

# OPENShift CONTAINER STORAGE

OpenShift commons Milan

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# POSSIBLE STORAGE PROVIDERS

- NFS
  - GlusterFS
  - OpenStack Cinder
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- iSCSI
  - Fibre Channel
- Ceph RBD
  - AWS Elastic Block Store (EBS)
  - GCE Persistent Disk
- VMWare vSphere
  - Container Storage Interface (CSI)
  - Dynamic Provisioning and Creating Storage Classes
- Azure Disk
  - Azure File
  - FlexVolume

# STORAGE PROVISIONING IN OPENSIFT

- **STATIC PROVISIONING**

Storage Admin creates storage volumes upfront

OpenShift selects a predefined volume based upon claim, nearest available size

No automated housekeeping - causing administrative burden

Error Prone due to increasing complexity and resulting administrative overhead

- **DYNAMIC PROVISIONING**

OpenShift user requests for storage by persistent volume claim (PVC)

Storage system does the needful in an automated way

Delivers the exact requested size and type storage volume

No administrative overhead and storage admin involvement upfront

Automated housekeeping, better efficiency

# 4 BASIC STORAGE NEEDS IN OPENSOURCE

- **REGISTRY STORE**

Where container base images reside.

By default not redundant, therefore possible point of failure. OCS resolves this.

- **PERSISTENT FILE STORAGE FOR CONTAINERS**

Container application state is held in this persistent file storage

- **PERSISTENT BLOCK STORAGE FOR CONTAINERS**

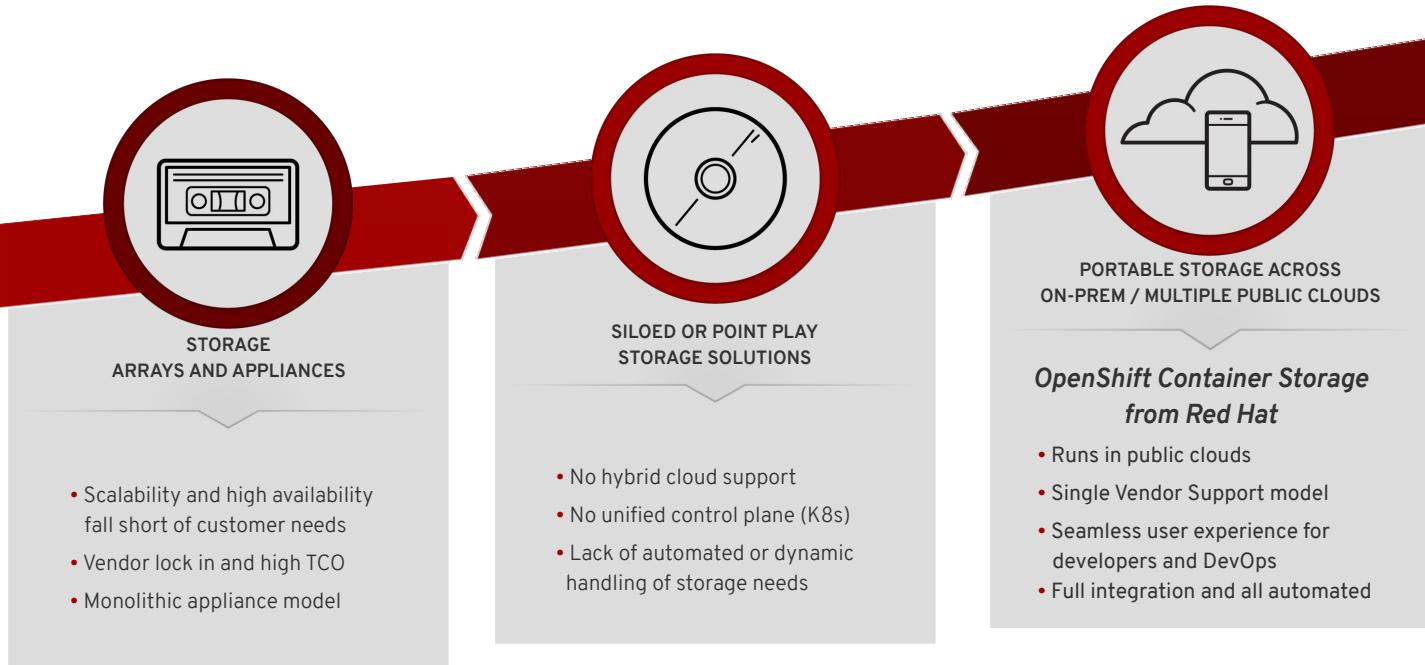
Specific storage type for specific workloads that require certain performance  
i.e. Database workloads, Logging where Elastic or equivalents are involved.

- **EPHEMERAL STORAGE**

Application internal storage, also named EmptyDir.

Outside scope for container storage

# STORAGE OPTIONS FOR CONTAINERS



# Consistent Storage Experience Across Hybrid Cloud

APPLICATION PORTABILITY AND LOWER COSTS

BARE METAL

RED HAT<sup>®</sup>  
ENTERPRISE  
LINUX<sup>®</sup>



VIRTUAL  
MACHINES

RED HAT<sup>®</sup>  
VIRTUALIZATION



CONTAINERS

RED HAT<sup>®</sup>  
OPENSHIFT  
Container Platform



PRIVATE  
CLOUD

RED HAT<sup>®</sup>  
OPENSTACK<sup>®</sup>  
PLATFORM



PUBLIC  
CLOUD

LEGACY  
STORAGE



RED HAT OPENSHIFT CONTAINER STORAGE

RED HAT OPENSHIFT CONTAINER PLATFORM

The background features a stylized, abstract representation of modern skyscrapers in a deep red color. The buildings are depicted with sharp, angular facades and glass windows, creating a sense of depth and perspective. The lighting is dramatic, with strong highlights and shadows that emphasize the geometric shapes of the structures.

# OCS 3

## OpenShift Container Storage

### Based on GlusterFS technology

# OPENSHIFT PLATFORM STORAGE NEEDS

## OCP Infrastructure



Registry



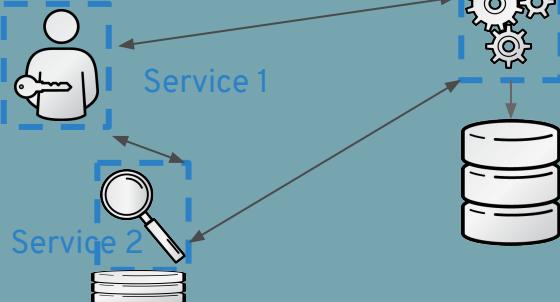
Metrics



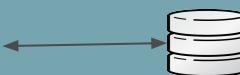
Logging



## OCP Application



## Local/Ephemeral Storage



Openshift Container Storage focus

# PERSISTENT STORAGE FOR CONTAINERS

VALUE PROPOSITION FOR STORAGE ADMIN VS. DEVOPS

## STORAGE FOR CONTAINERS

Persona: Storage Admins, Infrastructure Admins



- Leverage existing investment in traditional storage, managed by storage admin
- Attach to stand alone storage

