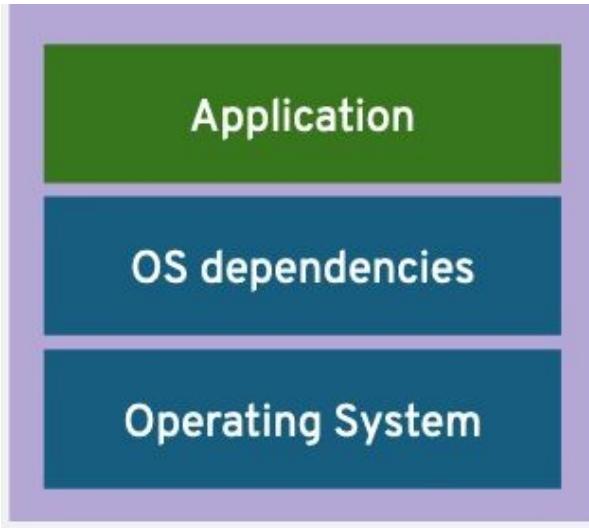


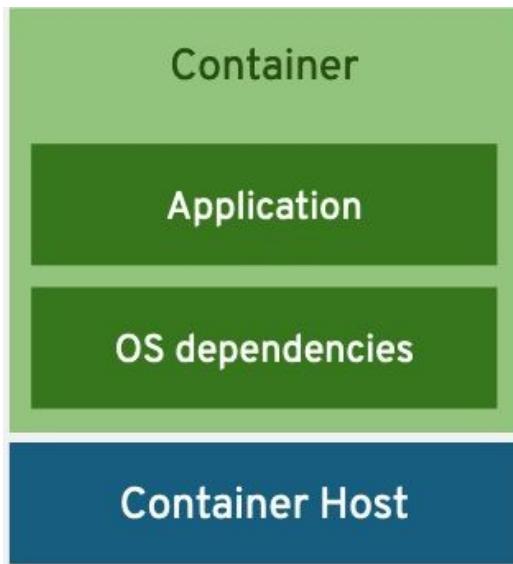
OPENShift STORAGE

APPLICATION PROPERTIES AND BEHAVIOUR



TRADITIONAL APPLICATION

APPLICATION PROPERTIES AND BEHAVIOUR

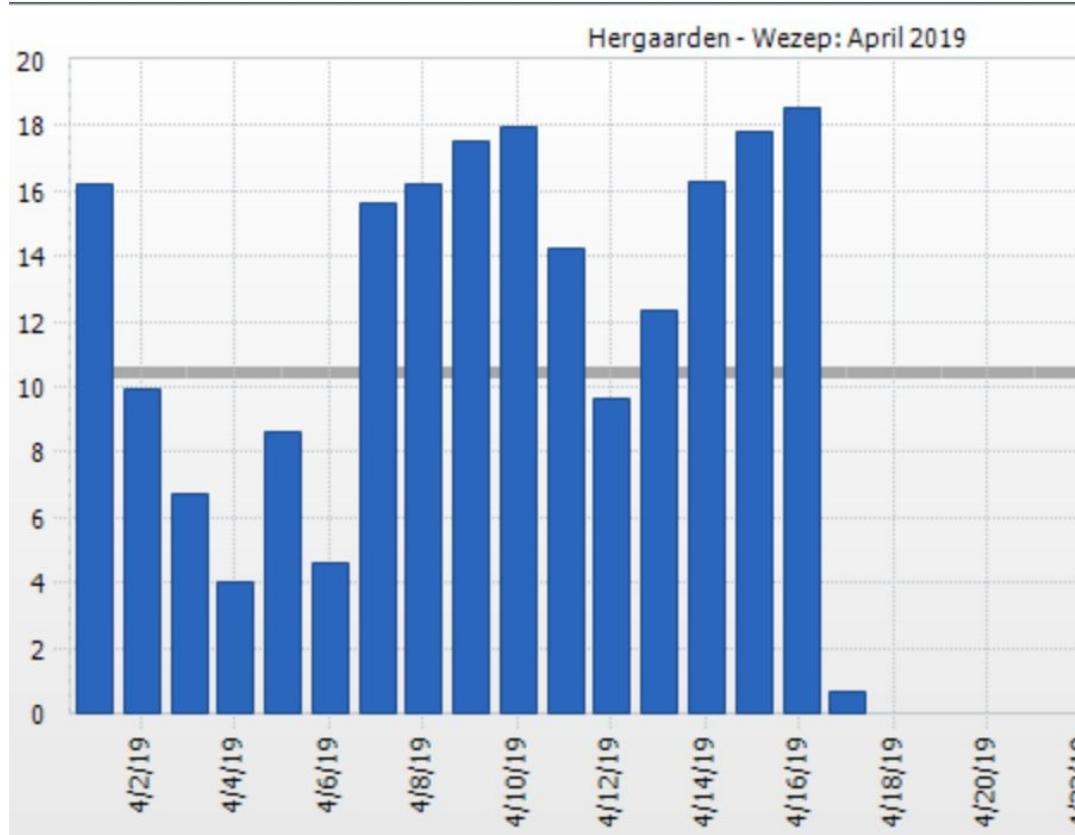


MODERN APPLICATION

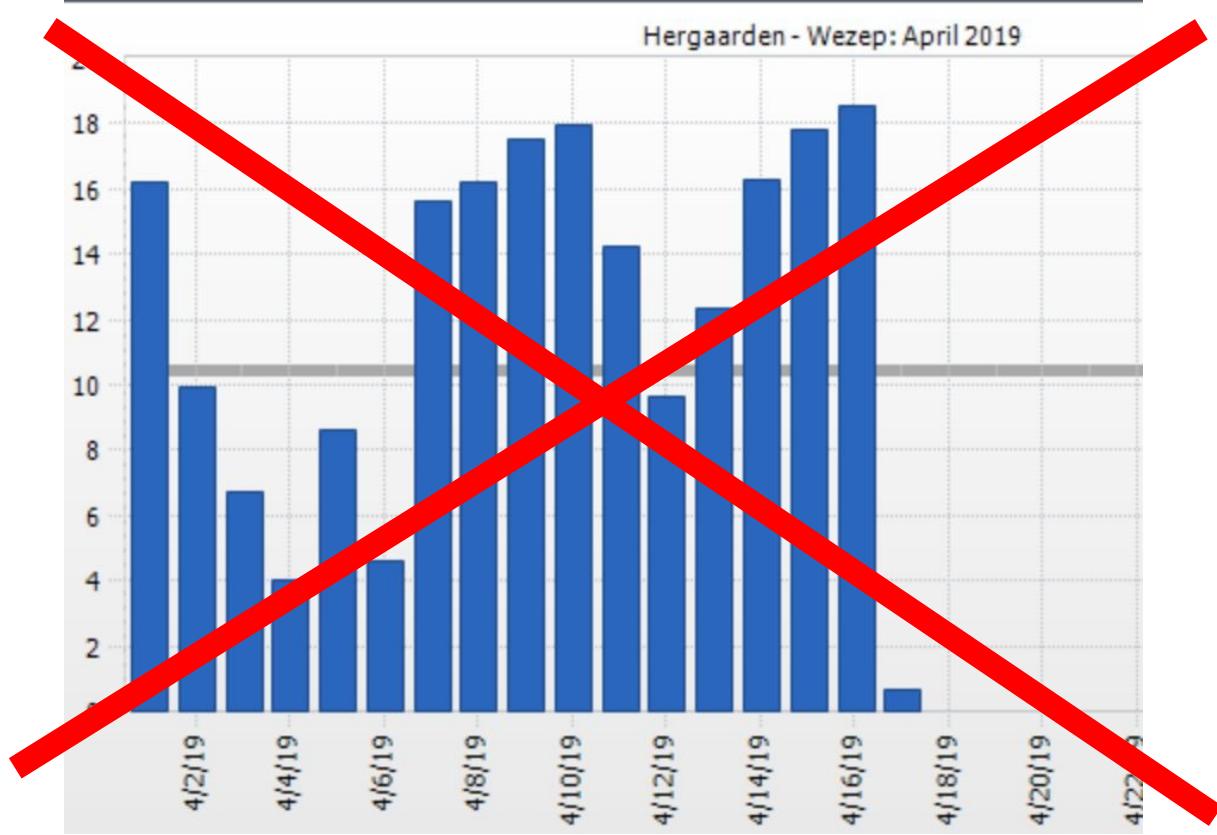
A CONTAINER IS A SYSTEM PROCESS

