

# Red Hat OpenShift Container Storage

Persistent data services for OpenShift - Open Hybrid Cloud

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# Presentation Outline

**OCS - What & Why**

**OCS 4 - Direction, Plans, Timelines**

**OCS 3 to OCS 4 transition**

# Red Hat OpenShift Container Storage

## What & Why

# What is it?

Add-On for OpenShift for running stateful apps

## Highly scalable, production-grade persistent storage

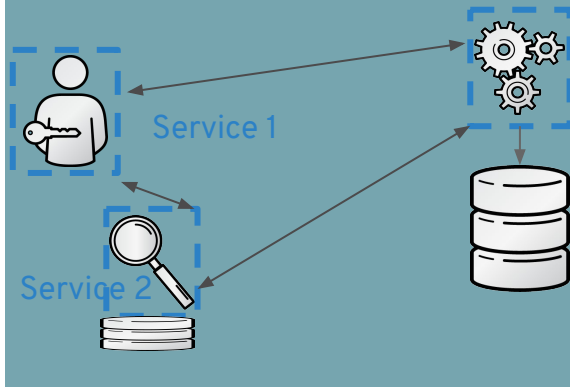
- For **stateful applications** running in Red Hat<sup>®</sup> OpenShift
- Optimized for Red Hat **OpenShift Infrastructure services**
- Developed, released and deployed in synch with Red Hat OpenShift
- Supported via a single contract with Red Hat OpenShift
- Complete persistent storage fabric across hybrid cloud for OCP