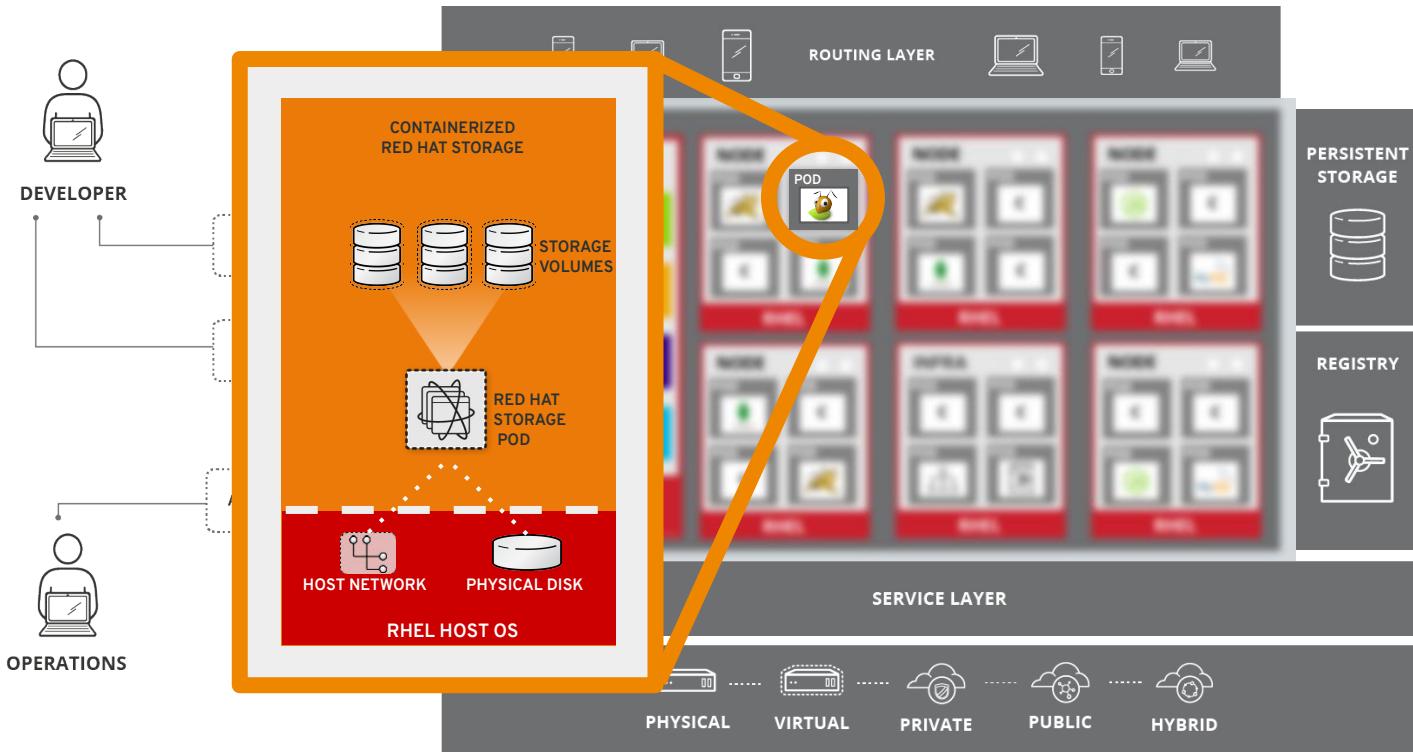
## STORAGE IN CONTAINERS

Persona: DevOps, App Architects

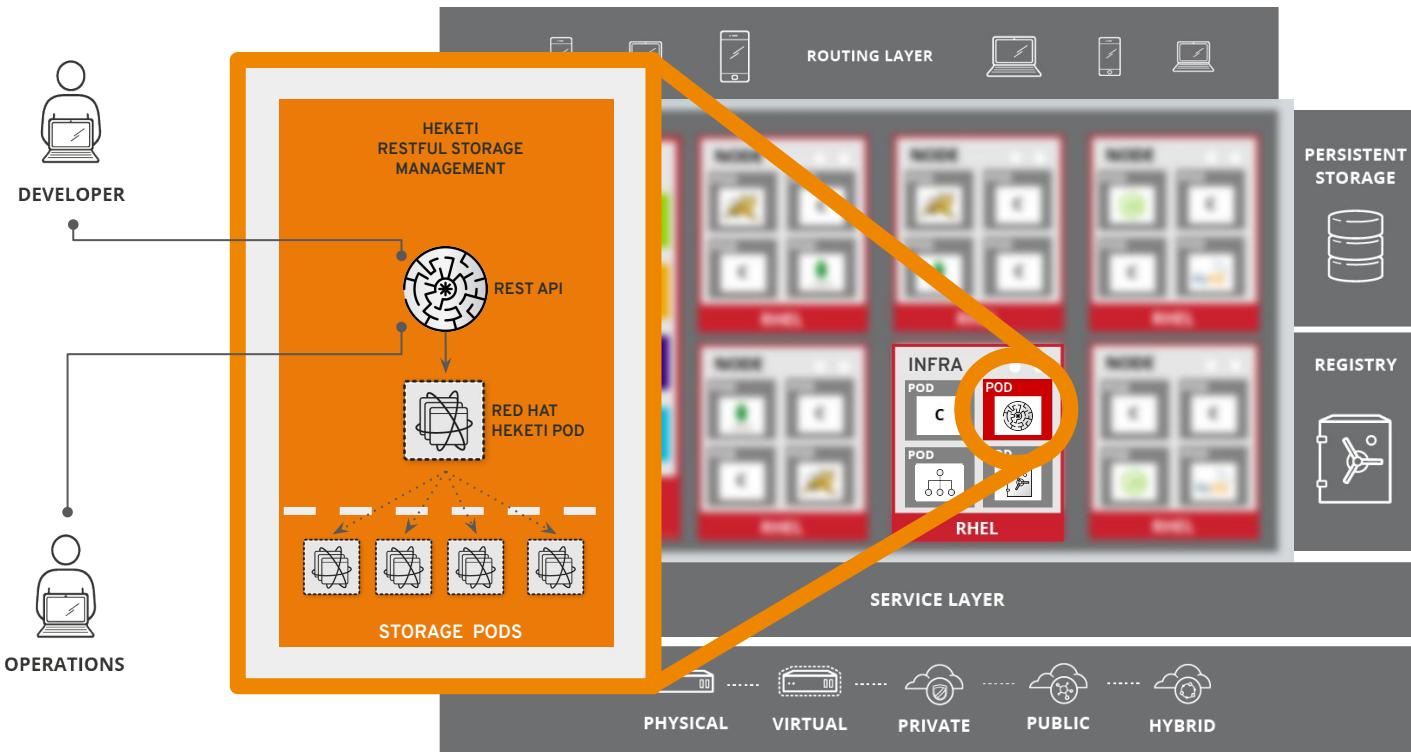


- Highly scalable, enterprise-grade storage, fully integrated into OpenShift Container Platform

# OCS Data Plane



# OCS Control Plane



# OCS product features

More relevant since v3.9

Integration	Features	CNS 3.9	OCS 3.10	OCS 3.11
kubernetes	Support RWX, RWO, ROX	✓	✓	✓
	Dynamic provisioning	✓	✓	✓
	PVC resize (oc edit pvc)	✓	✓	✓
Openshift	Prometheus storage API metrics	□	✓	✓
	Deploy with OCP ansible playbook	□	✓	✓
	PVC resize (web-console)	□	□	✓
	Storage class volume options	□	✓	✓
	Infra support registry, metrics, logging	✓	✓	✓
Storage	Block storage with iSCSI support	✓	✓	✓
	File sharing with glusterfs-fuse	✓	✓	✓
	Object with S3/Swift (tech preview)	✓	✓	✓
	Snapshot and geo-replication	✓	✓	✓
	Arbiter volume (replica 2 + metadata)	□	✓	✓
Infrastructure	Public Azure, AWS, GCP	✓	✓	✓
	Private Openstack	✓	✓	✓
	Virtualization (VMW, RHV)	✓	✓	✓

# OCS 3.11 support

## Aligned with the OCP lifecycle support

### Life Cycle Phases

#### Full Support

Full support is provided according to the published Scope of Coverage and Service Level Agreement<sup>[5&6]</sup>. Likewise, Development Support is provided according to the published Scope of Coverage and Service Level Agreement.

During the Full Support Phase, qualified Critical and Important Security errata advisories (RHSAs) and Urgent and Selected High Priority Bug Fix errata advisories (RHBAAs) may be released as they become available, all other available fix and qualified patches may be released via periodic updates. Customers are expected to upgrade their OpenShift environment to the most current supported version. On request, and at Red Hat's discretion, qualified Critical Security errata advisories (RHSAs) and Critical Bug Fix errata advisories (RHBAAs) may be made available to non-current minor versions.

Non-current releases within the full support phase which are no longer eligible for maintenance updates of any kind are marked as unmaintained. The following tables outlines the schedule for which minor versions of OpenShift v3 will no longer be eligible for maintenance updates:

#### v3.X End of Maintenance Schedule

Nov 2018	Jan 2019	Apr 2019	Jul 2019	Oct 2019	Jun 2022
3.0 & 3.1	3.2 & 3.3	3.4 & 3.5	3.6 & 3.7	3.9 & 3.10	3.11



<https://access.redhat.com/support/policy/updates/openshift>

# OCP v4 storage integration requirements

New challenge for storage vendors

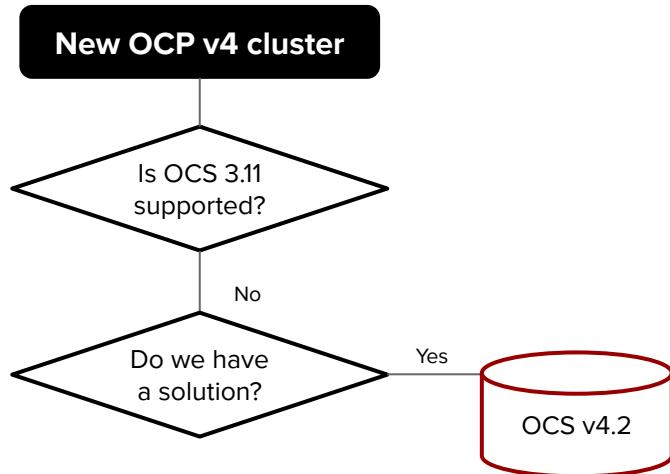
- Operator framework for standard lifecycle management
- New industry standard storage API with CSI (Container Storage Interface) integrated with kubernetes offering:
  - Storage Classes which provide configuration to CSI drivers
  - Ability to encrypt credentials
  - Multiple CSI drivers can co-exist
  - Ensure that one controller service start at a time

# CSI plugin components (API calls)

CONTROLLER Service	NODE Service	IDENTITY Service
<ul style="list-style-type: none"><li>. CreateVolume</li><li>. DeleteVolume</li><li>. ListVolume</li> <li>. ControllerPublishVolume</li><li>. ControllerUnpublishVolume</li><li>. ValidateVolumeCapabilities</li><li>. GetCapacity</li> <li>. CreateSnapshot</li><li>. DeleteSnapshot</li><li>. ListSnapshot</li> <li>. ControllerGetCapabilities</li></ul>	<ul style="list-style-type: none"><li>. NodeStageVolume</li><li>. NodeUnstageVolume</li> <li>. NodePublishVolume</li><li>. NodeUnpublishVolume</li> <li>. NodeGetVolumeStats</li> <li>. NodeGetInfo</li><li>. NodeGetCapabilities</li></ul>	<ul style="list-style-type: none"><li>. GetPluginInfo</li> <li>. GetPluginCapabilities</li> <li>. Probe(ProbeRequest)</li></ul>

# It's OCS 3.11 ready for OCP 4.2?

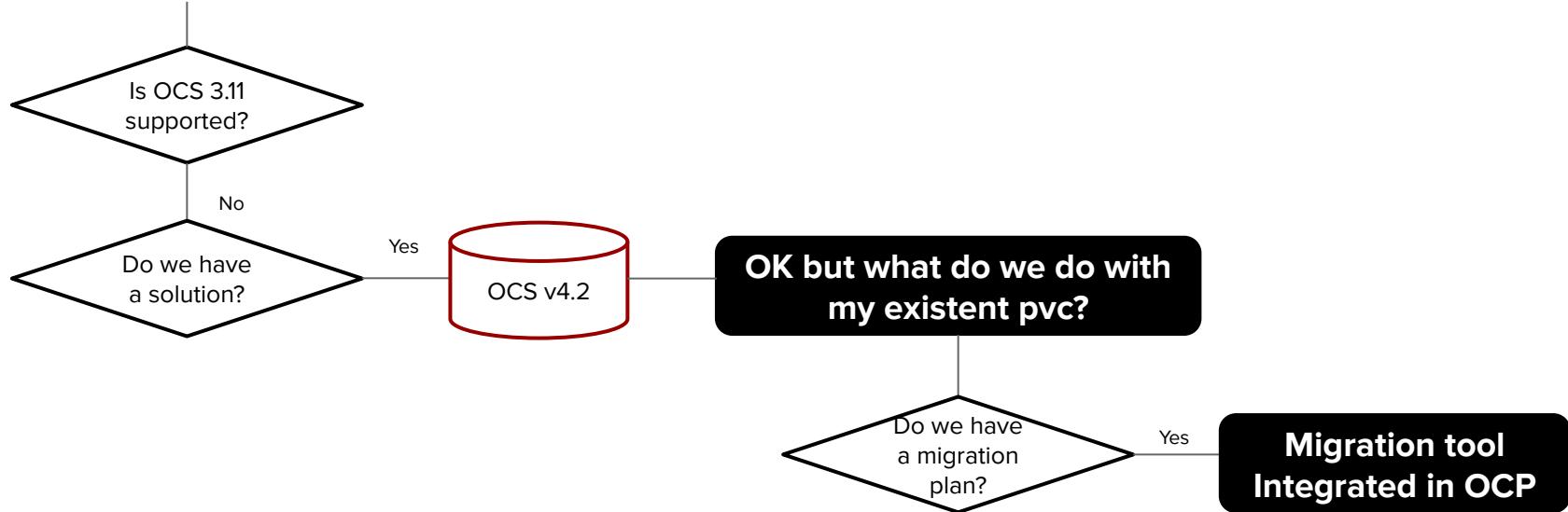
Use case for fresh new OCP 4.2 cluster



# It's OCS 3.11 ready for OCP 4.2?

Use case for existent OCP 3.11 to OCP 4.2

**From OCP v3.11 to OCP 4.2**



The background of the slide features a stylized architectural scene composed of several modern skyscrapers. The buildings are rendered in a deep red color, with some having a grid-like pattern on their facades. They are set against a dark red sky, creating a dramatic and futuristic atmosphere.

# OCS 4

## OpenShift Container Storage

# OPENShift OPERATOR FRAMEWORK

- Goal of an Operator: Put operational knowledge into software
- Day-1: Operators implement and automate common installation, configuration
- Day-2: Re-configuration, update, backup, failover, restore
- Kubernetes-native application  
(integrating natively with Kubernetes concepts and APIs)

# WHAT CHANGED

- **OPENSHIFT**

OpenShift transitions from OCP 3 to OCP 4

- **OPENSHIFT CONTAINER STORAGE**

also transitions from OCS 3 to OCS 4

- **OCS 4 will be based on ROOK.IO, which uses Red Hat Ceph Storage and the recently acquired NooBaa technology as the Red Hat Multi Cloud Gateway**

- **Will OCS 3 work with OCP 4?**

**NO.** [Migration tooling](#) will be available to facilitate the move to OCS 4.x.

- **MIGRATION PATH**

There will be a supported migration path offered for OCS 3 to OCS 4

# THE OCS 4 TECHNOLOGY STACK

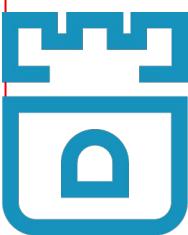


# WHY WE MOVE TO CEPH

- **MOTIVATION**

As cloud-native applications have evolved, we are noticing more customer requests for a native, easy to use S3/object interface (apps like registry, chargeback, metering, AI/ML) in addition to traditional persistent volumes (RWX & RWO) on the platform.

By leveraging Ceph, OCS can now provide a production-grade S3 interface in addition to persistent volumes for stateful applications.