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



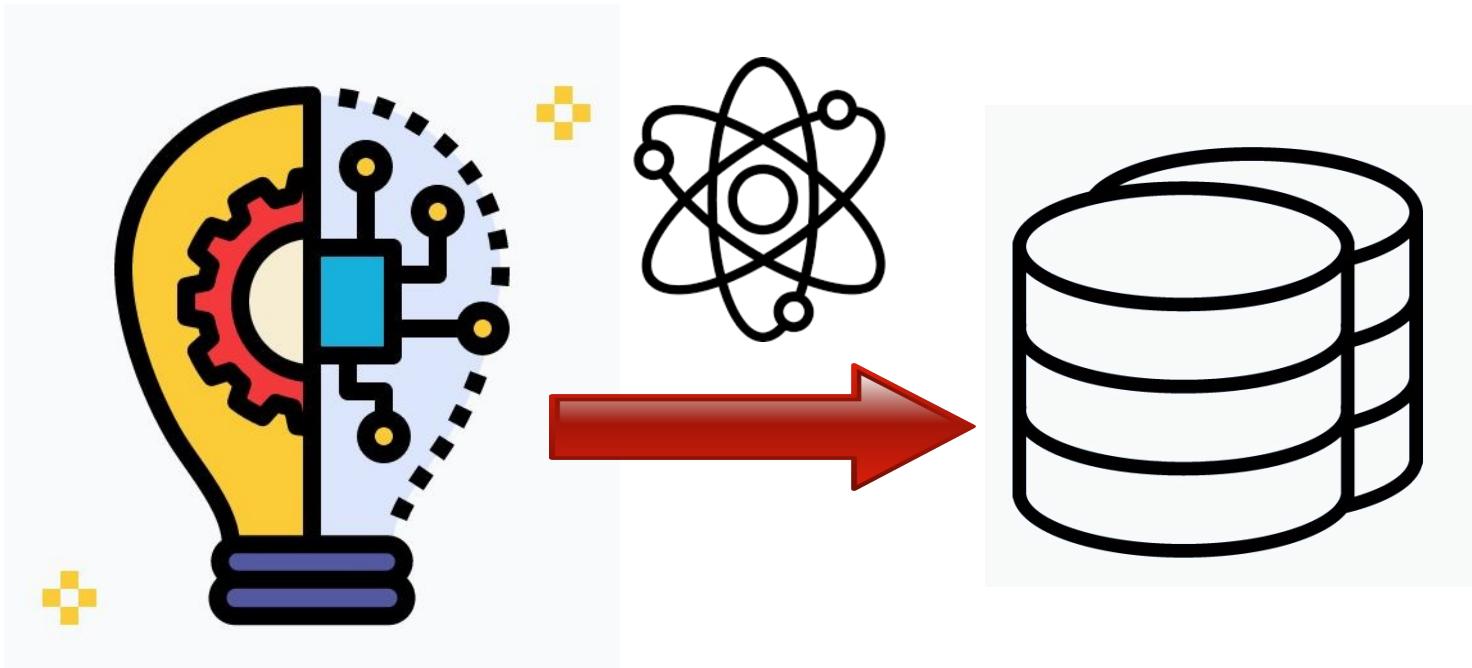
A STOPPED PROCESS CAUSES LOSS OF THAT STATE



NEED FOR PERSISTENT STORAGE

CONTAINERS NEED STORAGE

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



POSSIBLE STORAGE PROVIDERS

- NFS
- GlusterFS
- OpenStack Cinder
- 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 OPENSIFT