# Why do you need persistent Storage?

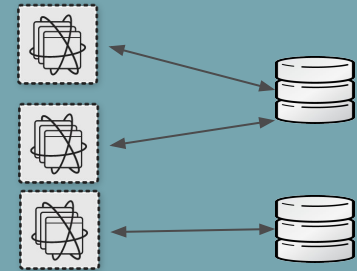
## OCP Infrastructure



## OCP Application



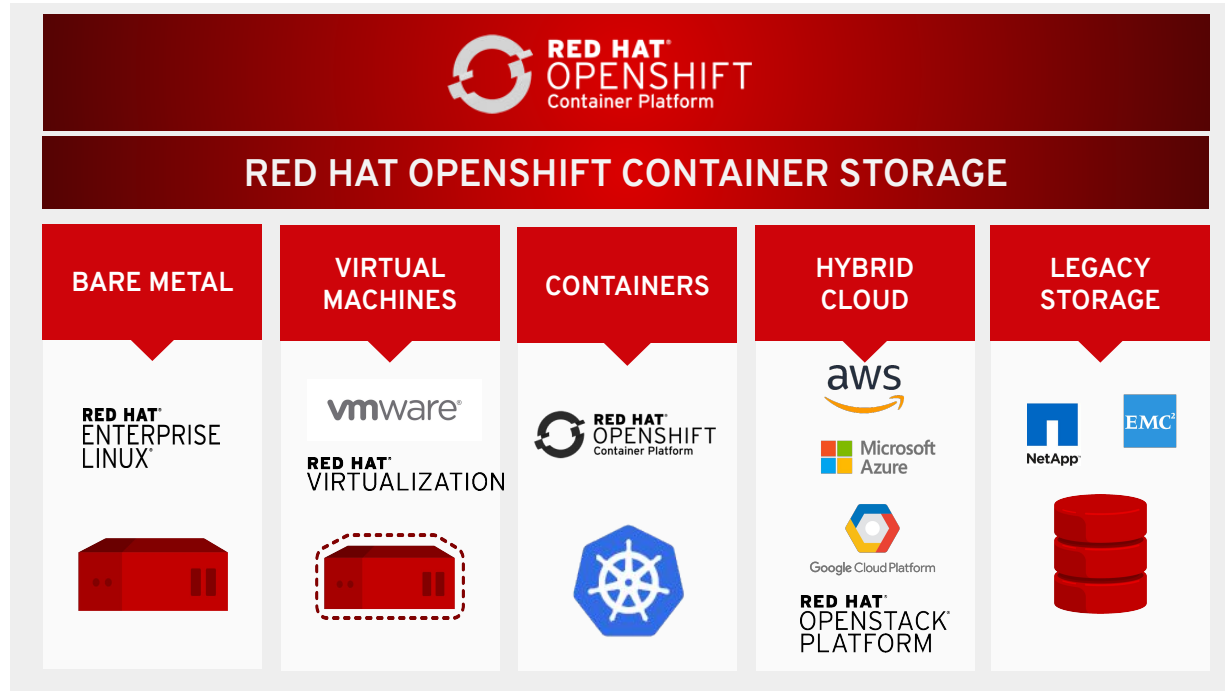
## Local/Ephemeral Storage



OpenShift Container Storage Focus  
RWX/RWO backed by File, Block, S3

# EXPLOIT THE FULL POWER OF OPENSIFT

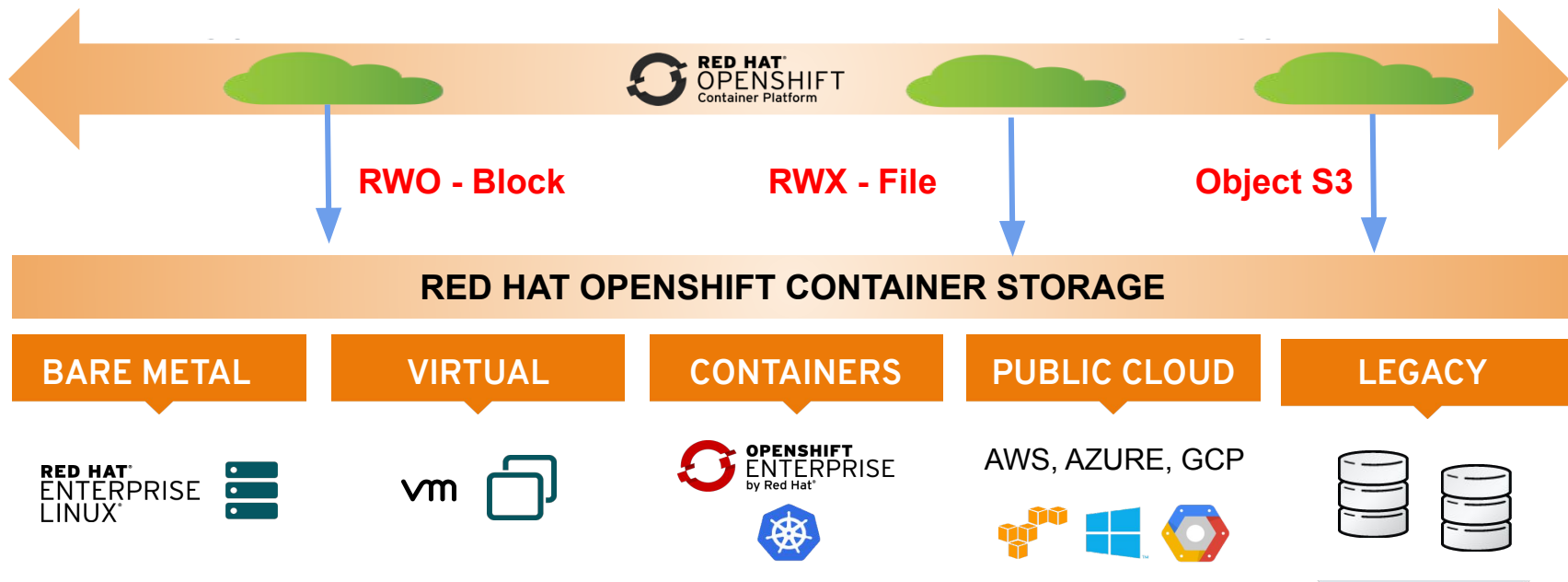
consistent storage consumption, management, and operations



**ANY CLOUD. ANY APP. NO LOCK IN**

**Future Proof against cloud or infrastructure lock-in**

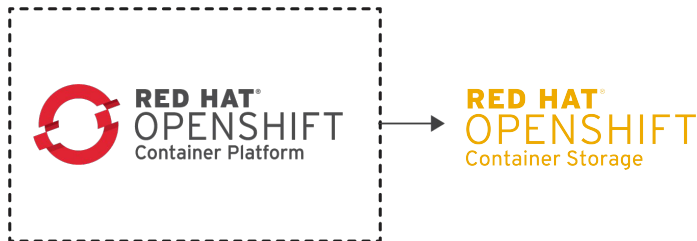
# Complete Storage for Container Platform



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

# TWO FLAVORS OF CONTAINER STORAGE

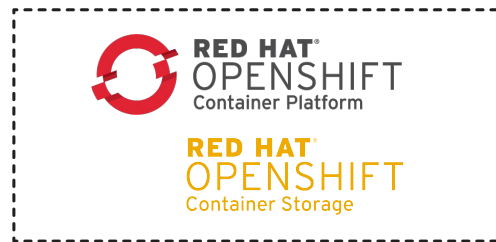
## Flexibility in Deployment



### OPENSIFT CONTAINER STORAGE INDEPENDENT MODE

Use existing investment in traditional storage,  
managed by storage admin – attach to standalone storage