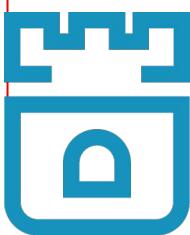
# ROOK

- ROOK Project

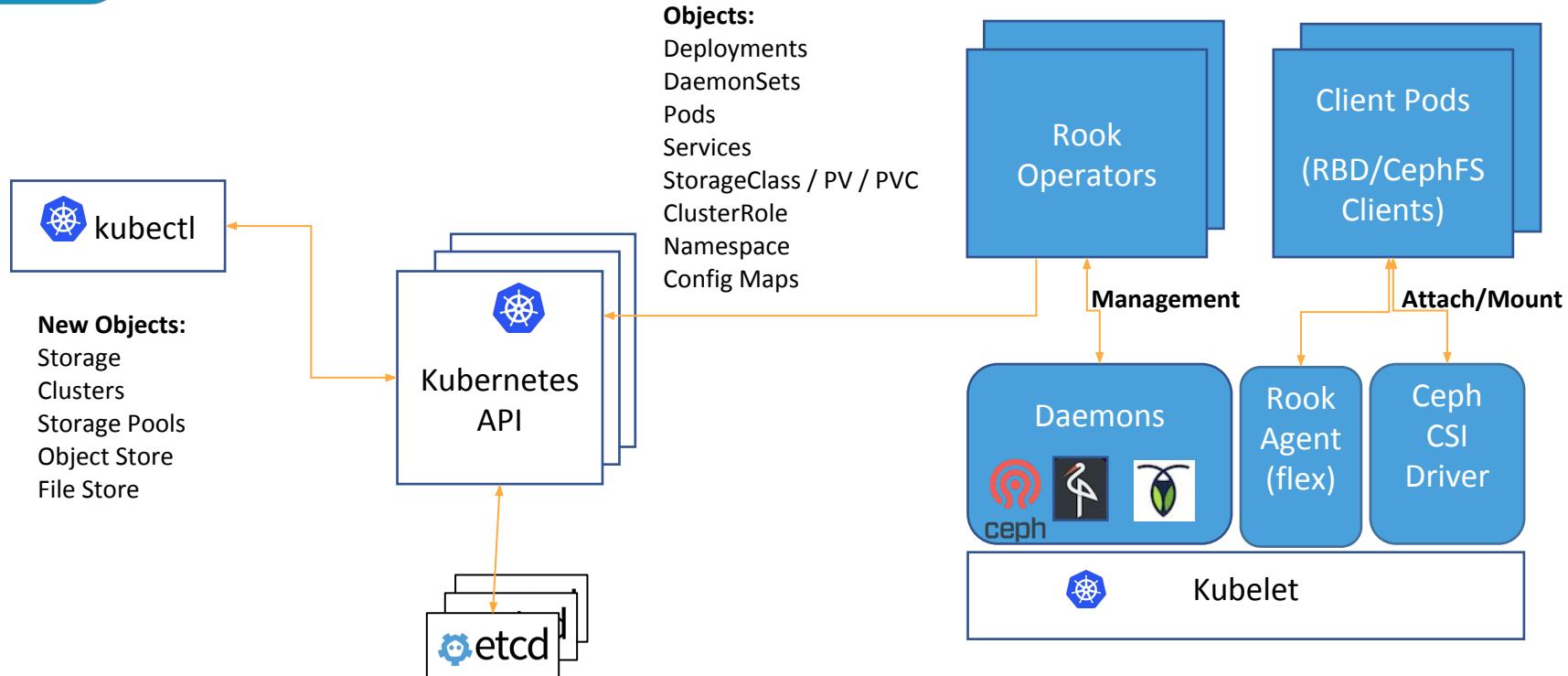
**CLOUD-NATIVE STORAGE ORCHESTRATOR**  
automated deployment and life-cycle management

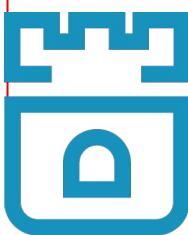
- Bootstrapping
- Configuration, provisioning, scaling, upgrading, migration, disaster recovery, monitoring, and resource management

<https://rook.io>

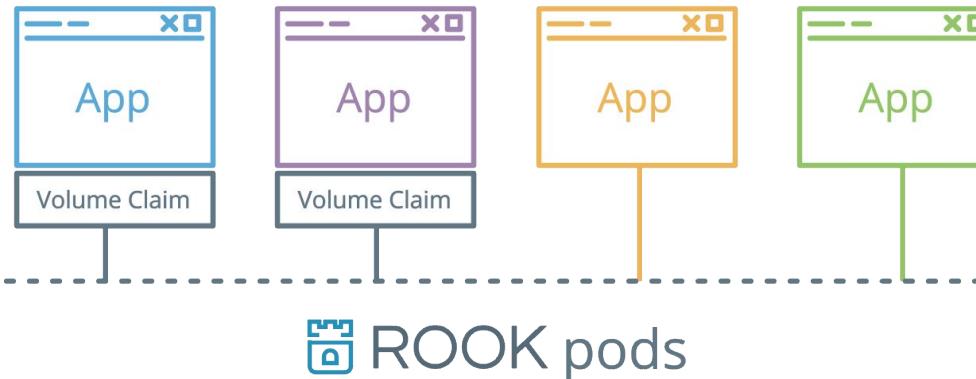


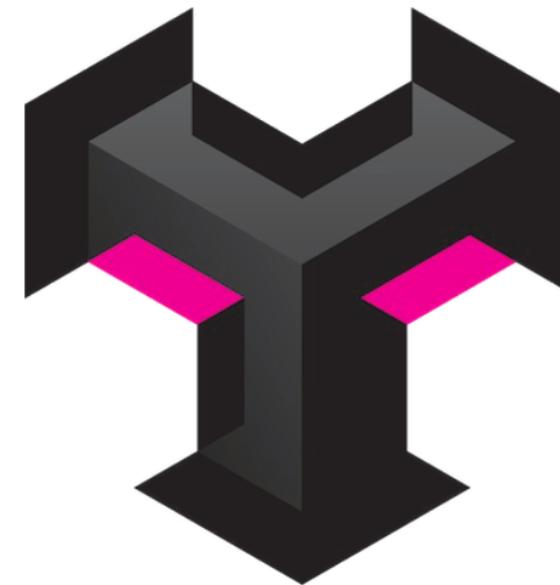
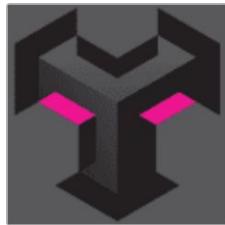
# ROOK ARCHITECTURE





# CEPH ON OPENSHIFT WITH ROOK





# NOOBAA.IO

# ABOUT NOOBAA

- **OCS MULTI CLOUD GATEWAY (NOOBAA)**

NooBaa provides a consistent S3 endpoint across different infrastructures (AWS, Azure, GCP, Bare Metal, VMware)

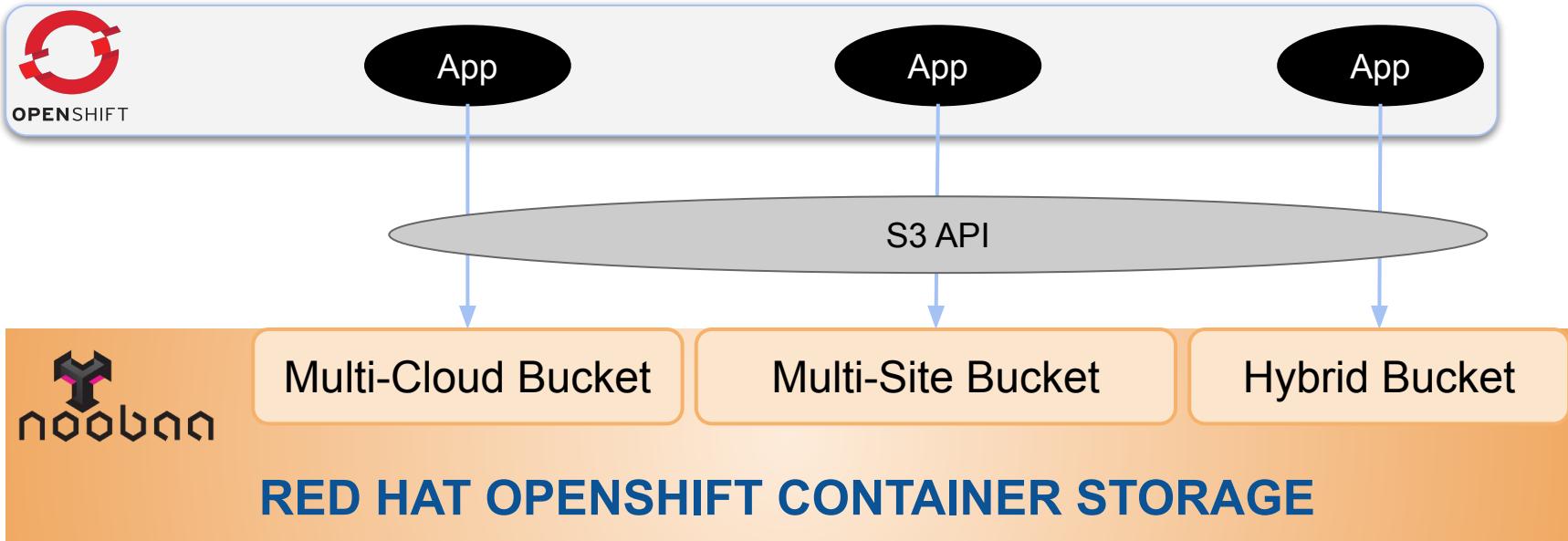
- **OCS MCG FUNCTIONALITY**

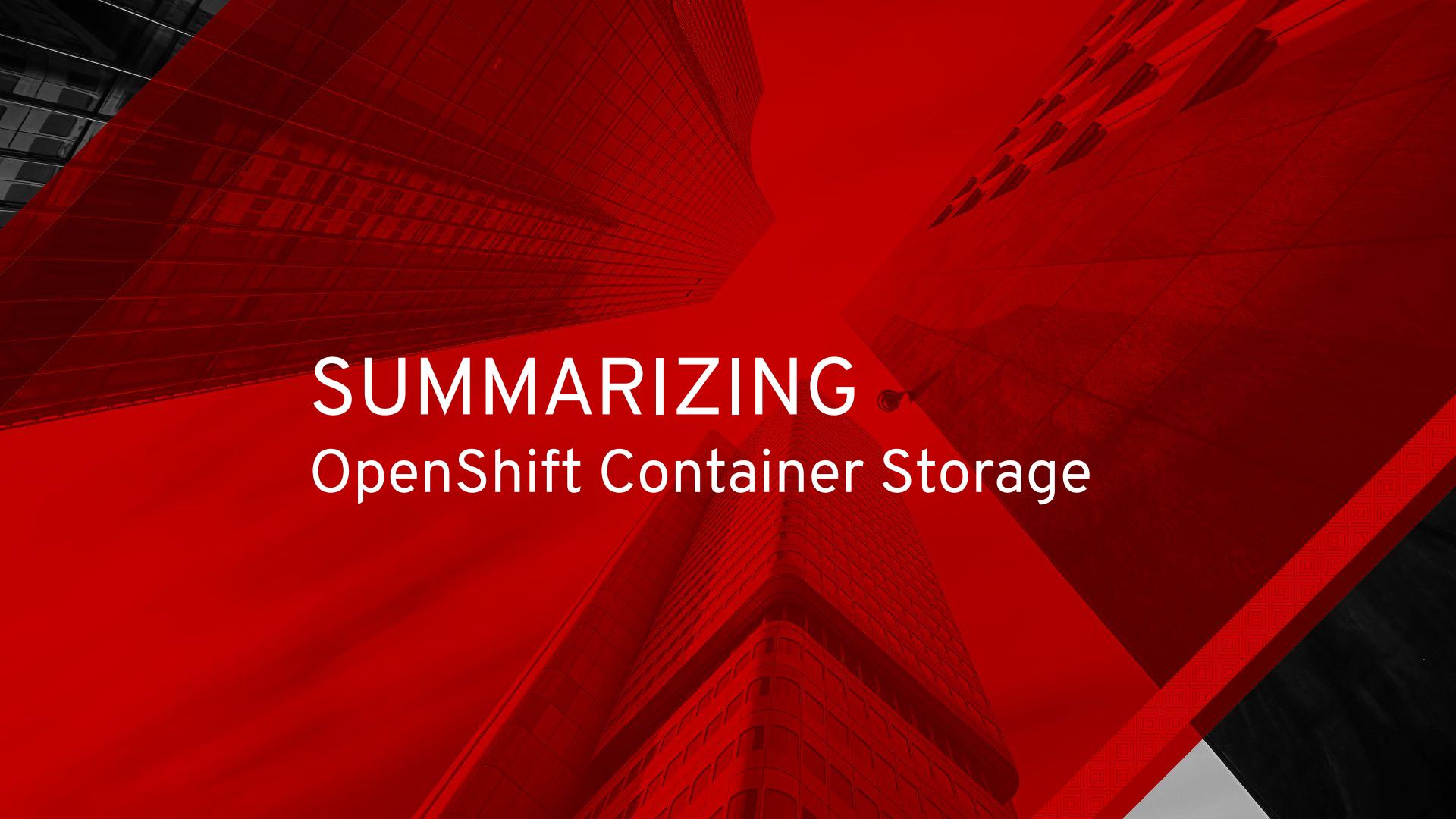
Multi Cloud Object Gateway: Active/Active read/write across different clouds.