- **REGISTRY STORE**

Where container base images reside.

By default not redundant, therefore possible point of failure.

- **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 the require certain performance
i.e. Database workloads, Logging where Elastic or equivalents are involved.

- **EPHEMERAL STORAGE**

Application internalstorage, also named EmptyDir.

Outside scope for container storage

The background of the slide features a stylized architectural scene with several skyscrapers. The buildings are rendered in a deep red color, with some showing a grid-like pattern of windows. The perspective is from a low angle, looking up at the towers. A large, dark red triangular shape is positioned in the lower right corner. The overall composition is modern and minimalist.

BACKUP SLIDES

RED HAT SOLUTION: RHOCS

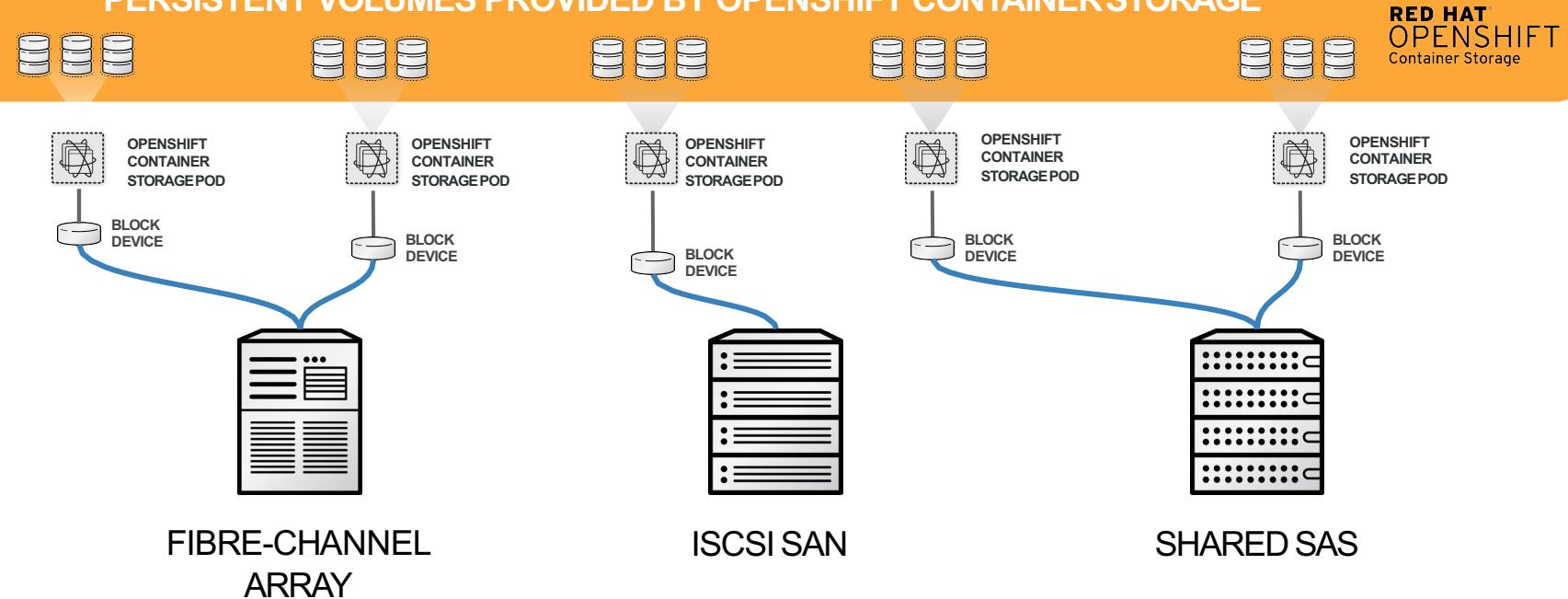
RED HAT OFFERS A FULLY INTEGRATED STORAGE SOLUTION FOR OPENSHIFT

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

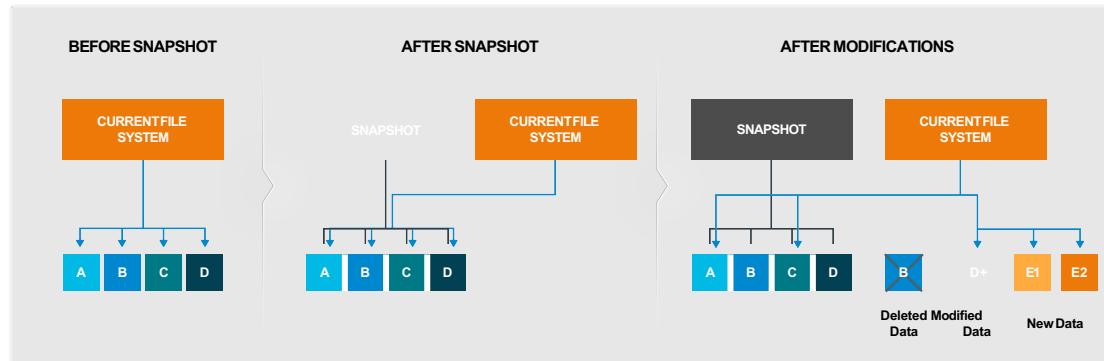
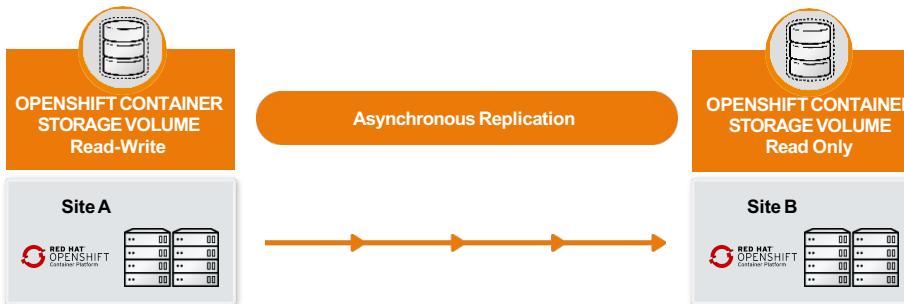


