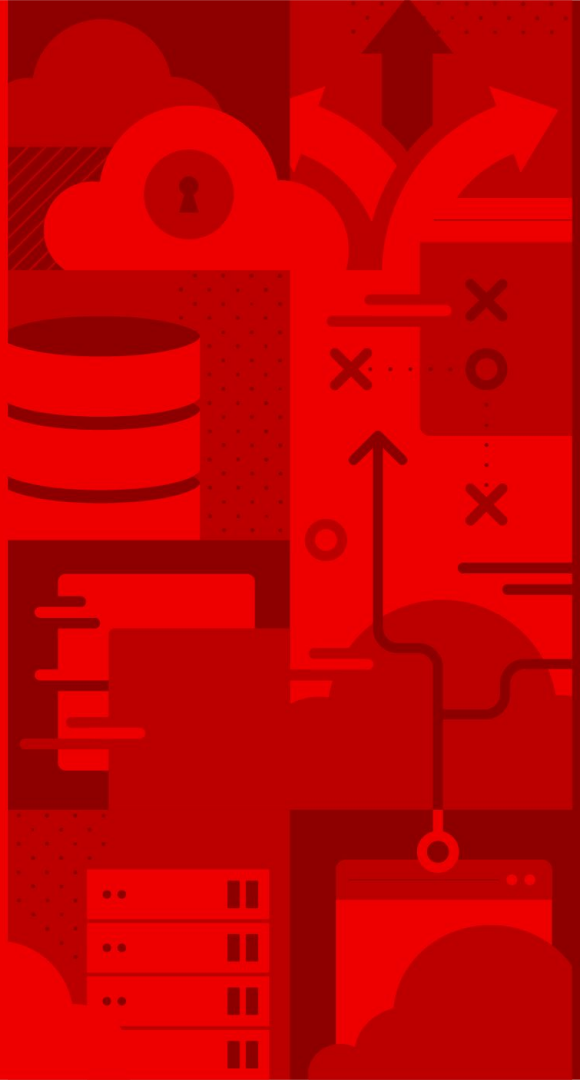
# INTEGRATED INTO OPENSHIFT OPERATORS HUB








Red Hat



# ROOK-CEPH



Red Hat

# Rook: Automating Ceph for Kubernetes via an Operator

# Platform Revolution: Kubernetes

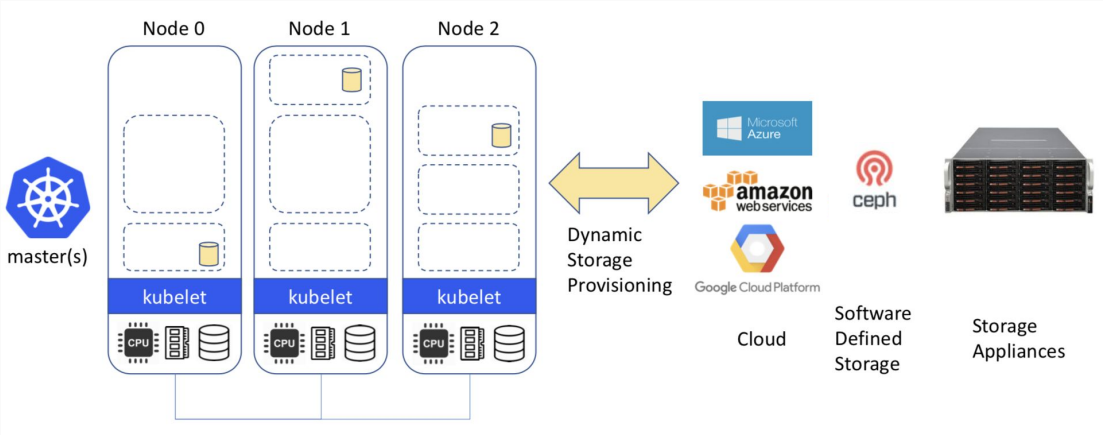
- Kubernetes is the new platform for applications
- Based on containers
- https://kubernetes.io/