- **PRODUCTIZATION**

productized as RHOCS Multi-Cloud Gateway, starting with OCS 4.2  
(NooBaa, is upstream only, downstream OCS Multi-Cloud-Gateway)

# MULTI-CLOUD OBJECT GATEWAY



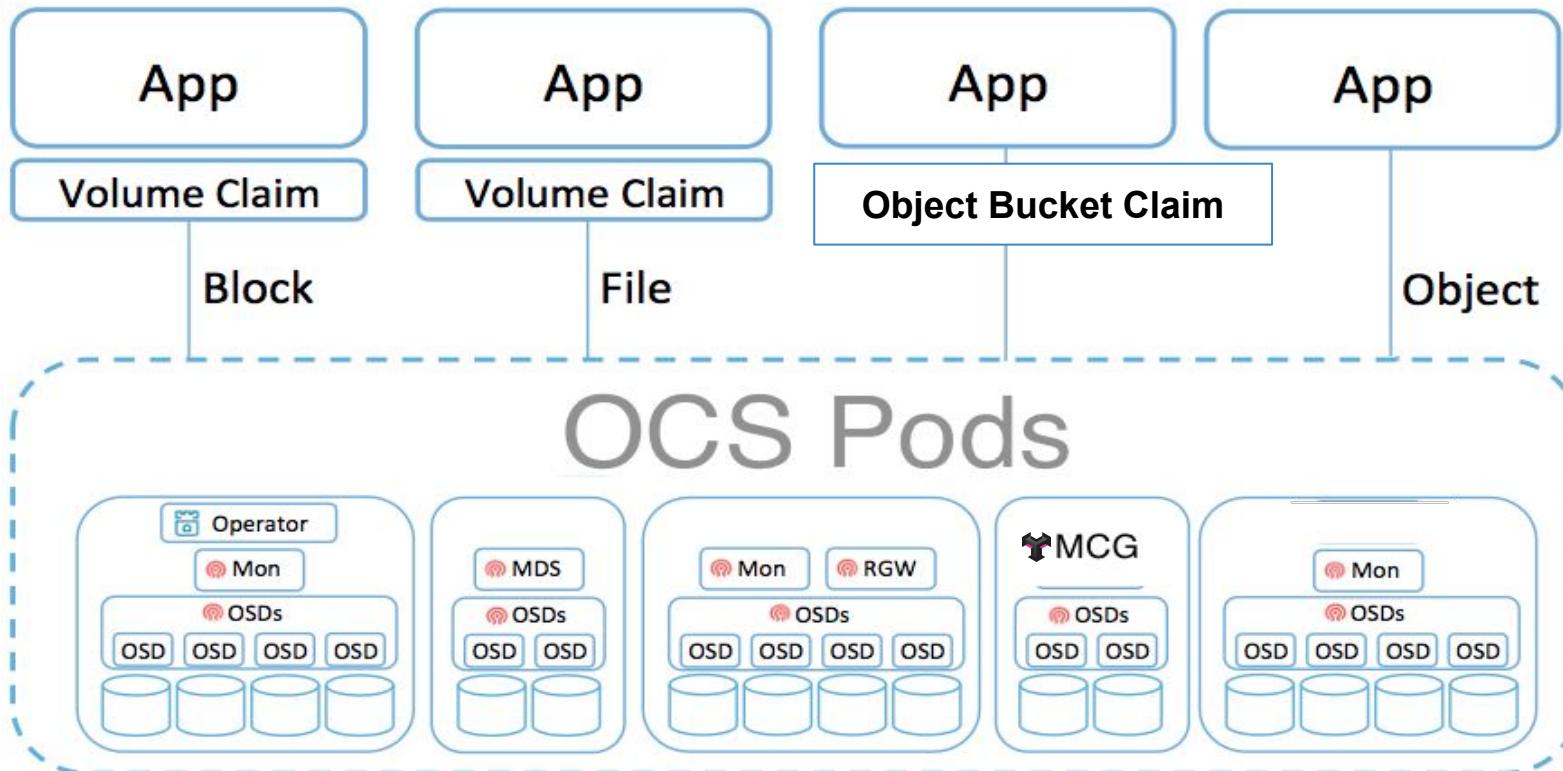
The background of the slide features a vibrant red color with abstract, overlapping geometric shapes. These shapes include large triangles and rectangles that create a sense of depth and perspective, resembling a modern architectural or digital landscape.

# SUMMARIZING

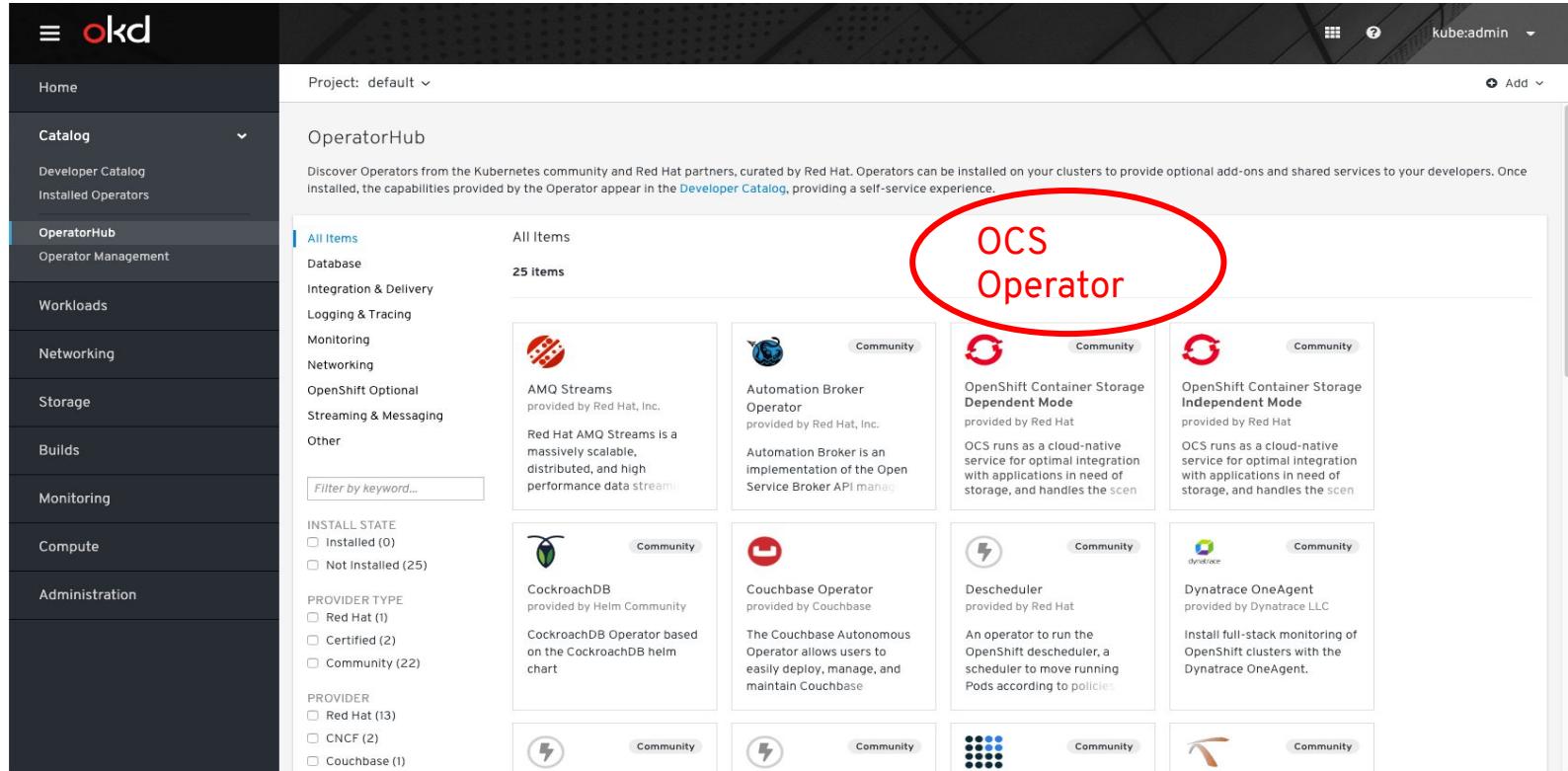
## OpenShift Container Storage

# OCS 4.x Operator Install, Upgrade, Expansion

OCS Operator based on Rook.io with Operator Lifecycle Manager (OLM)



# OCS 4.x Operator Driven Install from OperatorHub



The screenshot shows the OKD web interface with the 'OperatorHub' catalog selected. The 'OCS Operator' card is circled in red.

**Project:** default ▾

**OperatorHub**

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.

**All Items**      All Items  
Database      25 items

**OCS Operator**

**AMQ Streams**  
provided by Red Hat, Inc.  
Red Hat AMQ Streams is a massively scalable, distributed, and high performance data stream.

**Automation Broker Operator**  
provided by Red Hat, Inc.  
Automation Broker is an implementation of the Open Service Broker API managed.

**OpenShift Container Storage Dependent Mode**  
provided by Red Hat  
OCS runs as a cloud-native service for optimal integration with applications in need of storage, and handles the scene.

**OpenShift Container Storage Independent Mode**  
provided by Red Hat  
OCS runs as a cloud-native service for optimal integration with applications in need of storage, and handles the scene.

**CockroachDB**  
provided by Helm Community  
CockroachDB Operator based on the CockroachDB helm chart

**Couchbase Operator**  
provided by Couchbase  
The Couchbase Autonomous Operator allows users to easily deploy, manage, and maintain Couchbase.

**Descheduler**  
provided by Red Hat  
An operator to run the OpenShift descheduler, a scheduler to move running Pods according to policies.

**Dynatrace OneAgent**  
provided by Dynatrace LLC  
Install full-stack monitoring of OpenShift clusters with the Dynatrace OneAgent.