OCS 4.3



### OPENSIFT CONTAINER STORAGE CONVERGED MODE

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

OCS 4.2



# CONTAINER PLATFORM - COMPLETE FROM Red Hat



UNIFIED CLUSTER | COMPLETE PLATFORM | INTEGRATED & TESTED SINGLE  
VENDOR | UPGRADE & SCALE | SINGLE POINT OF SUPPORT

# VALUE PROPOSITION BY PERSONA

## OPENSIFT CUSTOMERS

Complete Platform

Complete Storage

Infrastructure Agnostic

## OPERATIONS

Consistent Operation  
across Hybrid Cloud

Manage & Monitor  
OCP + OCS together

## DEVELOPERS

Consistent Consumption  
Experience

Invisible Infrastructure

## BUSINESS LEADERS

Complete Platform  
from Red Hat

Single Vendor

No Lock-in



**Red Hat**  
OpenShift  
Container Platform



**Red Hat**  
OpenShift  
Container Storage

# Red Hat OpenShift Container Storage

## Direction & Timeline

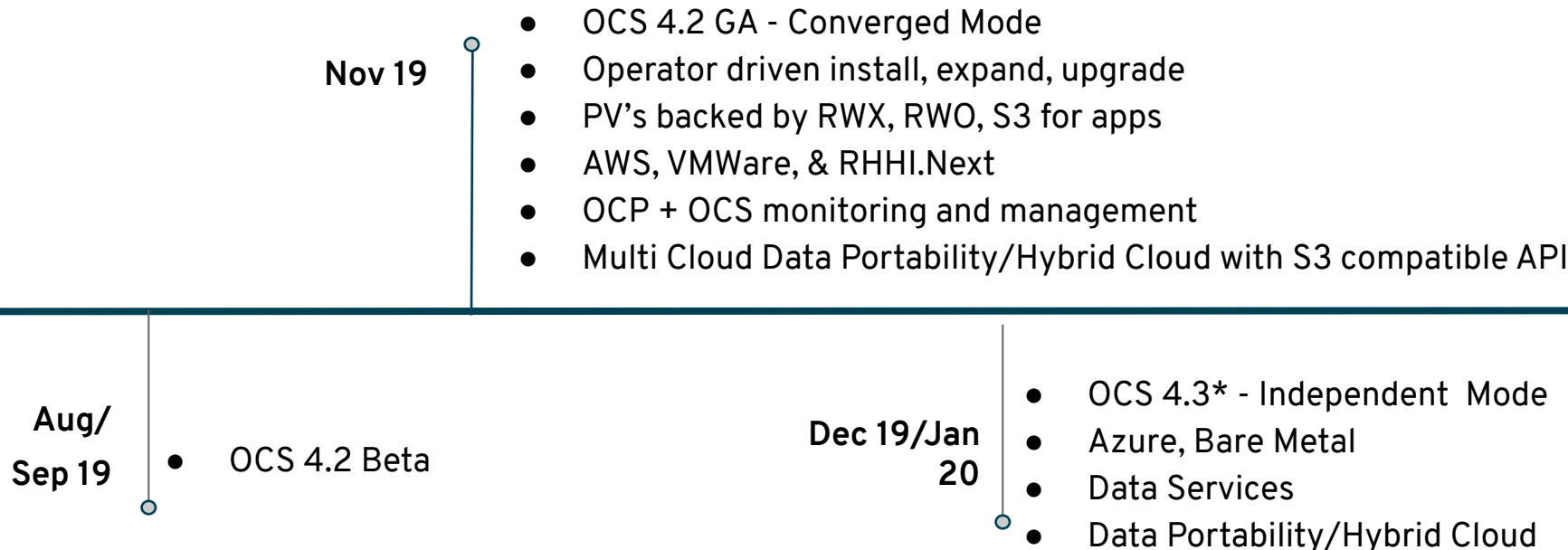
# OCS 4 Technology Stack

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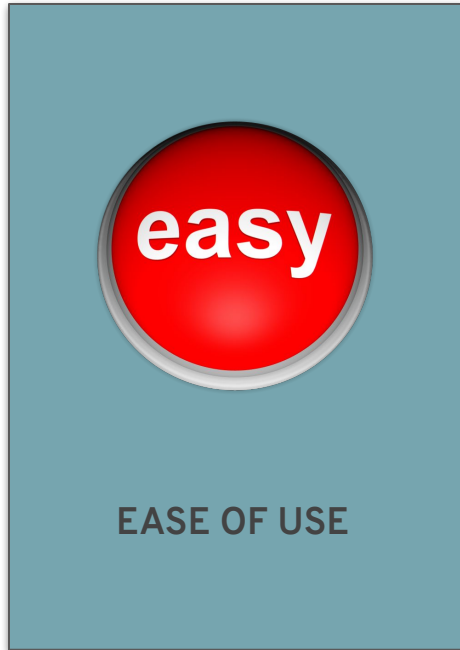