LEVERAGE LEGACY STORAGE... WITH OPENSHIFT CONTAINER STORAGE CONVERGED MODE

PERSISTENT VOLUMES PROVIDED BY OPENSHIFT CONTAINER STORAGE



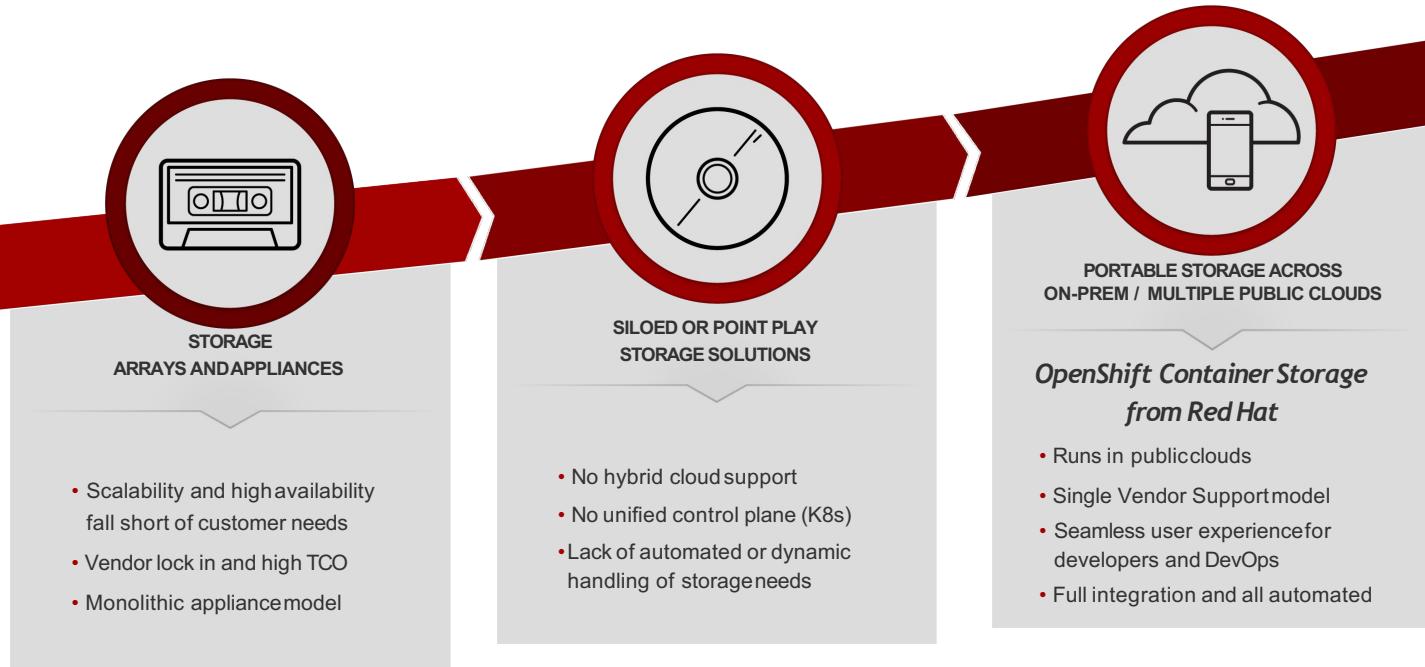
SNAPSHOTS AND GEO-REPLICATION



SUMMARY FACTS

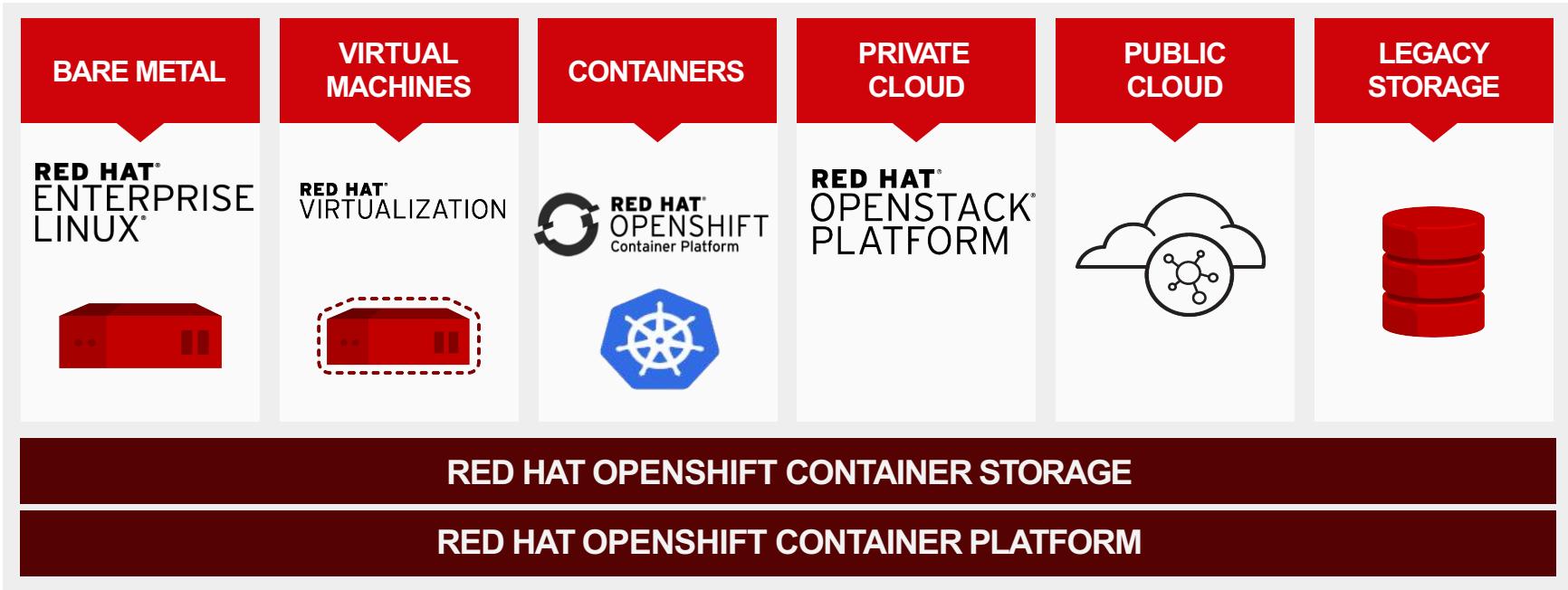
- CONTAINERS ARE SYSTEM PROCESSES
- CONTAINER STATES ARE VOLATILE BY DEFAULT
- CONTAINERS THEREFORE NEED PERSISTENT STORAGE
- EXISTING STORAGE ENTITIES CAN BE USED IN CONJUNCTION WITH OPENSHIFT
- EXISTING STORAGE ENTITIES OFTEN JUST ADDRESS ONE SINGLE PART OF THE 4 NEEDS
- PROVISIONING AND HANDLING OF 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 -