# 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

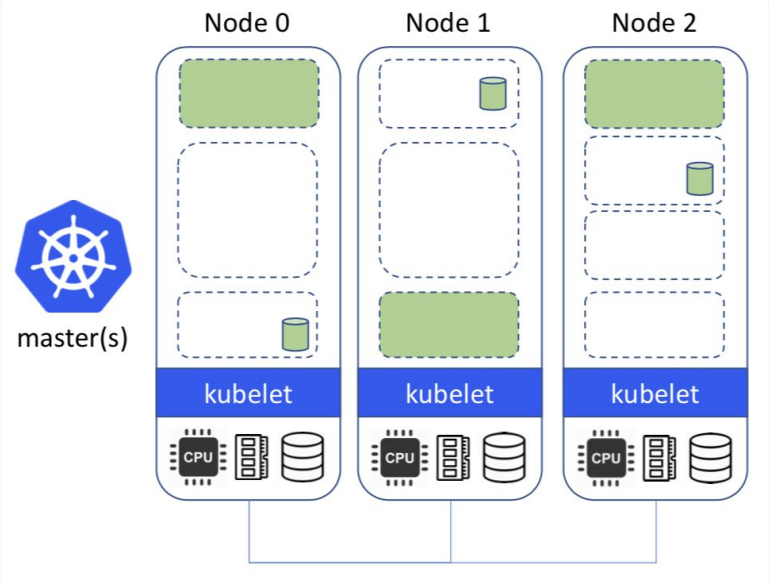


# Traditional Storage Limitations

- 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



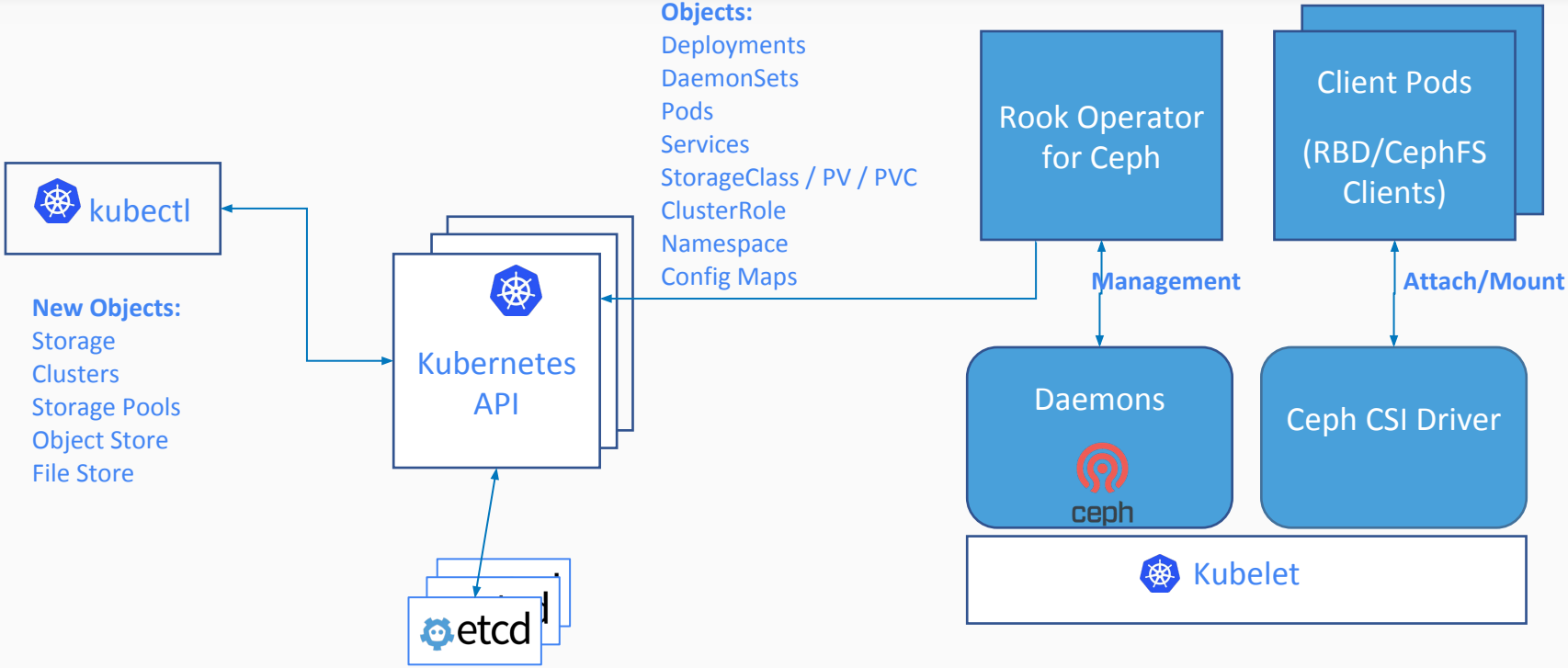
# What is Rook?