# RHOCS 4.x Roadmap

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# OCS 4.X - Focus Areas

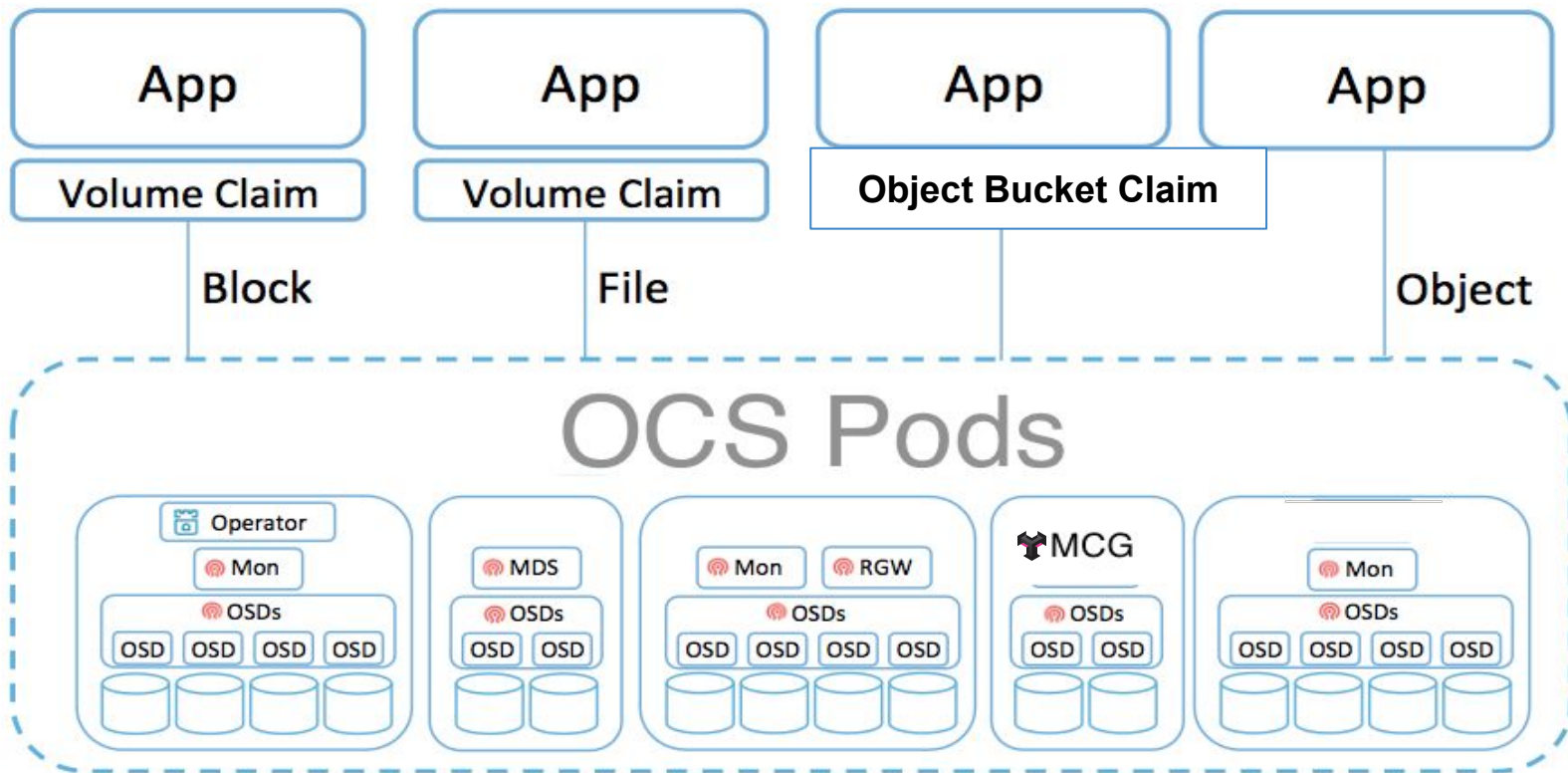


# Ease of Use Hybrid Cloud Kubernetes Storage

# OCS 4.x Operator Install, Upgrade, Expansion

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





# OCS 4.x Operator Driven Install from OLM

The screenshot displays the Red Hat OpenShift Container Platform interface. The left sidebar shows the navigation menu with 'Operators' expanded and 'OperatorHub' selected. The main content area is titled 'OperatorHub' and shows a list of operators under the 'Storage' category. The 'OCS 4.x Operator' is highlighted with a red circle and a red arrow pointing to it. The operator card for 'OCS 4.x Operator' includes the Red Hat logo, the text 'OCS 4.x Operator', and a description: 'Red Hat OpenShift Container Storage 4.x provides...'. The 'INSTALL STATE' section shows 'Installed (1)' and 'Not Installed (5)'. The 'PROVIDER TYPE' section shows 'Red Hat (0)', 'Certified (3)', 'Community (2)', and 'Custom (1)'.

Red Hat OpenShift Container Platform

You are logged in as a temporary administrative user. Update the [cluster OAuth configuration](#) to allow others to log in.

Project: openshift-storage

## 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.

### Storage

Filter by keyword...

6 items

Community	Community	Custom	Custom
 <b>AWS S3 Operator</b> provided by Red Hat Manage the full lifecycle of installing, configuring and managing AWS S3 Provisioner.	 <b>OpenEBS</b> provided by OpenShift project Creates and maintains OpenEBS Control Plane deployments	 <b>OCS 4.x Operator</b> provided by Red Hat Red Hat OpenShift Container Storage 4.x provides...	 <b>Portworx Enterprise</b> provided by Portworx Cloud-native storage solution for production workloads

**StorageOS**  
provided by StorageOS, Inc.  
Cloud-native, persistent storage for containers.

**Robin Storage**  
provided by Robin.io  
Robin Storage operator enables advanced data management capabilities to Kubernetes apps like

**INSTALL STATE**  
☒ Installed (1)  
☐ Not Installed (5)

**PROVIDER TYPE**  
☐ Red Hat (0)  
☐ Certified (3)  
☐ Community (2)  
☐ Custom (1)

# OCS 4.x Simple Install

L

**Administrator** | You are logged in as a temporary administrative user. Update the [cluster OAuth configuration](#) to allow others to log in.

Project: openshift-storage

OpenShift Container Storage Operator > Create OCS Cluster Service

## Create New OCS Service

[Edit YAML](#)

OCS runs as a cloud-native service for optimal integration with applications in need of storage, and handles the scenes such as provisioning and management.

**Select Nodes \***

A minimum of 3 nodes needs to be labeled with `cluster.ocs.openshift.io/openshift-storage=""` in order to create the OCS Service.

**An AWS bucket will be created to provide the OCS Service.**

Select at least 3 nodes you wish to use. \*

Filter by name...

	Name	Role	CPU	Memory
<input type="checkbox"/>	ip-10-0-130-15.ec2.internal	worker	2 CPU	7.2 GiB
<input type="checkbox"/>	ip-10-0-130-197.ec2.internal	master	4 CPU	15.07 GiB
<input type="checkbox"/>	ip-10-0-149-152.ec2.internal	master	4 CPU	15.07 GiB
<input checked="" type="checkbox"/>	ip-10-0-156-133.ec2.internal	worker	2 CPU	7.2 GiB
<input checked="" type="checkbox"/>	ip-10-0-160-15.ec2.internal	worker	2 CPU	7.2 GiB
<input checked="" type="checkbox"/>	ip-10-0-161-253.ec2.internal	master	4 CPU	15.07 GiB

3 node(s) selected

**Storage Class**

gp2

[Create](#) [Cancel](#)

# OCP + OCS Integrated Monitoring and Management

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The screenshot displays the Red Hat OpenShift Container Platform console interface. A red circle highlights the 'OCS Dashboard' link in the left-hand navigation menu, which is also labeled with a red circle and the text 'OCS Dashboard'. The main content area shows the OCS Dashboard for a specific cluster, including details about the cluster, provider, and OpenShift version. The dashboard is divided into several sections: Cluster Health, Alerts, Cluster Capacity, Cluster Utilization, and Events. The Cluster Capacity section shows CPU, Memory, Storage, and Network utilization. The Cluster Utilization section shows a table of CPU, Memory, and Disk Usage. The Events section shows a list of events with details about the events and their status.