# INTEGRATED MONITORING AND MANAGEMENT

The screenshot displays the Red Hat OpenShift web interface. On the left, a sidebar menu includes Home, Dashboards (selected), Projects, Search, Events, Catalog, Workloads, Networking, Storage, Builds, Monitoring, Compute, and Administration. The main content area is titled 'OCS Dashboard' and is circled in red. It features tabs for Overview and Storage. The Overview tab contains sections for Details (Cluster Name: cluster-name, Provider: AWS Cloud, Region: region-name, Availability zone: zone-name, OpenShift version: v4.0, Kubernetes version: v1.12.4+670b342, Operating system: RHEL Server) and Health (Cluster is healthy, Cluster is compliant). The Storage tab displays Utilization metrics: CPU (2.2 available of 6.3 Ghz, 70% Used), Memory (768 available of 1.05 Ti, 25% Used), Storage (120 available of 279 Ti, 57% Used), and Network (9.4 available of 10 Gbps, 6% Used). The Top consumers section shows CPU time for various pods and VMs. The Events section lists recent activity: a pod named 'pod-name-1' pulling the 'openshift/hello-openshift' image, a host named 'host-name-1' with high CPU utilization over 50%, and a host named 'host-name-1' with memory utilization over 80%.

**OCS Dashboard**

**Storage**

**Utilization**

Resource	Current	Total	Used (%)
CPU	2.2	6.3 Ghz	70%
Memory	768	1.05 Ti	25%
Storage	120	279 Ti	57%
Network	9.4	10 Gbps	6%

**Top consumers**

Pod/VM	CPU time
pod-1	19.3%
vm-1	17.2%
pod-27	15.0%
pod-82	13.2%
pod-23	4.3%
vm-23	3.1%
pod-23	2.7%
vm-23	2.4%

**Events**

- A few seconds ago - 1 time in the last 24 hours  
P pod-name-1  
From kubelet ip-10-0-147-109.ec2.internal  
pulling image "openshift/hello-openshift"
- 2 minutes ago - 2 times in the last 24 hours  
BMB host-name-1  
From kubelet ip-1-0-120-109.ec2.internal  
CPU utilization over 50%. Migrated 2 pods to other hosts.
- 10 minutes ago - 1 time in the last 24 hours  
BMB host-name-1  
From kubelet ip-1-0-120-109.ec2.internal  
Memory utilization over 80%. Migrating workloads to other hosts.

# OCS INTEGRATED DASHBOARD

RED HAT OPENSHIFT

- Home
- Dashboards
- Projects
- Status
- Search
- Events

- Catalog
- Workloads
- Networking
- Storage
- Builds
- Monitoring
- Compute
- Administration

## Dashboards

Overview **Storage**

**Details**

Name	cluster-name
Provider	Bare Metal
OCS version	v1.0

**Inventory**

- 3 Nodes
- 24 Disks
- 20 Pods
- 12 PVs
- 18 PVCs

**Health**

OCS is healthy

**Capacity**

Total Capacity: 120 available of 279 Gi  
59% Used

**Data Resiliency**

Your Data Is Resilient

**Top Consumers**

Used capacity over time (1:30 to 13:30)

Project	Used Capacity (Gi)
Project 5	63 Gi
Project 2	61 Gi
Project 10	42 Gi
Project 4	37 Gi
Project 9	26 Gi

**Performance**

6 Hours

IOPS: 151,215 IOPS

Latency: 3.35 ms

Throughput: 2.32 Gi/s

Recovery rate: 7.5 Gi/s

**Events**

- A few seconds ago - 1 time in the last 24 hours: rook-osd-10-328949 crashed. From kubelet ip-1-0-147-109.ec2.internal. Rebuild initiated as Disk 5 failed.
- 2 minutes ago - 2 times in the last 24 hours: host-name-1. CPU utilization over 50%. Migrated 2 pods to other hosts.
- 10 minutes ago - 1 time in the last 24 hours: host-name-1. CPU utilization over 50%. Migrated 2 pods to other hosts.

**Health, Capacity, Performance, Configuration**



# OCS INTEGRATED DASHBOARD - ALERTS

RED HAT  
OPENSHIFT

Home Dashboards Projects Status Search Events Catalog Workloads Networking Storage Builds Monitoring Compute Administration

**Monitoring and Alerts**

Dashboards Overview Storage

Details

Name	cluster-name
Provider	Bare Metal
OCS version	v1.0

Inventory

3 Nodes	1
24 Disks	8
20 Pods	3
12 PVs	
18 PVCs	

Health

OCS is health is degraded

Alerts

Node	Node 2 is offline	host-name-3
Disks	8 Disks are offline.	Disks list
Disks	Your cluster is running out of disk space	Disks list
Memory	Alert 4	Node 2
Host	Warning 2	host-name-3

Capacity

Total capacity: 25 available of 168 Gi

85% Used

Data Resiliency

Rebuilding data resiliency

Rebuilding in progress: 85.2%

Top Consumers

Projects: Top 5 By used capacity

Used capacity

Events

A few seconds ago - 1 time in the last 24 hours

**rook-osd-10-328949 crashed**  
From kubelet ip-10-0-147-109.ec2.internal  
Rebuild initiated as Disk 5 failed

2 minutes ago - 2 times in the last 24 hours

**host-name-1**  
From kubelet ip-1-0-120-109.ec2.internal  
CPU utilization over 50%. Migrated 2 pods to other hosts.

10 minutes ago - 1 time in the last 24 hours

**host-name-1**

Performance

6 Hours

3pm 4pm 5pm 6pm 7pm Now

IOPS: 151,215 IOPS

Latency: 3.35 ms

Throughput: 2.32 Gi/s

Recovery rate: 7.5 Gi/s

Events

A few seconds ago - 1 time in the last 24 hours

**rook-osd-10-328949 crashed**  
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**host-name-1**  
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CPU utilization over 50%. Migrated 2 pods to other hosts.

10 minutes ago - 1 time in the last 24 hours

**host-name-1**

# FUNCTIONALITIES AND SUPPORTABILITY

- **FUNCTIONALITIES**

- OCS 4.2 has **FILE**, **BLOCK**, and **OBJECT** support
- OCS 4.2 supports **Prometheus**
- OCS 4.2 will be **FIPS** compliant

- **SUPPORTABILITIES**

- **VMWare**

- storage provisioned from VMDKs and RDMS

- **PUBLIC CLOUD**

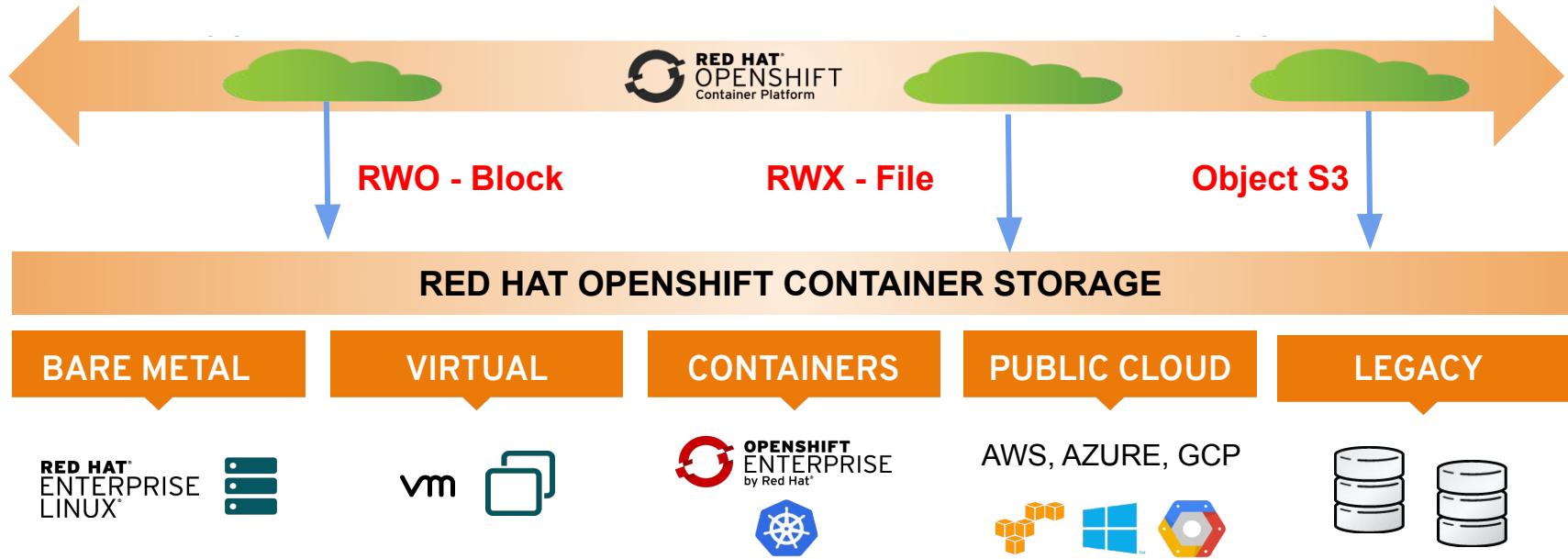
- supported in all public cloud environments where OCS 3 is supported today,  
including AWS (OCS 4.2),  
Azure and Google Cloud (OCS 4.3)

# ANY CLOUD, ANY APP, ONE STORAGE EXPERIENCE



Consistent consumption, management, operations  
Future Proof against cloud or infrastructure lock-in

# COMPLETE STORAGE FOR CONTAINER PLATFORM



Provides Storage for All Apps and infrastructure Services  
in their native interfaces

# SKU's

- **NO SKU CHANGES**

OCS 3.X and OCS 4.x will have the same subscription model;  
there are no plans to change this.

Please note that customers will still be buying and consuming OCS  
(even though the underlying technology will be different)  
using the same SKUs that we have today  
which will provide access to the new Ceph-related content set.

# THE FACTS - SUMMARY

- CONTAINERS ARE SYSTEM PROCESSES AND ARE VOLATILE BY DEFAULT
- CONTAINERS THEREFORE NEED PERSISTENT STORAGE
- OCP 4 USES OPERATORS TO MANAGE THE ENTIRE OCP CLUSTER
- RHOCS NOW CHANGES AND WILL NOW USE CEPH AND NOOBAA ‘UNDER THE HOOD’
- OCS 4.2 IS PLANNED TO BECOME GENERAL AVAILABLE STARTING AT OCP 4.2
- OCS 4.2 WILL OFFER FILE, BLOCK AND OBJECT STORAGE
- SKU PROPOSITION WILL REMAIN THE SAME

# 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](https://www.linkedin.com/company/red-hat)



[youtube.com/user/RedHatVideos](https://www.youtube.com/user/RedHatVideos)



[facebook.com/redhatinc](https://www.facebook.com/redhatinc)



[twitter.com/RedHat](https://twitter.com/RedHat)

# REFERENCE HYPERLINKS

## OCS Sales Enablement

<https://mojo.redhat.com/docs/DOC-1204753>

## Velero Migration Tooling

<https://youtu.be/VvqsKjAvCx4>

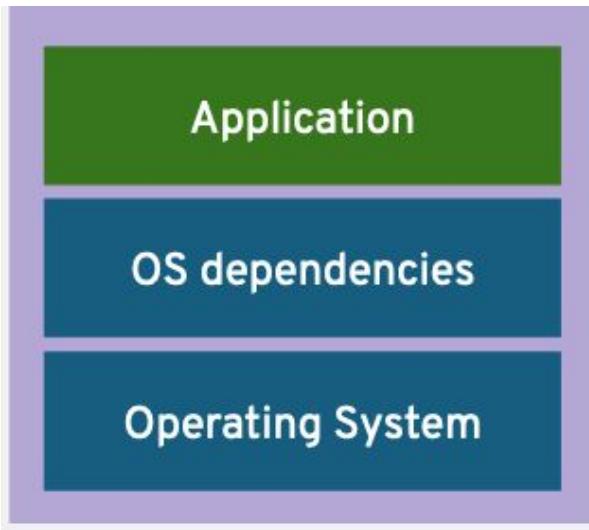
## OpenShift Storage for Admins

<http://admin-labguides.6923.rh-us-east-1.openshiftapps.com/workshop/ocp-for-admins/lab/environment>