STORAGE OPTIONS FOR CONTAINERS



Consistent Storage Experience Across Hybrid Cloud

APPLICATION PORTABILITY AND LOWERCOSTS





OCS 3

OpenShift Container Storage

Based on GlusterFS technology

OPENSHIFT PLATFORM STORAGE NEEDS

OCP Infrastructure

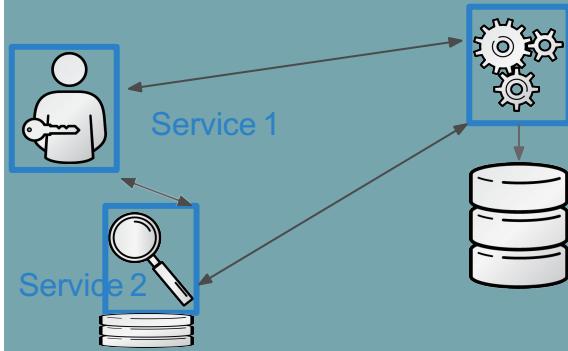


Registry

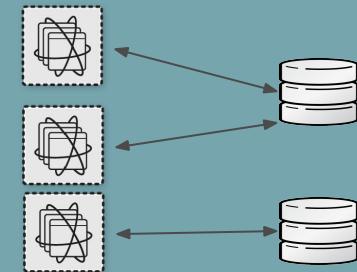
Metrics

Logging

OCP Application