**Cluster Details:**

- Cluster: 31e527d4-0c22-4b70-8389-870ee13c3bdf
- Provider: AWS
- OpenShift Version: 4.2.0-0.ci-2019-08-20-173300

**Cluster Inventory:**

- 6 Nodes (6/6 OK)
- 423 Pods (416 OK, 6 Pending, 1 Error)
- 6 PVCs (5 OK, 1 Pending)
- 3 Bare Metal Hosts (3/3 OK)

**Cluster Health:**

- Multiple errors: Cluster health is degraded

**Alerts:**

- API server is returning errors for 100% of requests for GET /apis/custom.metrics.k8s.io/v1beta1.
- Cluster Autoscaler has 1 unschedulable pods
- API server is returning errors for 100% of requests for GET /apis/custom.metrics.k8s.io/v1beta1.
- The average time between iptables resyncs is too high. NOTE - There is some scrape delay and other offsets, 90s isn't exact but it is still too high.

**Cluster Capacity:**

- CPU: 79% available out of 100% (21% utilization)
- Memory: 66.81 Gi available out of 70.33 Gi (5% utilization)
- Storage: Not available
- Network: 7.5 GBps available out of 7.5 GBps (0% utilization)

**Cluster Utilization:**

	10:00	10:05	10:10	10:15	10:20	10:25	10:30	10:35	10:40	10:45	10:50	10:55	11:00	
CPU	21%	[Bar chart showing CPU utilization over time]												
Memory	3.52 Gi	[Bar chart showing Memory utilization over time]												
Disk Usage	No datapoints found.													

**Events:**

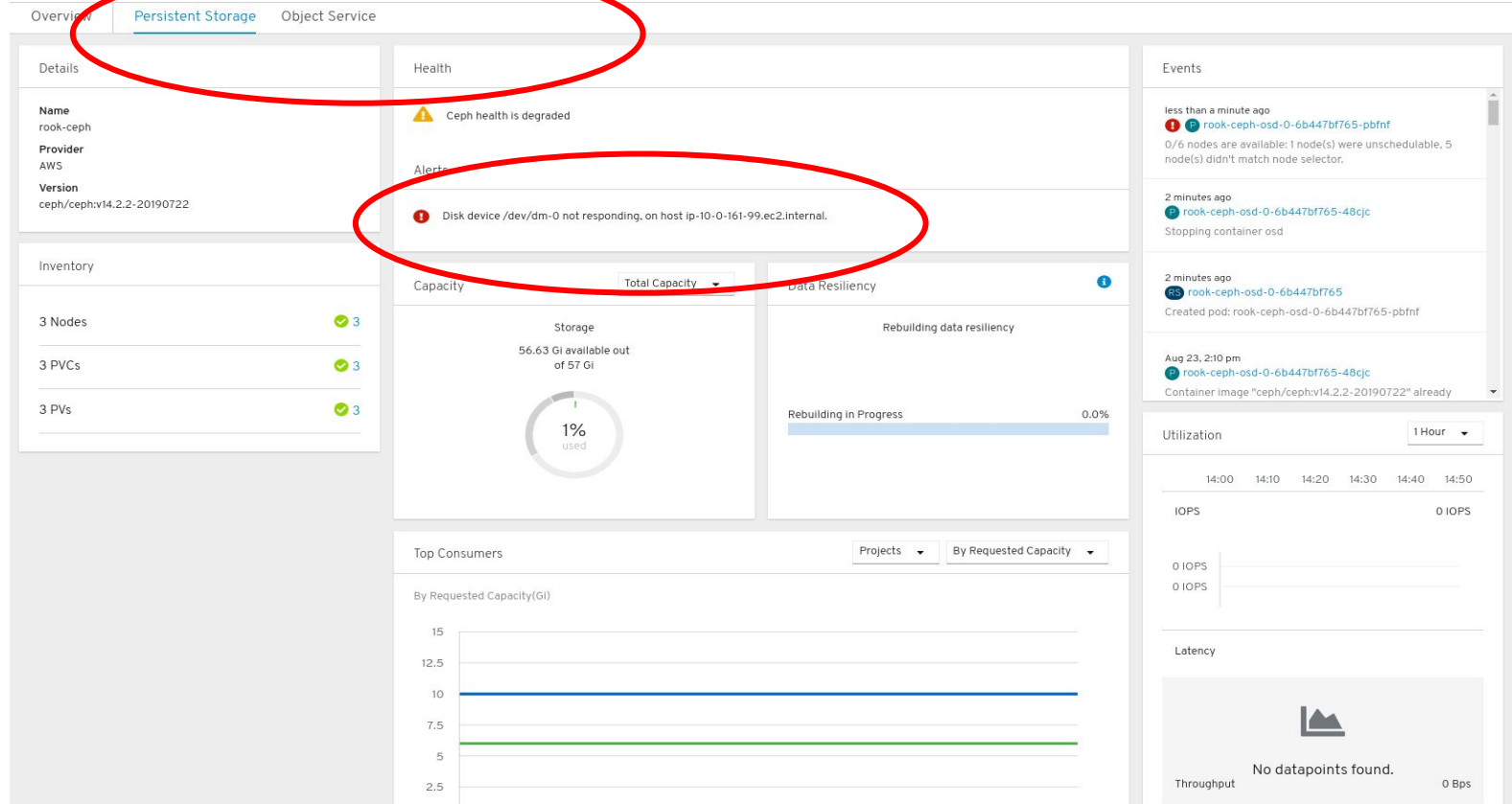
- 1 minute ago: istio-pilot-577f6784c-w5xk8: pod didn't trigger scale-up (it wouldn't fit if a new node is added):
- 2 minutes ago: istio-pilot-577f6784c-w5xk8: 0/6 nodes are available: 3 Insufficient cpu, 3 node(s) had taints that the pod didn't tolerate.
- 2 minutes ago: imag111-1-28b1t: Back-off restarting failed container
- 3 minutes ago: istio-ingressgateway-54968c8854-vrbm9: Readiness probe failed: HTTP probe failed with statuscode: 503
- 3 minutes ago: cluster-local-gateway-58758f588-6qnrz