- 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

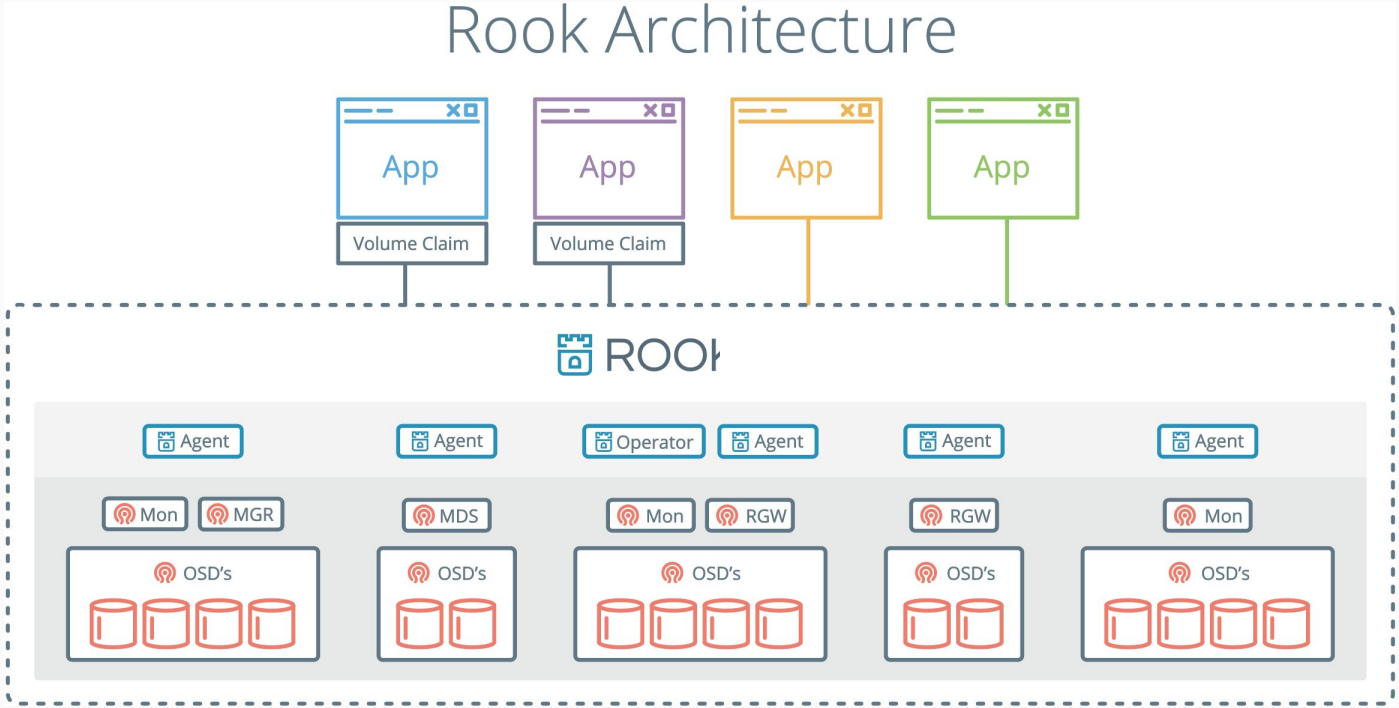
# Rook Project

- 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

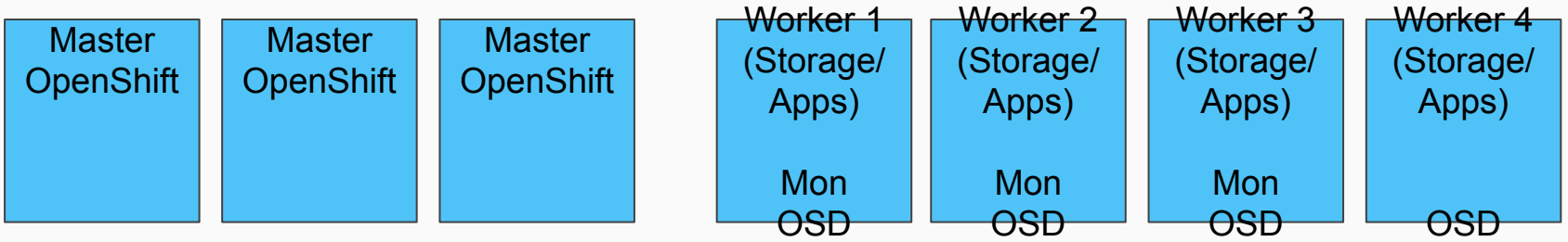


# Ceph on Kubernetes with Rook



# DEMO: Rook Walkthrough

Start a Ceph cluster on OpenShift

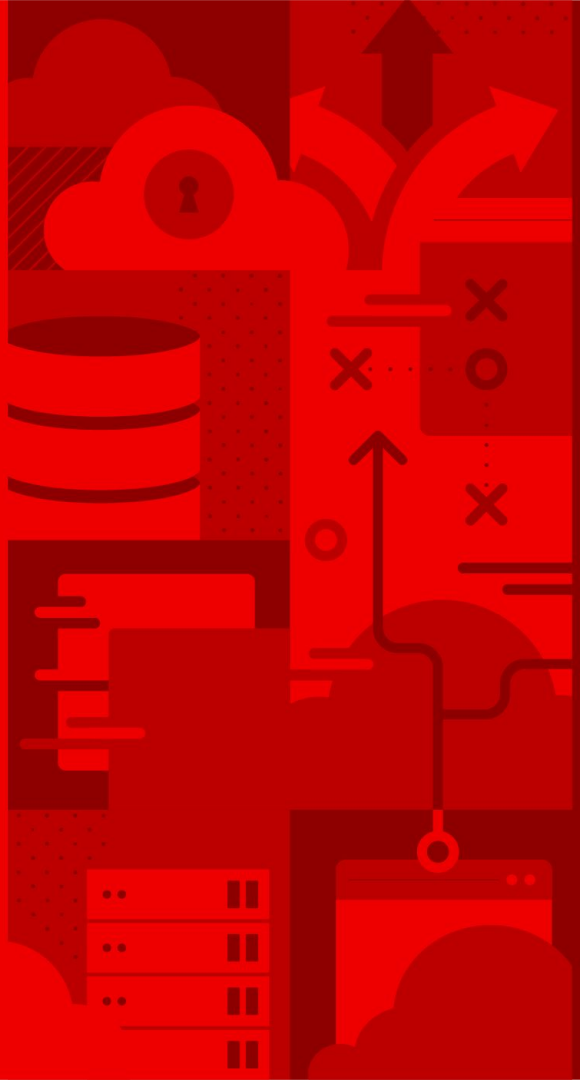


# Operator Pattern

- 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

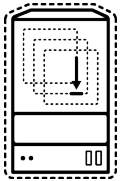
- The Operator leverages the full power of K8S
  - Services, ReplicaSets, DaemonSets, Secrets, …
- Contains all the logic to manage storage systems at scale
  - Handle stateful upgrades
  - Handle rebalancing the cluster
  - Handle health and monitoring tasks
- Not on the data path – can be offline for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