Local/Ephemeral Storage



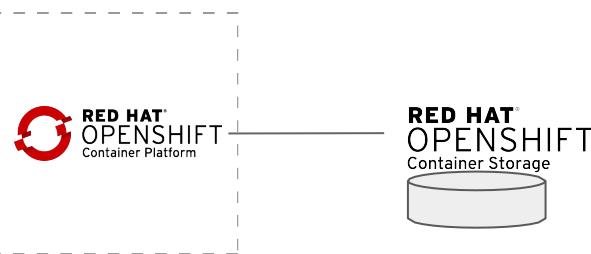
Openshift Container Storage focus

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

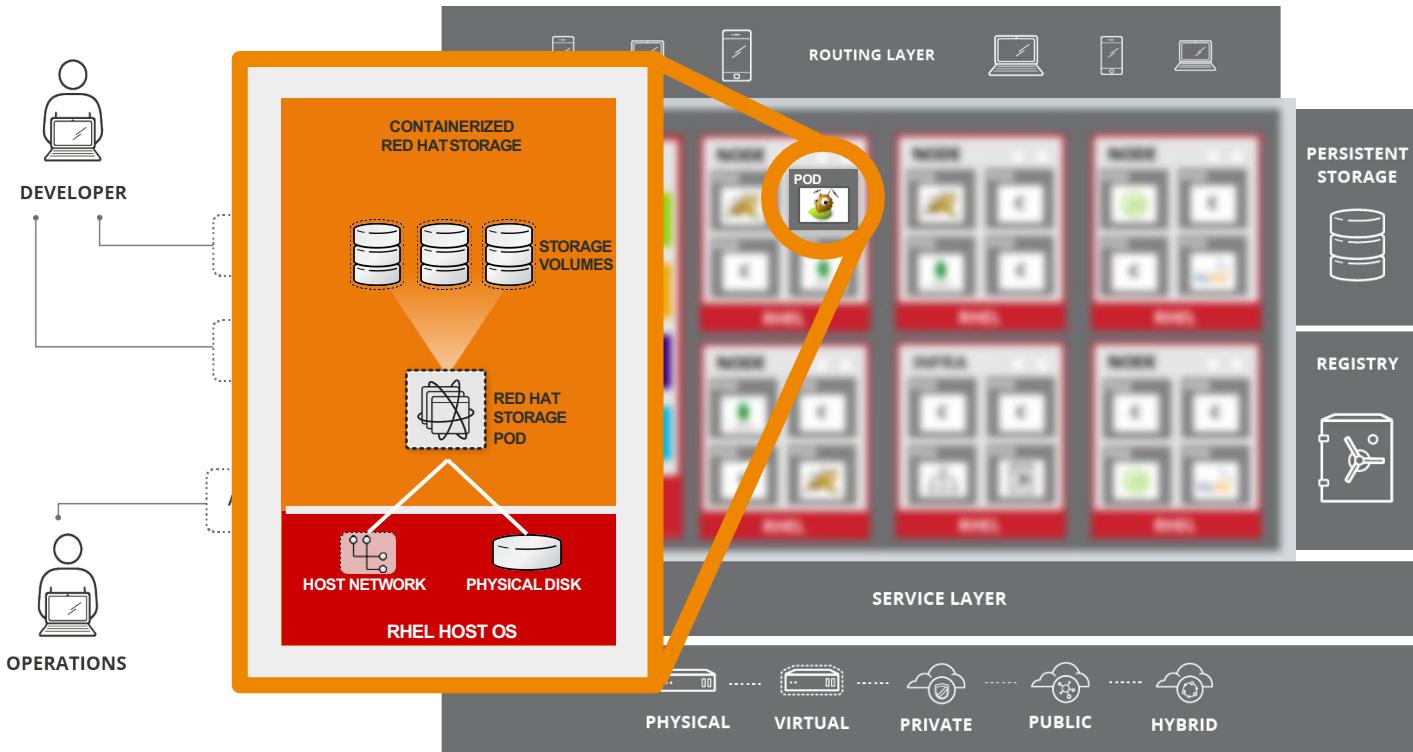
STORAGE IN CONTAINERS

Persona: DevOps, App Architects

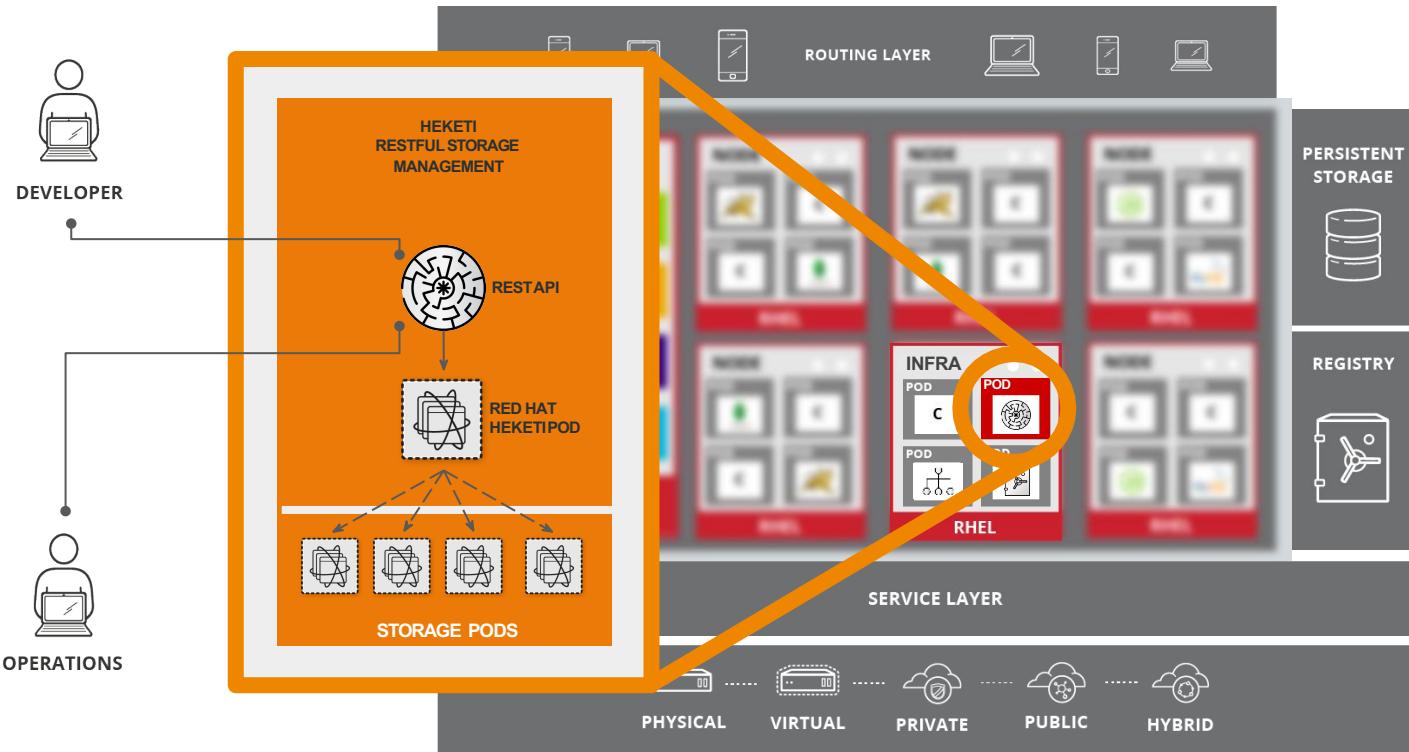


- Highly scalable, enterprise-grade storage, fully integrated into OpenShift Container Platform