# AGENDA - Part I

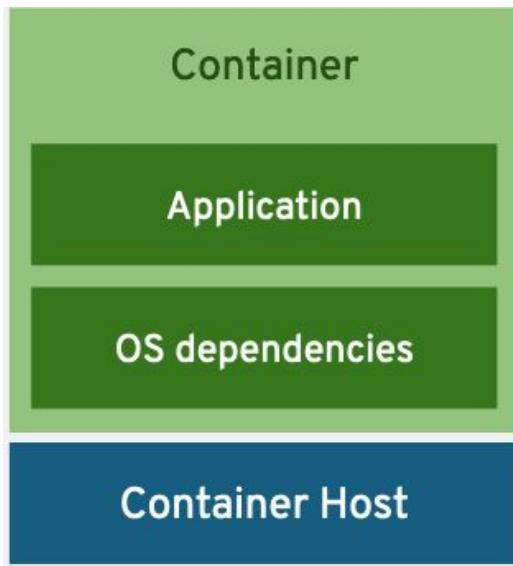
- APPLICATION PROPERTIES AND BEHAVIOUR
- TRANSITION FROM APPLICATION INTO MICROSERVICES
- TYPICAL PROPERTIES OF A MICROSERVICE
- APPLICATION STATE AND PERSISTENCE
- STORAGE PROVIDERS THAT CAN BE CONSUMED BY OPENSHIFT
- STORAGE PROVISIONING OPTIONS
- THE FOUR STORAGE NEEDS IN OPENSHIFT
- OCS: VALUE ADD TO THE BUSINESS
- FACTS

# APPLICATION PROPERTIES AND BEHAVIOUR



TRADITIONAL APPLICATION

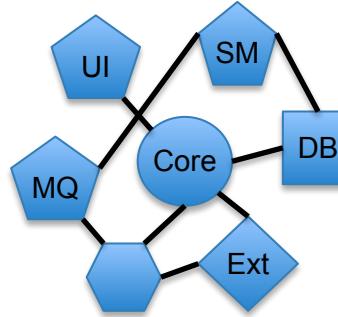
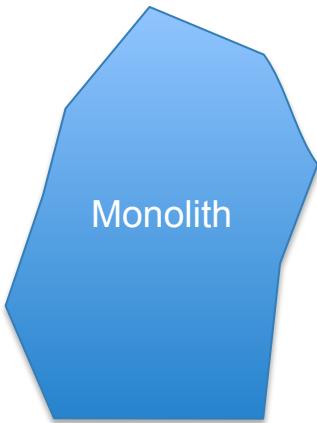
# APPLICATION PROPERTIES AND BEHAVIOUR



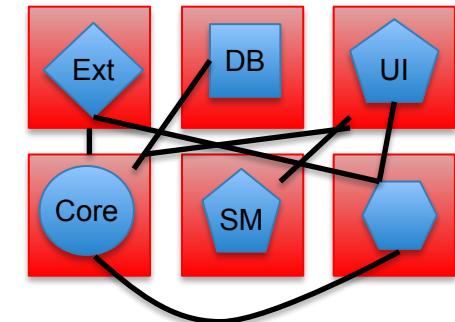
MODERN APPLICATION

# MICRO-SERVICES & CONTAINERS

Microservices architecture is different from containers



Refactoring of application  
Into components (micro-services)



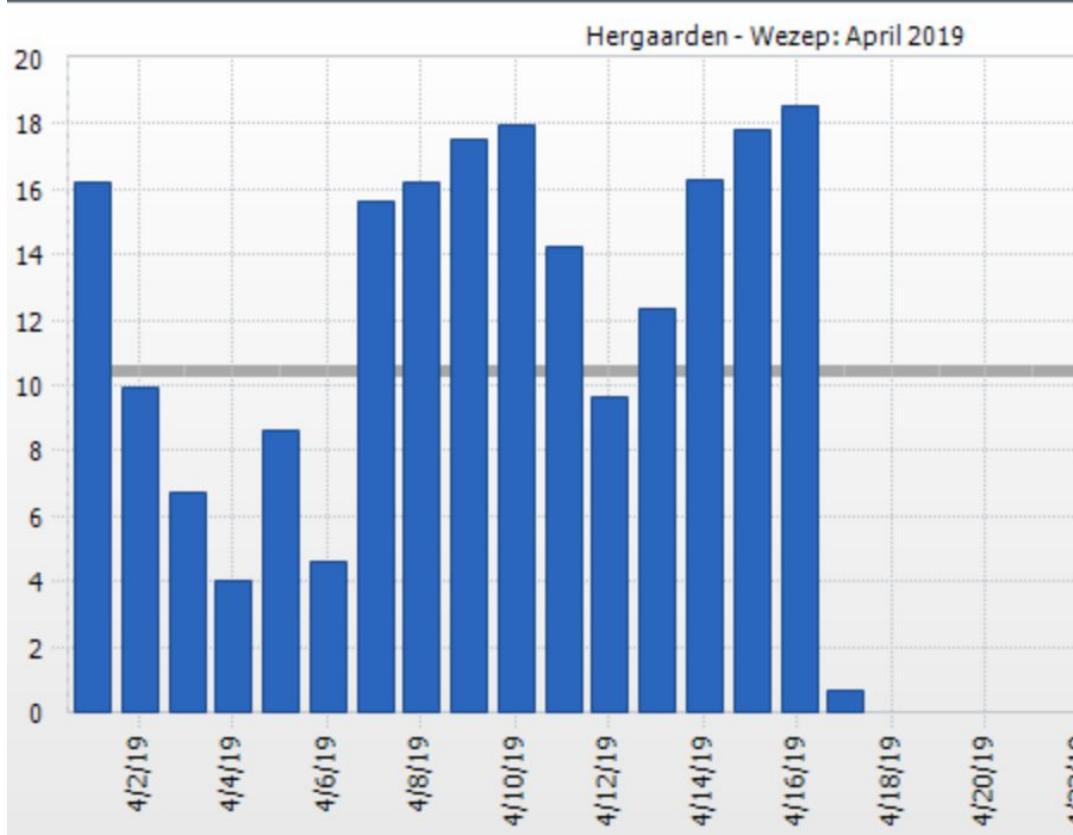
Containers  
Encapsulating micro services

- Microservices architecture is about writing applications so that components can be independently updated and delivered to complete the product
  - May use containers for each of the components
  - Monolith vs componentized
  - Each component can evolve independently

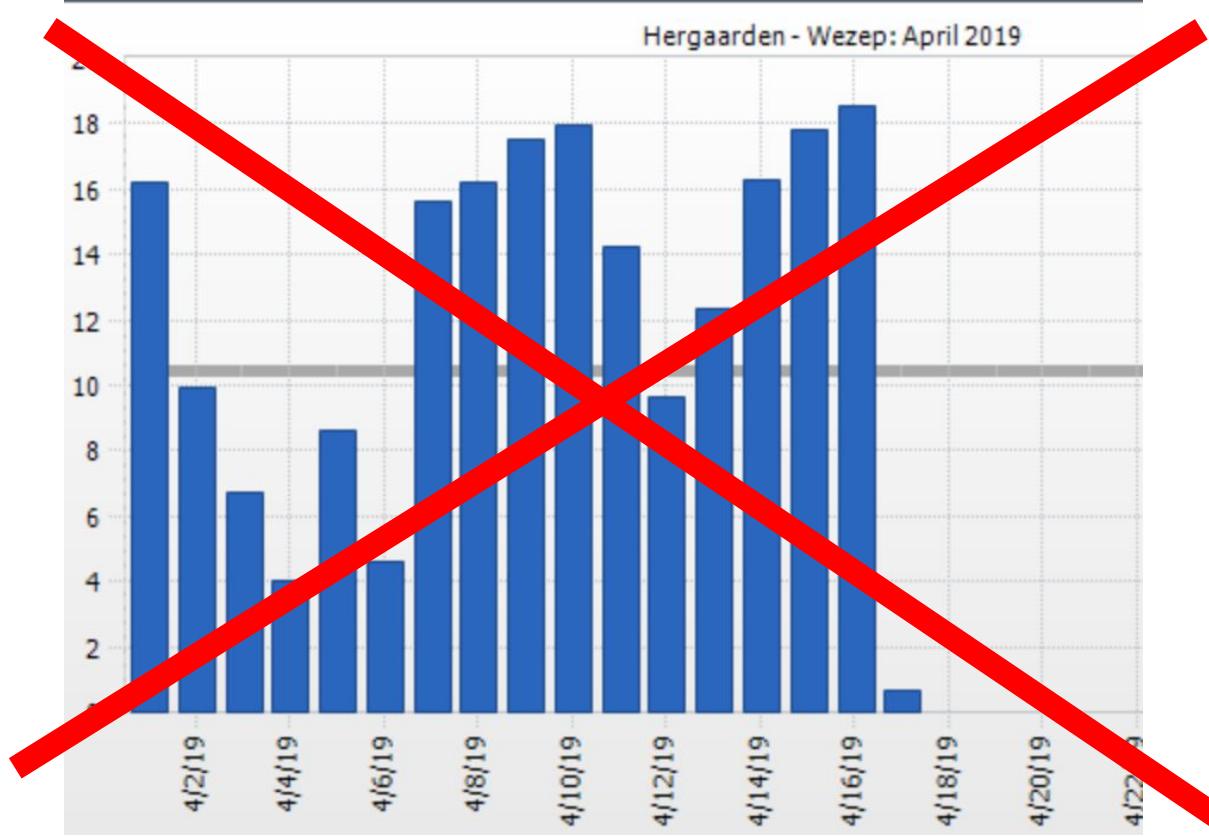
# A CONTAINER IS A SYSTEM PROCESS

root	1998	1	0	Apr15	?	00:00:06 /usr/sbin/nmbd -D
root	2017	1	0	Apr15	?	00:00:01 /usr/sbin/smbd -D
root	2036	2017	0	Apr15	?	00:00:00 /usr/sbin/smbd -D
104	2040	1	0	Apr15	?	00:00:00 /usr/bin/dbus-daemon --system
root	2090	1	0	Apr15	?	00:00:00 nginx: master process /usr/sbin/
www-data	2091	2090	0	Apr15	?	00:00:00 nginx: worker process
www-data	2092	2090	0	Apr15	?	00:00:21 nginx: worker process
www-data	2093	2090	0	Apr15	?	00:00:22 nginx: worker process
www-data	2095	2090	0	Apr15	?	00:00:21 nginx: worker process
ntp	2108	1	0	Apr15	?	00:00:24 /usr/sbin/ntpd -p /var/run/ntpda.
root	2136	1	0	Apr15	?	00:00:00 /usr/sbin/sshd
nobody	2161	1	0	Apr15	?	00:00:02 /usr/sbin/thd --daemon --trigger
root	2176	1	0	Apr15	tty1	00:00:00 /sbin/getty --noclear 38400 tty1
root	2177	1	0	Apr15	tty2	00:00:00 /sbin/getty 38400 tty2
root	2178	1	0	Apr15	tty3	00:00:00 /sbin/getty 38400 tty3
root	2179	1	0	Apr15	tty4	00:00:00 /sbin/getty 38400 tty4
root	2180	1	0	Apr15	tty5	00:00:00 /sbin/getty 38400 tty5
root	2181	1	0	Apr15	tty6	00:00:00 /sbin/getty 38400 tty6
root	3704	2	0	04:17	?	00:00:02 [kworker/u2:2]
root	3761	2	0	05:39	?	00:00:00 [kworker/u2:0]
root	4051	2136	6	10:40	?	00:00:00 sshd: pi [priv]