# MULTI-CLOUD OBJECT GATEWAY

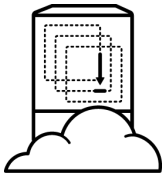
**Start lean**

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

# MAJOR COMPONENTS

## NOOBAA CORE

Managing the data flow

Providing the object service

## NOOBAA OPERATOR

Deployment and second day operations

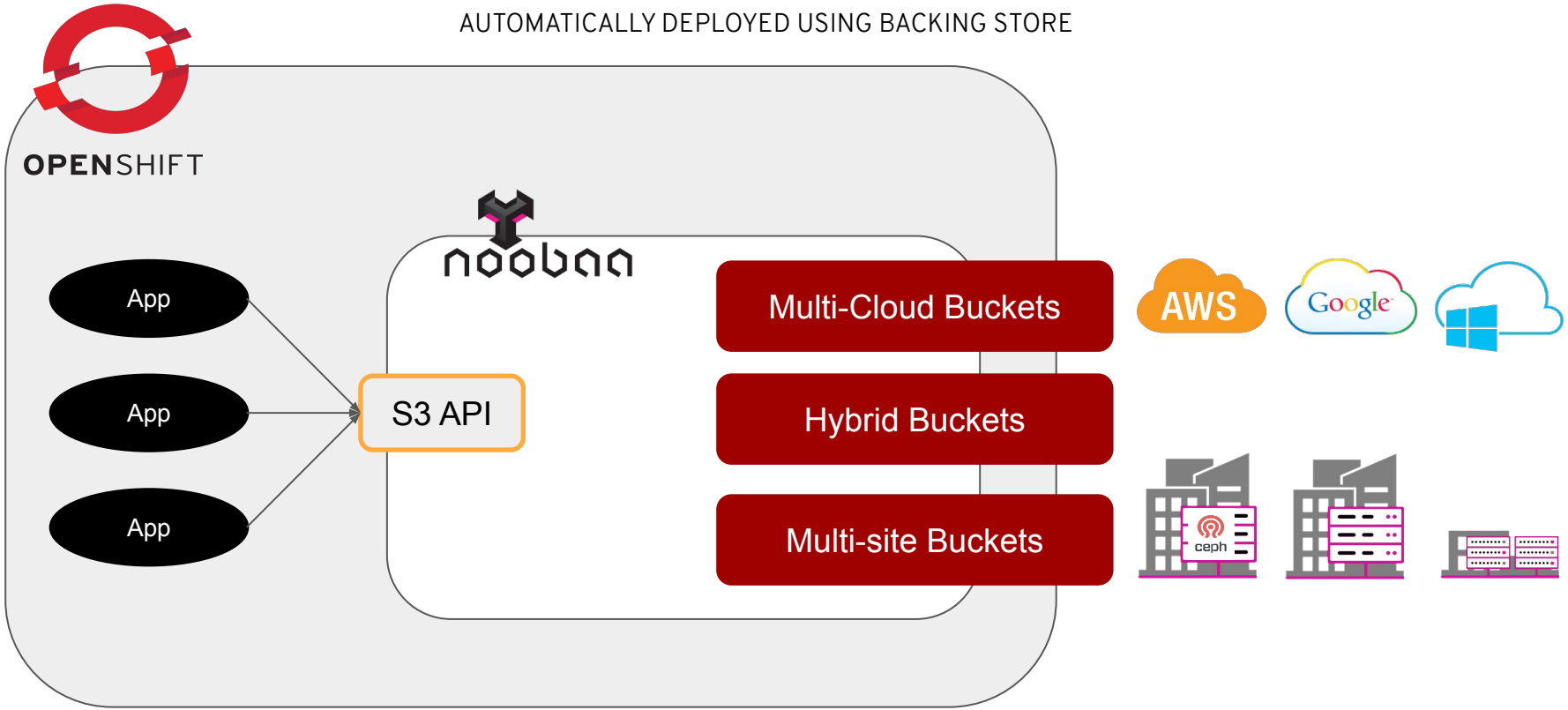
## COMMAND LINE

Bringing user experience to data management