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^[5&6]. 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

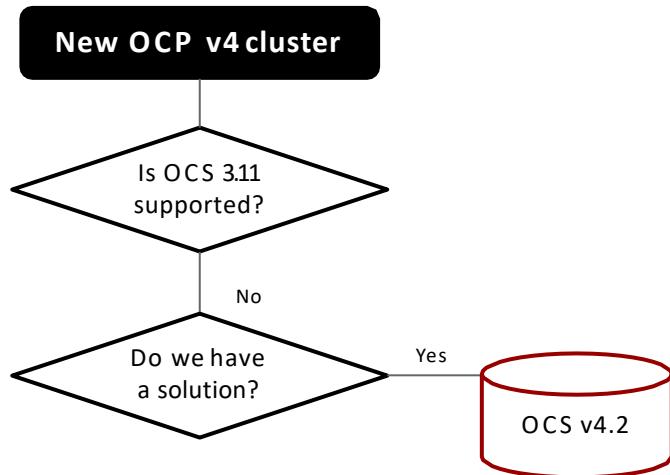
- Operator framework for standard lifecycle management
- New industry standard storage API with CSI (Container Storage Interface) integrated with kubernetes offering:
 - Storage Classes which provide configuration to CSI drivers
 - Ability to encrypt credentials
 - Multiple CSI drivers can co-exist
 - 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">. CreateVolume. DeleteVolume. ListVolume . ControllerPublishVolume. ControllerUnpublishVolume. ValidateVolumeCapabilities. GetCapacity . CreateSnapshot. DeleteSnapshot. ListSnapshot . ControllerGetCapabilities	<ul style="list-style-type: none">. NodeStageVolume. NodeUnstageVolume . NodePublishVolume. NodeUnpublishVolume . NodeGetVolumeStats . NodeGetInfo. NodeGetCapabilities	<ul style="list-style-type: none">. GetPluginInfo . GetPluginCapabilities . Probe(ProbeRequest)

It's OCS 3.11 ready for OCP 4.2?

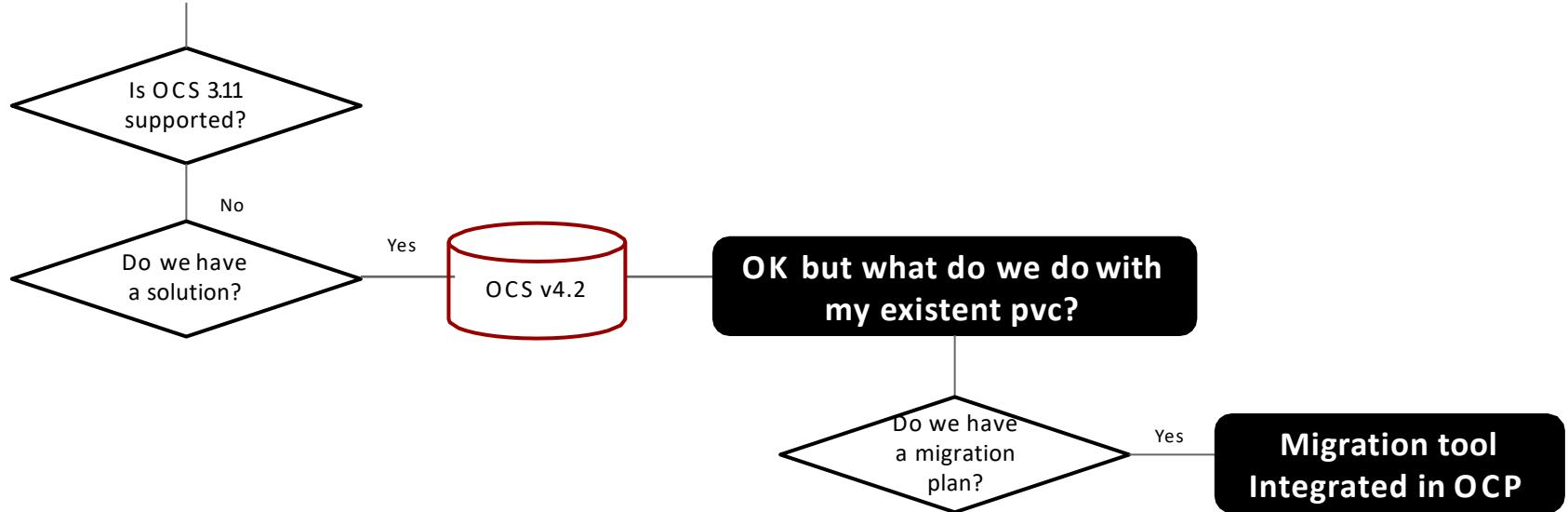
Use case for fresh new OCP 4.2 cluster



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 large, angular red and black geometric shapes that resemble modern skyscrapers or facets of a crystal. The perspective is from a low angle, looking up at the structures.

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 OCP4?**

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



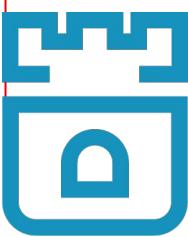
WHY WE MOVE TO CEPH

- **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.