# A SYSTEM PROCESS THAT PRODUCES STATE



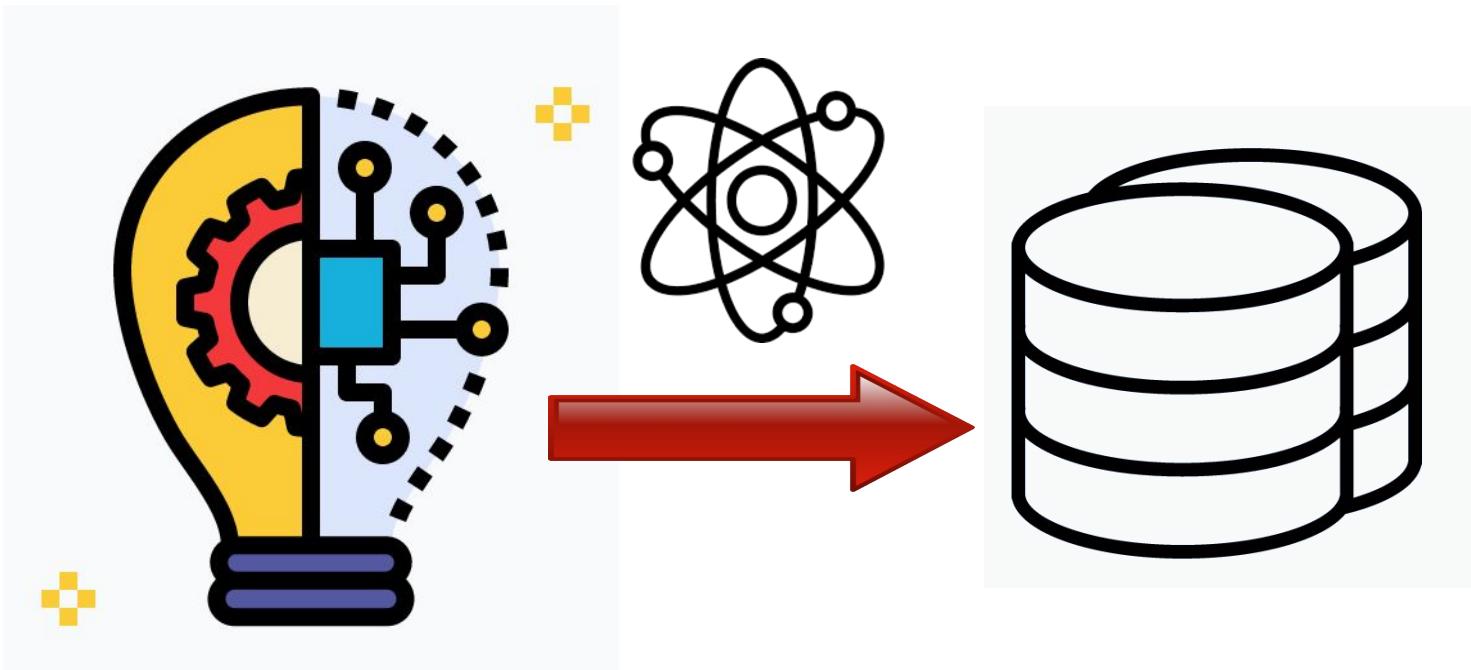
# A STOPPED PROCESS CAUSES LOSS OF THAT STATE



# NEED FOR PERSISTENT STORAGE

## CONTAINERS NEED STORAGE

Containers are not persistent by default. App data is lost when containers die.



# RED HAT SOLUTION: RHOCS

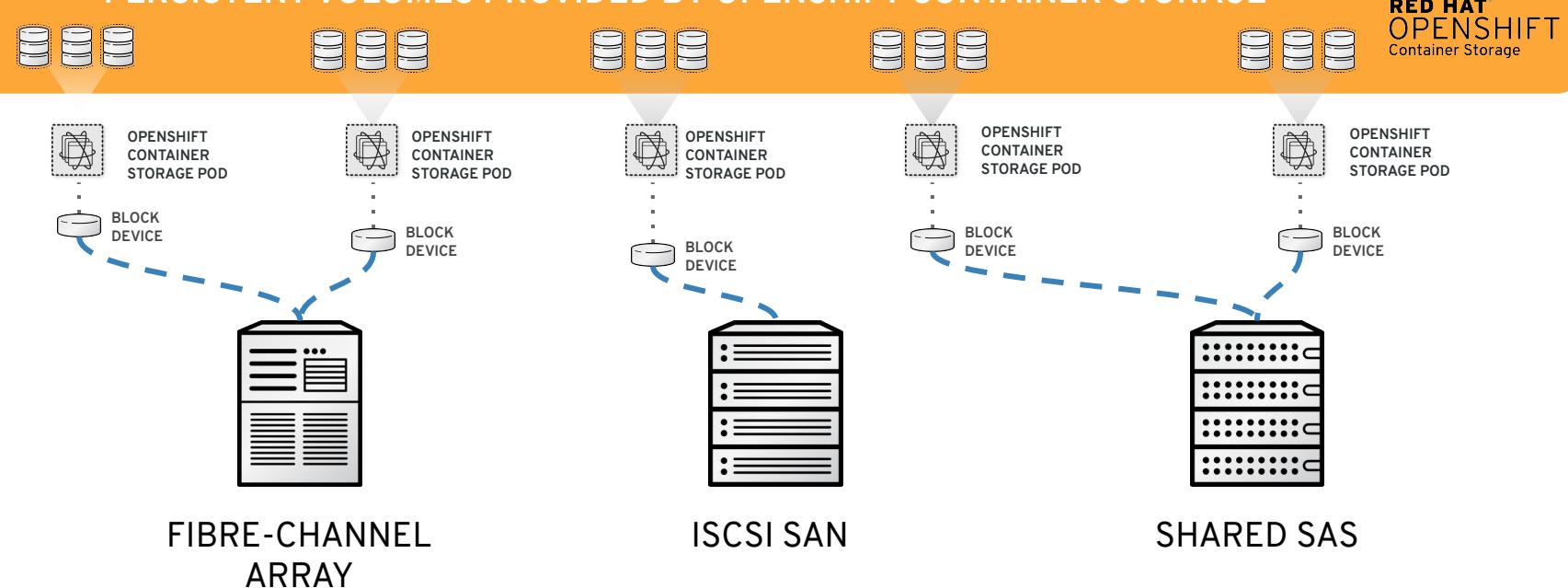
**RED HAT OFFERS A FULLY INTEGRATED STORAGE SOLUTION FOR OPENSHIFT**

Objection: “*We don't need your storage, we already have an existing storage solution present*”

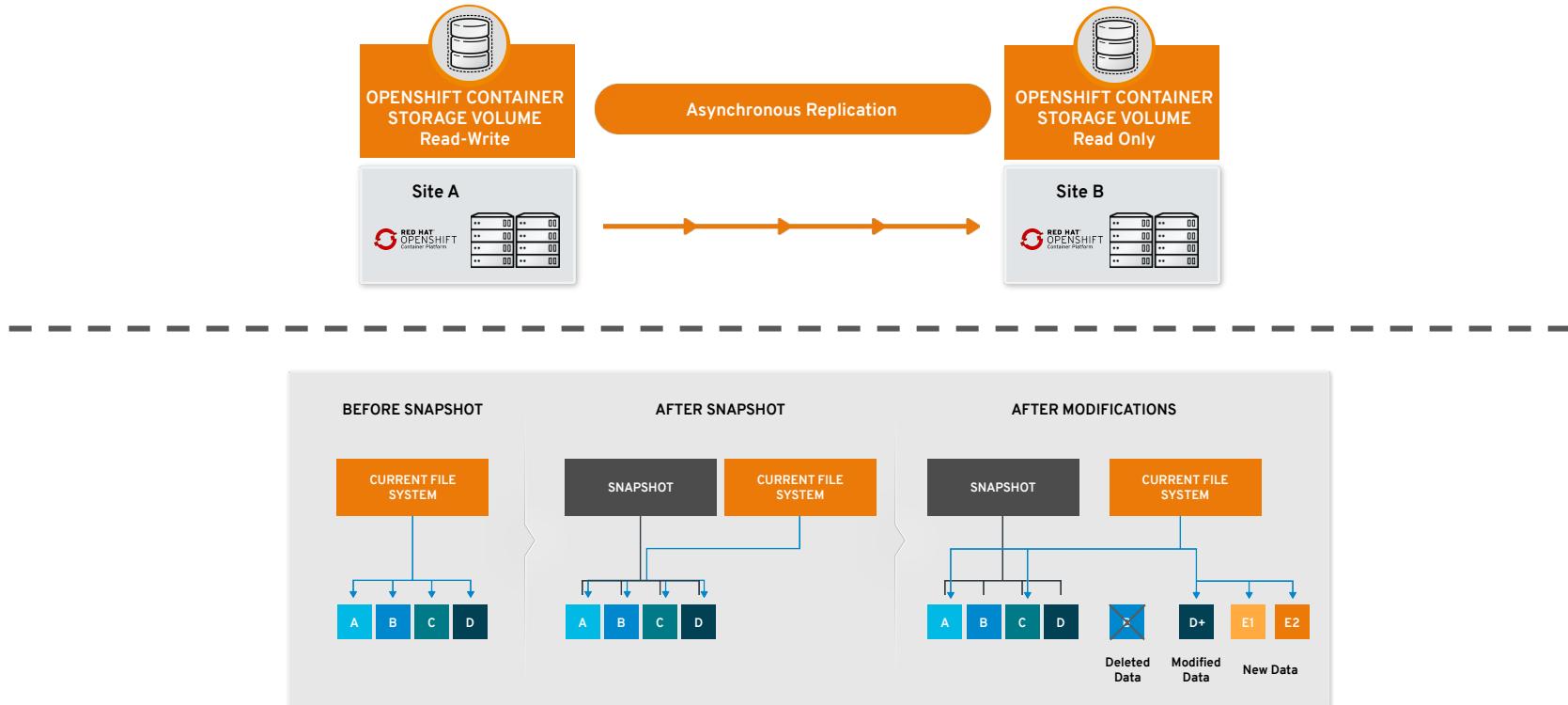


# LEVERAGE LEGACY STORAGE... WITH OPENSHIFT CONTAINER STORAGE CONVERGED MODE

## PERSISTENT VOLUMES PROVIDED BY OPENSHIFT CONTAINER STORAGE



# SNAPSHOTS AND GEO-REPLICATION



# SUMMARY FACTS

- CONTAINERS ARE SYSTEM PROCESSES
- CONTAINER STATES ARE VOLATILE BY DEFAULT
- CONTAINERS THEREFORE NEED PERSISTENT STORAGE
- EXISTING STORAGE ENTITIES CAN BE USED IN CONJUNCTION WITH OPENSHIFT
- EXISTING STORAGE ENTITIES OFTEN JUST ADDRESS ONE SINGLE PART OF THE 4 NEEDS
- PROVISIONING AND HANDLING OF CONTAINER STORAGE BECOMES COMPLEX SOON
- DIFFERENT STORAGE NEEDS IN OPENSHIFT REQUIRE DIFFERENT SOLUTIONS
- RED HAT OFFERS OCS - NOT JUST ANOTHER STORAGE SOLUTION - A STORAGE MANAGER
- OCS: VALUE ADD TO THE BUSINESS - NO DIY PLUMBING OF EXISTING THINGS -

# AGENDA - Part II

- OCP 4 - BRIEF INTRODUCTION
- INSTALLATION EXPERIENCES: IPI & UPI
- OPERATOR FRAMEWORK
- WHAT HAS CHANGED WITH RHOCS
- COMPONENTS: ROOK, CEPH & NOOBAA
- RED HAT ENTERPRISE SOLUTION
- FUNCTIONALITIES AND SUPPORTABILITY
- THE FACTS - SUMMARY

The background of the slide features a stylized architectural scene. In the foreground, a tall, curved skyscraper with a grid-like facade is visible. Behind it, several other skyscrapers are shown from various angles, some appearing to float in space. The colors are a deep red, with black and white highlights on the building edges, creating a modern and dynamic look.