Red Hat

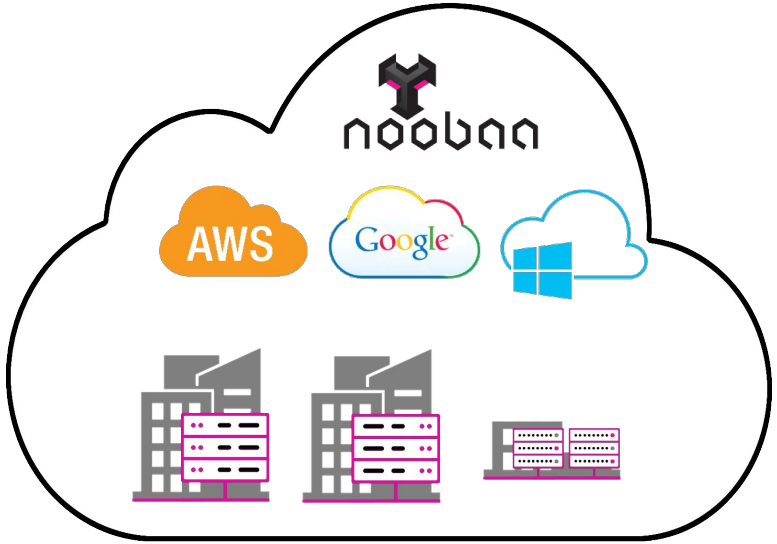
# MULTI CLOUD OBJECT GATEWAY






Red Hat

# SPANNED ACROSS A CONTINUOUS FABRIC




## 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

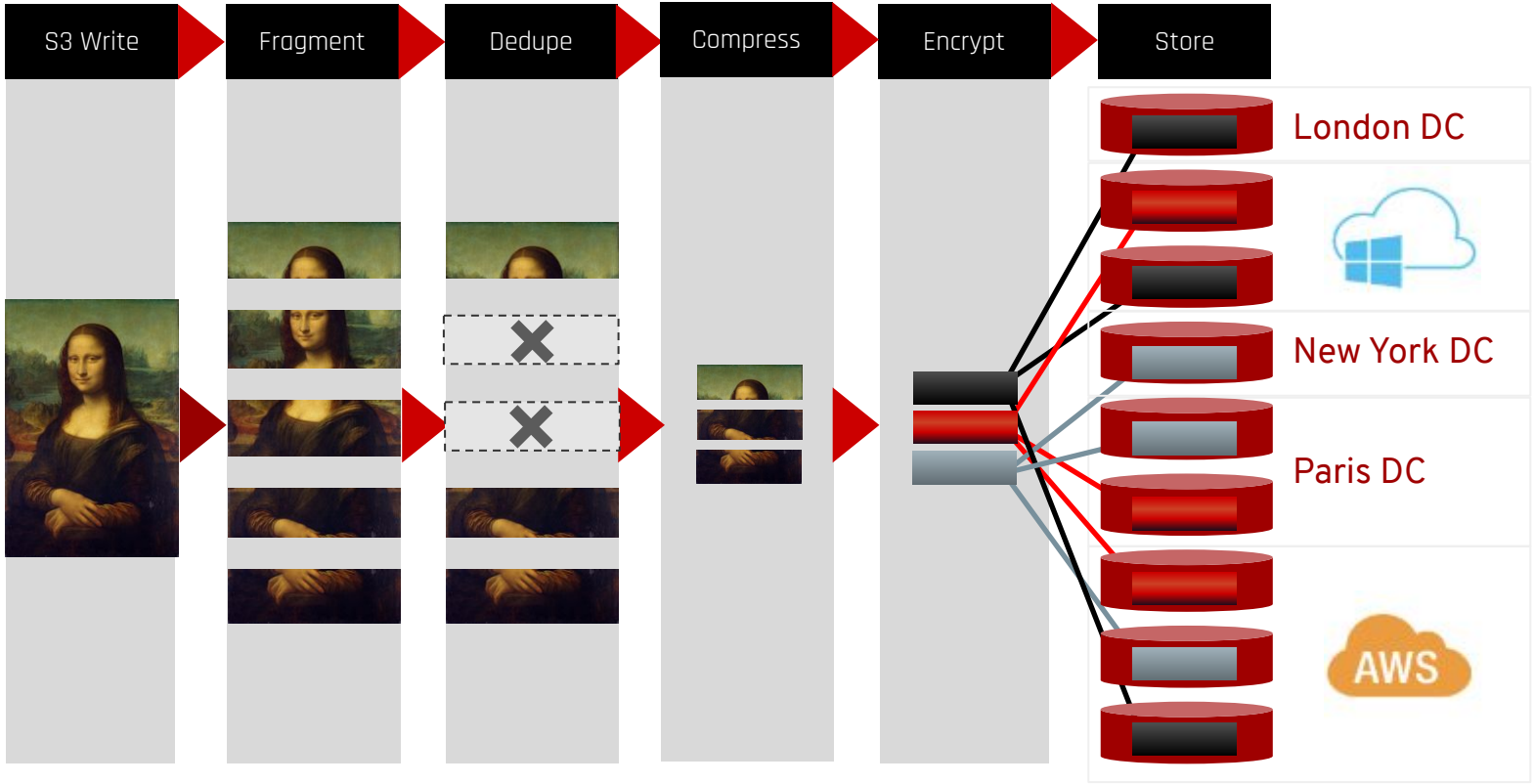
Unique customizable data flow, that can anonymize or mask your own data before storing or collaborating