**Top Consumers:**

- Pods: By CPU
- Prometheus-k8s-0: 0.40
- Prometheus-k8s-1: 0.31
- kube-apiserver-ip-10-0-146-123.us-east-2.compute.internal: 0.16
- kube-apiserver-ip-10-0-162-138.us-east-2.compute.internal: 0.09
- kube-apiserver-ip-10-0-136-50.us-east-2.compute.internal: 0.0

# OCS Integrated Dashboard

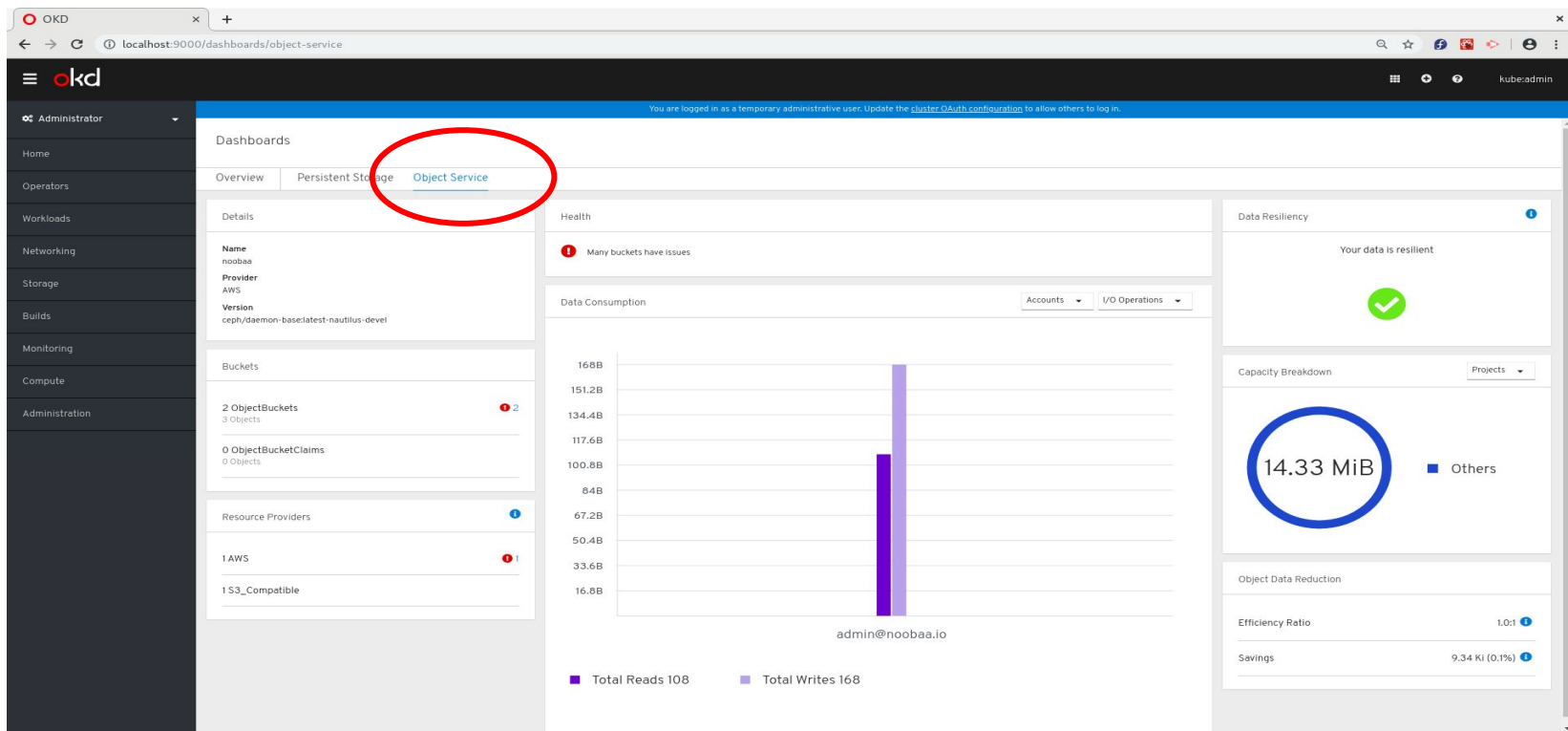
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Health, Capacity, Performance, Configuration, Alerts