# OCP 4

## brief introduction



## TRUSTED ENTERPRISE KUBERNETES

- Trusted Host, Content, Platform
- Full Stack Automated Install
- Over the Air Updates & Day 2 Mgt

## A CLOUD-LIKE EXPERIENCE, EVERYWHERE

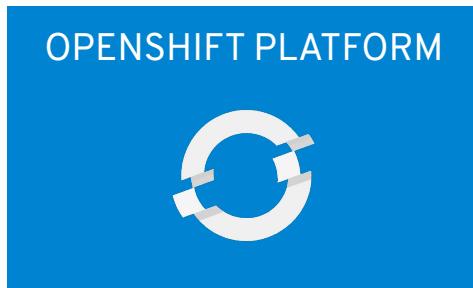
- Hybrid, Multi-Cluster Management
- Operator Framework
- Operator Hub & Certified ISVs

## EMPOWERING DEVELOPERS TO INNOVATE

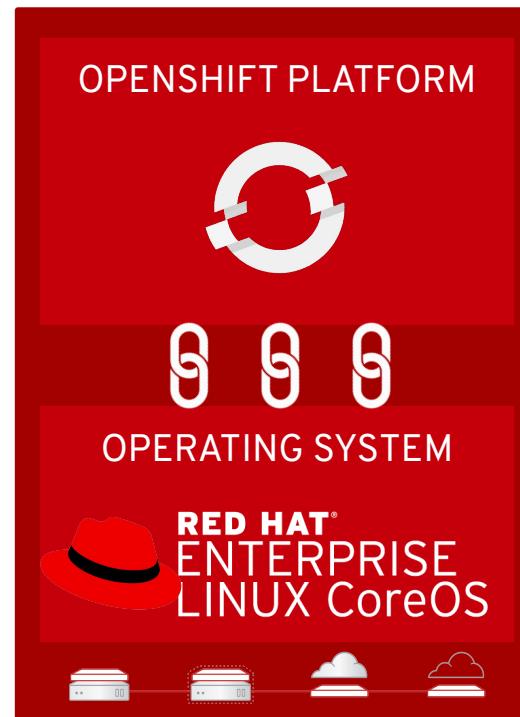
- OpenShift Service Mesh (Istio)
- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)

# FULL STACK AUTOMATED INSTALL + UPGRADE

OPENSHIFT 3



OPENSHIFT 4



# INSTALLATION EXPERIENCES

## OPENShift CONTAINER PLATFORM

### FULL STACK AUTOMATED

Simplified opinionated “Best Practices” for cluster provisioning

Fully automated installation and updates including host container OS.



**Red Hat**  
Enterprise Linux  
CoreOS

### PRE-EXISTING INFRASTRUCTURE

Customer managed resources & infrastructure provisioning

Plug into existing DNS and security boundaries



**Red Hat**  
Enterprise Linux  
CoreOS

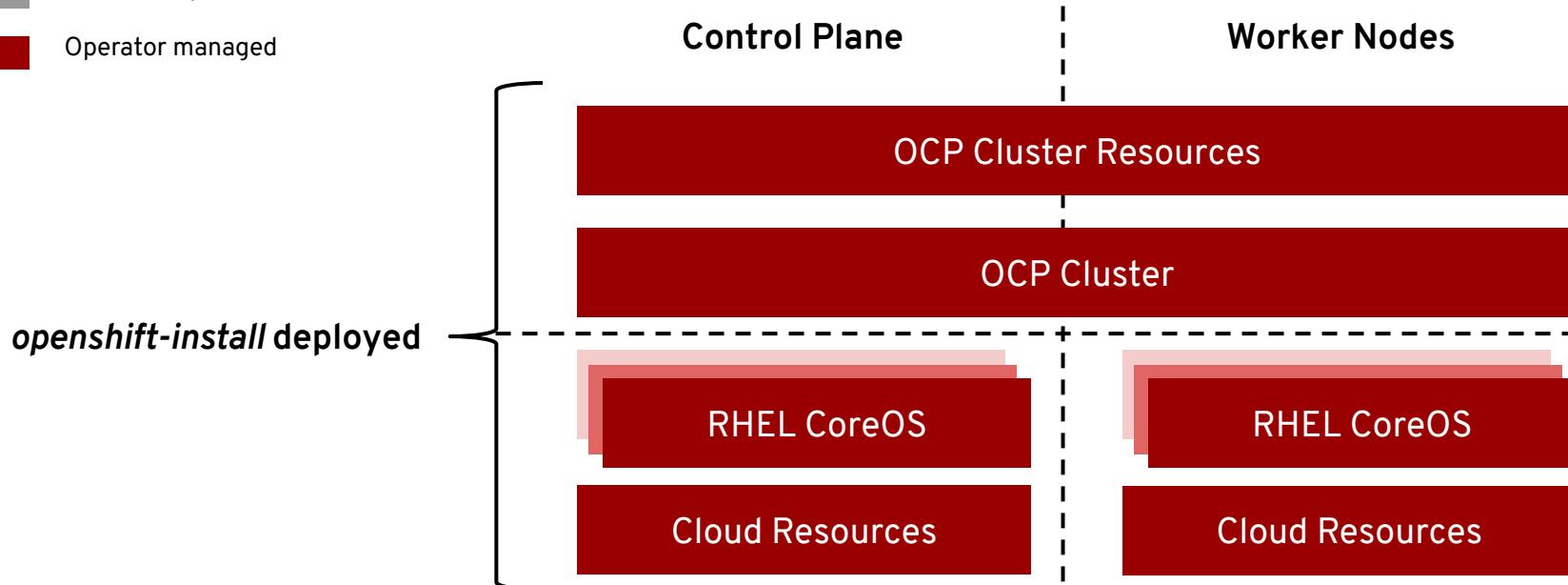


**Red Hat**  
Enterprise  
Linux

# IPI: FULL STACK AUTOMATED DEPLOYMENT

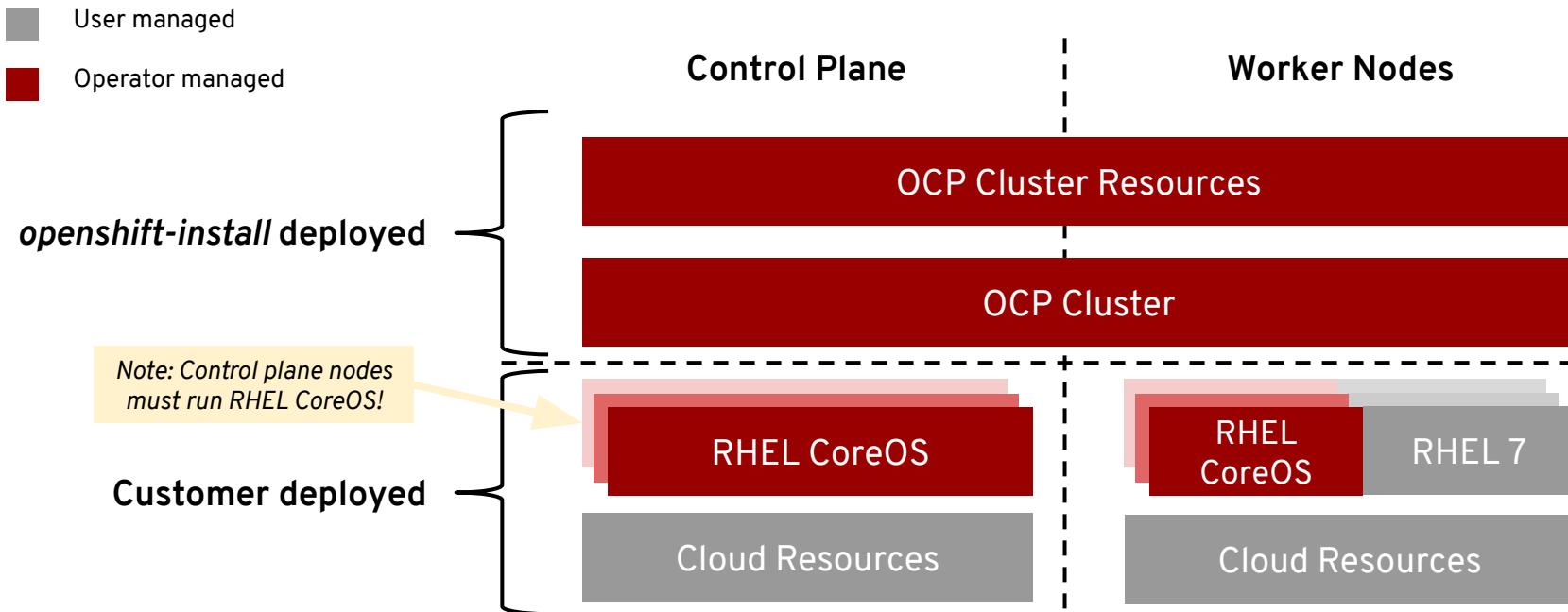
Day 1: openshift-install - Day 2: Operators

- User managed
- Operator managed



# UPI: DEPLOYING TO EXISTING INFRASTRUCTURE

Day 1: openshift-install - Day 2: Operators + Customer Managed Infra & Workers



# RED HAT ENTERPRISE LINUX

## RED HAT<sup>®</sup> ENTERPRISE LINUX<sup>®</sup>

### General Purpose OS

#### BENEFITS

- 10+ year enterprise life cycle
- Industry standard security
- High performance on any infrastructure
- Customizable and compatible with wide ecosystem of partner solutions

## RED HAT<sup>®</sup> ENTERPRISE LINUX CoreOS

### Immutable container host

- Self-managing, over-the-air updates
- Immutable and tightly integrated with OpenShift
- Host isolation is enforced via Containers
- Optimized performance on popular infrastructure

#### WHEN TO USE

When customization and integration with additional solutions is required

When cloud-native, hands-free operations are a top priority

# OPENSHIFT OPERATOR FRAMEWORK



# OPENSOURCE OPERATOR FRAMEWORK

OpenShift 4 uses **OPERATORS** to manage EVERY ASPECT of the cluster.

This includes operators that manage **essential** Kubernetes project components like the api server, scheduler, and controller manager.

**Additional** operators for components like the cluster-autoscaler, cluster-monitoring, web console, dns, ingress, networking, node-tuning, and authentication are included to provide management of the entire platform.

# Welcome to OperatorHub.io

OperatorHub.io is a new home for the Kubernetes community to share Operators. Find an existing Operator or list your own today.

## CATEGORIES

8 ITEMS

VIEW ▾ SORT A-Z ▾

AI/Machine Learning

Application Runtime

Big Data

Cloud Provider

Database

Developer Tools

Integration &amp; Delivery

Logging &amp; Tracing

Monitoring

Networking

OpenShift Optional

Security

Storage



Streaming &amp; Messaging

## PROVIDER

 Altinity (0) Argo (With Operator) (2)**AWS S3 Operator**

provided by Red Hat

Manage the full lifecycle of installing, configuring and managing AWS S3 Provisioning.

**NooBaa Operator**

provided by NooBaa

NooBaa is an object data service for hybrid and multi cloud environments.

**OpenEBS**

provided by OpenEBS project

Creates and maintains OpenEBS Control Plane deployments

**Portworx Enterprise**

provided by Portworx

Cloud native storage solution for production workloads

**Robin Storage**

provided by Robin.io

**Rook-Ceph**

provided by The Rook Authors

Install and maintain Ceph Storage cluster

**Rook-EdgeFS**

provided by The Rook Authors

Install and maintain EdgeFS Storage cluster

**StorageOS**

provided by StorageOS, Inc

Cloud-native, persistent storage for containers.