## FINGERPRINTING

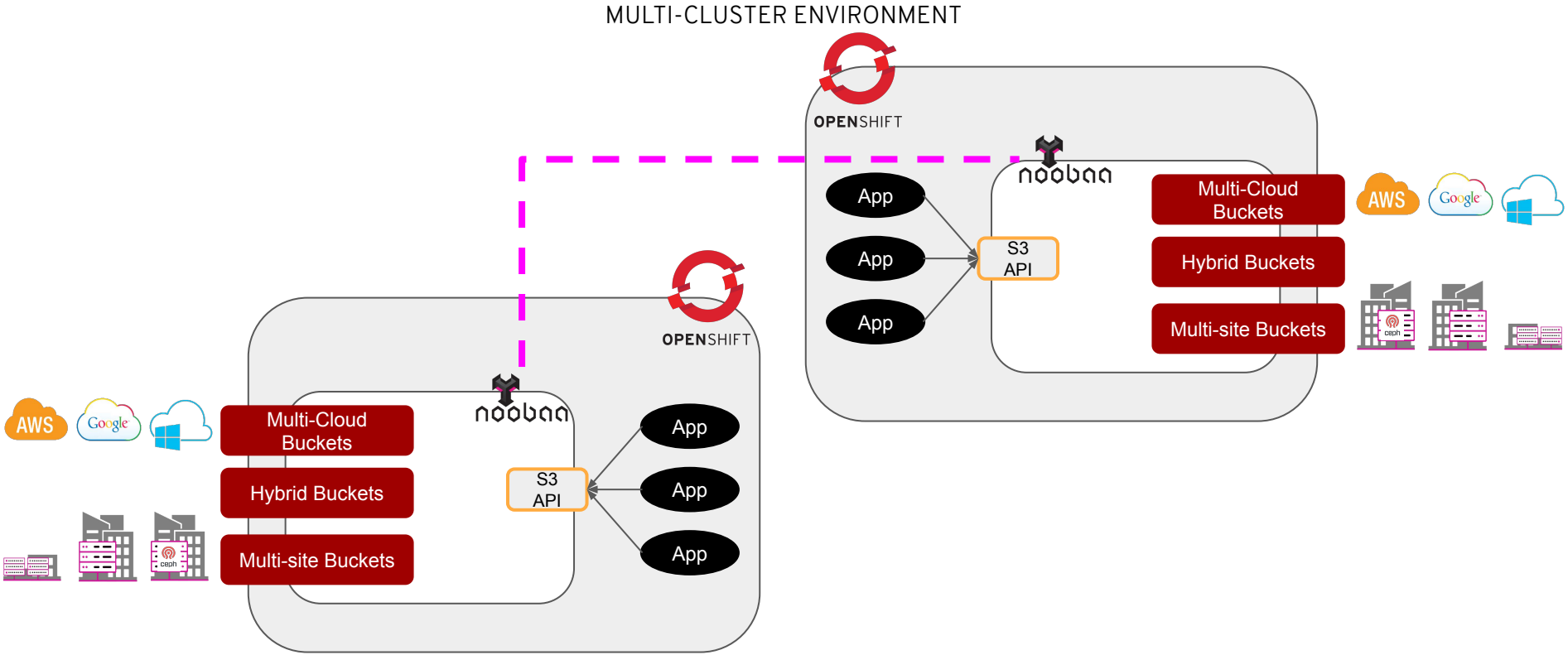
Automatic data fingerprinting with self-healing and trust management of the storage nodes