# OCS Integrated Dashboard - Object Storage

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Monitoring and Alerts

# Ease of Use Hybrid Cloud Kubernetes Storage

# Red Hat OpenShift Container Storage

## Consistent Set of OpenShift Stateful Service

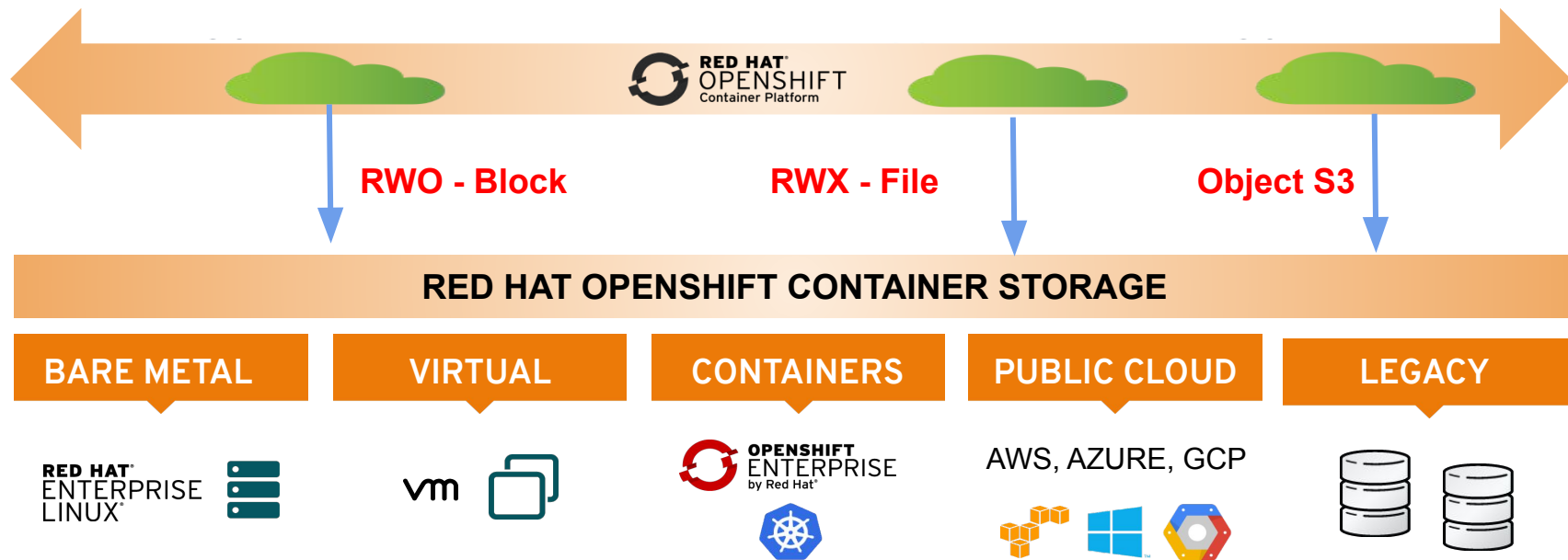


### OPEN HYBRID CLOUD IMPERATIVES

Application Portability | Platform Independence | Elastic

# Complete Storage for Container Platform

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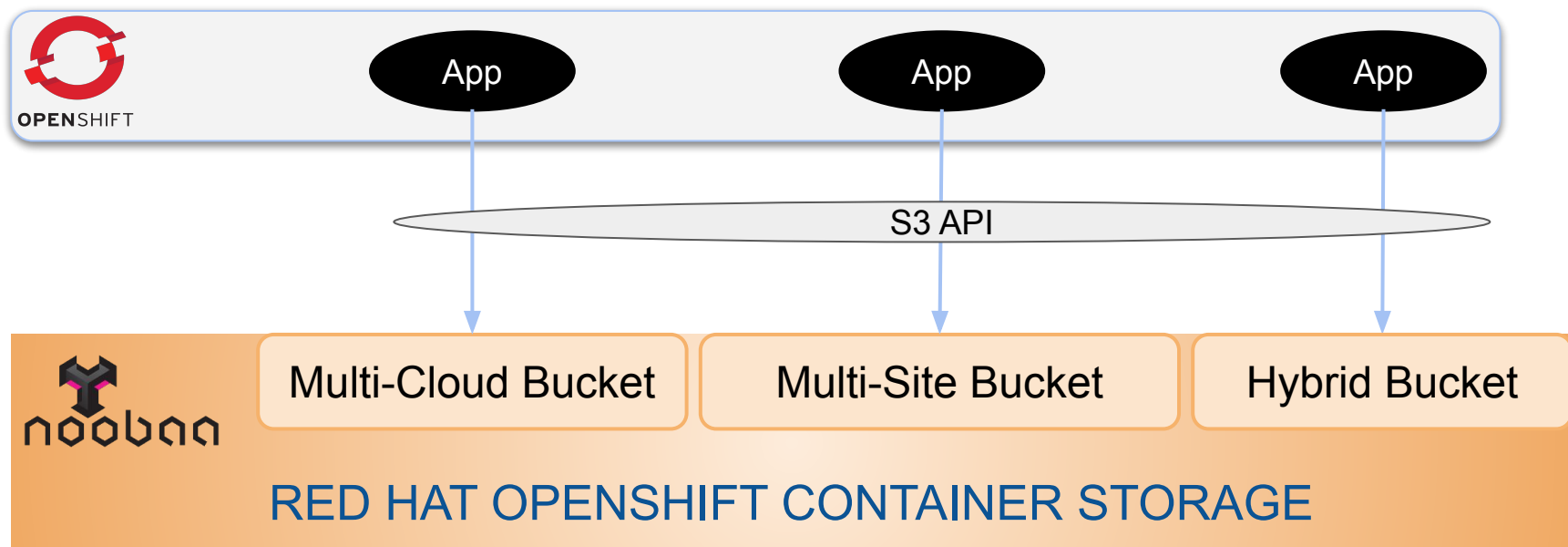


Addition of Object S3 completes the storage stack  
OCS- MCG (Noobaa) backed by RGW or cloud native S3



# Multi-Cloud Object Gateway (NooBaa)

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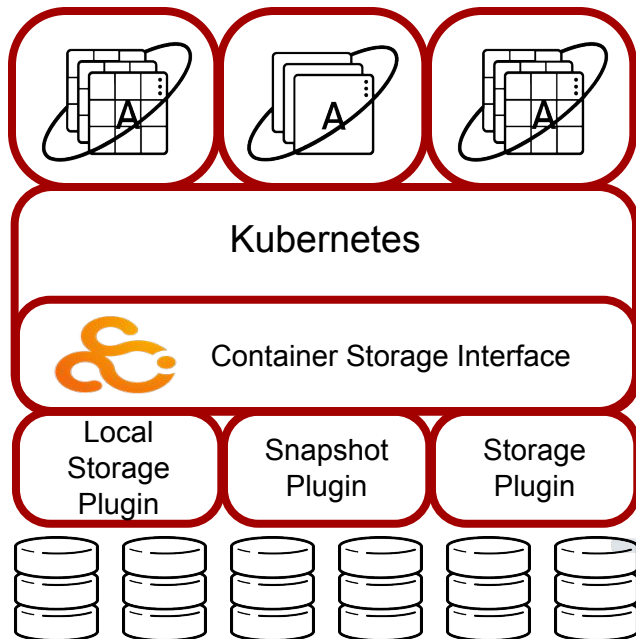
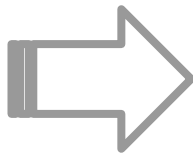
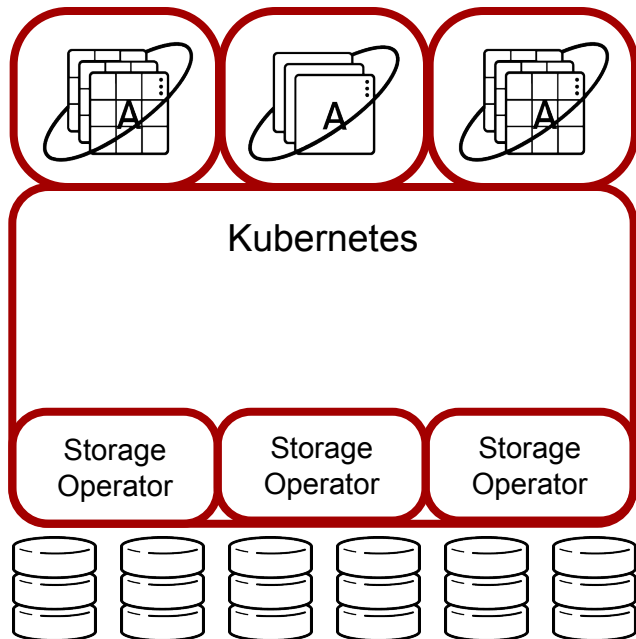
Active - Active Multi Cloud Read /Write, First Iteration

# Ease of Use Hybrid Cloud OpenShift/Kubernetes Storage

# OpenShift Storage - CSI

4.0

OCS 4.2



Updated  
Storage  
Plugin

Independent  
Update

## OpenShift 4.1

- Storage Operators
- Platform support: AWS EBS, Hostpath, iSCSI, FC, NFS, vSphere, AWS EFS (Dev Preview)

## OpenShift 4.2

- **Container Storage Interface 1.0 GA**
- CSI drivers
- CSI Test/Certification API Test Suite
- Local Storage Operator
- **Raw Block**
- **OCS integration and support**
- Platforms: Azure, GCP

## OpenShift 4.2+

- Snapshot and Restore
- Clone
- PV Resize

# Red Hat OpenShift Container Storage

## Getting Started with 3.11

# OPENSIFT CONTAINER STORAGE 3.11.x ROADMAP

## OCS 3.11.3

June 2019

- Optimized container images
- limit # of volumes
- 2TB block volumes
- Block stability fixes

RHOCS 3.11.4

October 2019

- Re-base to RHGS 3.5
- 2000 + PV gluster-file volumes
- PVC names > 63 characters
- quota configuration
- Improved Block performance

OCS 3.11 same lifecycle as OCP 3.11

No change in SKU or pricing

# Red Hat OpenShift Container Storage

OCP 3 + OCS 3 → OCP +  
OCS 4

# OpenShift Cluster App Migration Tool

Red Hat  
OpenShift Container Platform | Cluster Application Migration Tool

jmatthews

2 Clusters

2 Connected

0 Connection failed

[View all 2 Clusters](#)

1 Replication Repository

1 Connected

0 Connection failed

[View 1 Repository](#)

1 Migration Plan

0 Not started

0 In progress

0 Complete

[View 1 Plan](#)

Clusters

[Add cluster](#)

✓ OCP 3 source

ocp3.com

1 associated migration plan

[Edit](#) [Remove](#)

✓ OCP 4 destination

sddafadf

1 associated migration plan

[Edit](#) [Remove](#)

Replication Repositories

[Add repository](#)

✓ OCS\_S3

migrate

1 associated migration plan

[Edit](#) [Remove](#)

Migration Plans

[Add plan](#)

Name	Migrations	Source	Target	Repository	Persistent Volumes	Last Status	
<div>○ OCP3_to_4 Migration</div>	<div>➡ 1</div>	OCP 3 source	OCP 4 destination	OCS_S3	<div>🗄️ 2</div>	Staged Successfully	<div><a href="#">Stage</a> <a href="#">Migrate</a></div> <div>⋮</div>

#redhat #rhsummit

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# Thank you

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