# EFFICIENCY AND SECURITY BY DEFAULT





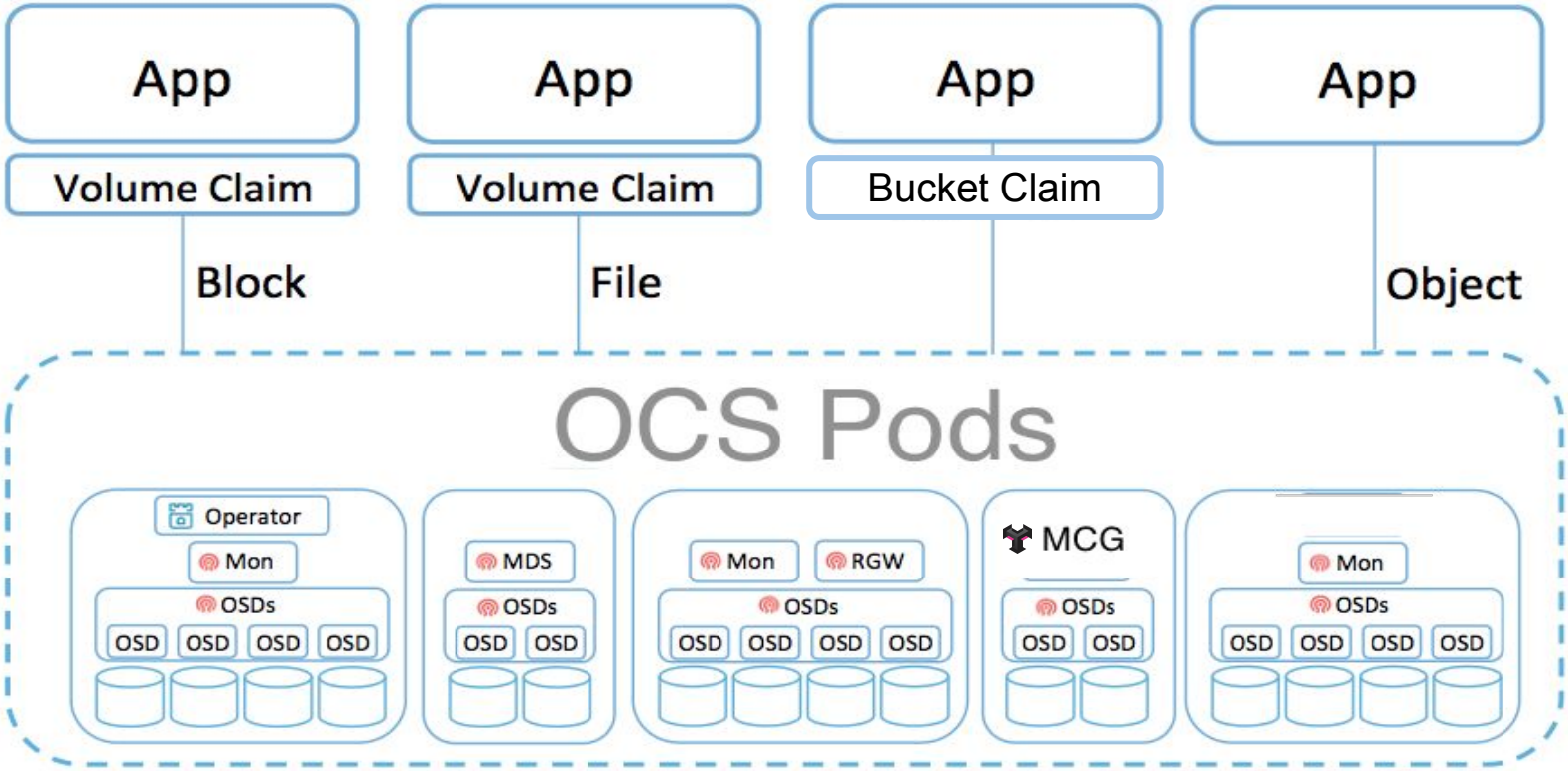
# MULTI CLOUD OBJECT GATEWAY






Red Hat

RED HAT CONFIDENTIAL



# 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.

linkedin.com/company/red-hat

youtube.com/user/RedHatVideos

facebook.com/redhatinc

twitter.com/RedHat



Red Hat