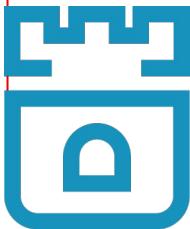
ROOK

- ROOK Project

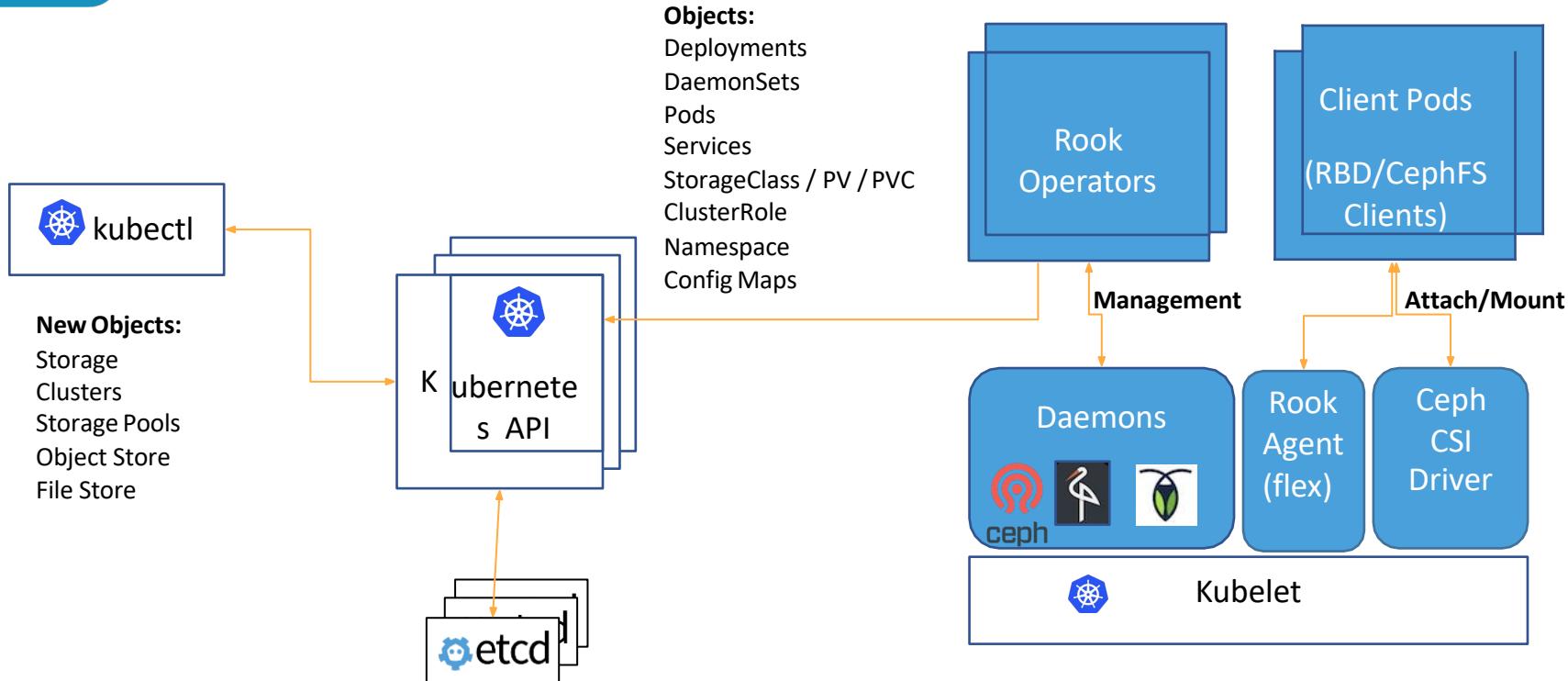
CLOUD-NATIVE STORAGE ORCHESTRATOR
automated deployment and life-cycle management

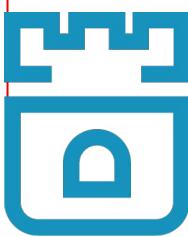
- Bootstrapping
- Configuration, provisioning, scaling, upgrading, migration, disaster recovery, monitoring, and resource management

<https://rook.io>

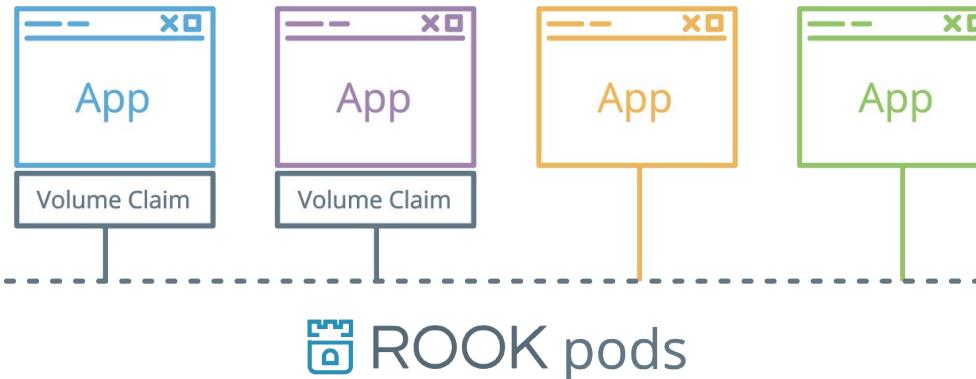


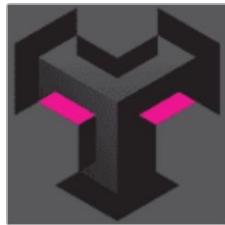
ROOK ARCHITECTURE





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)

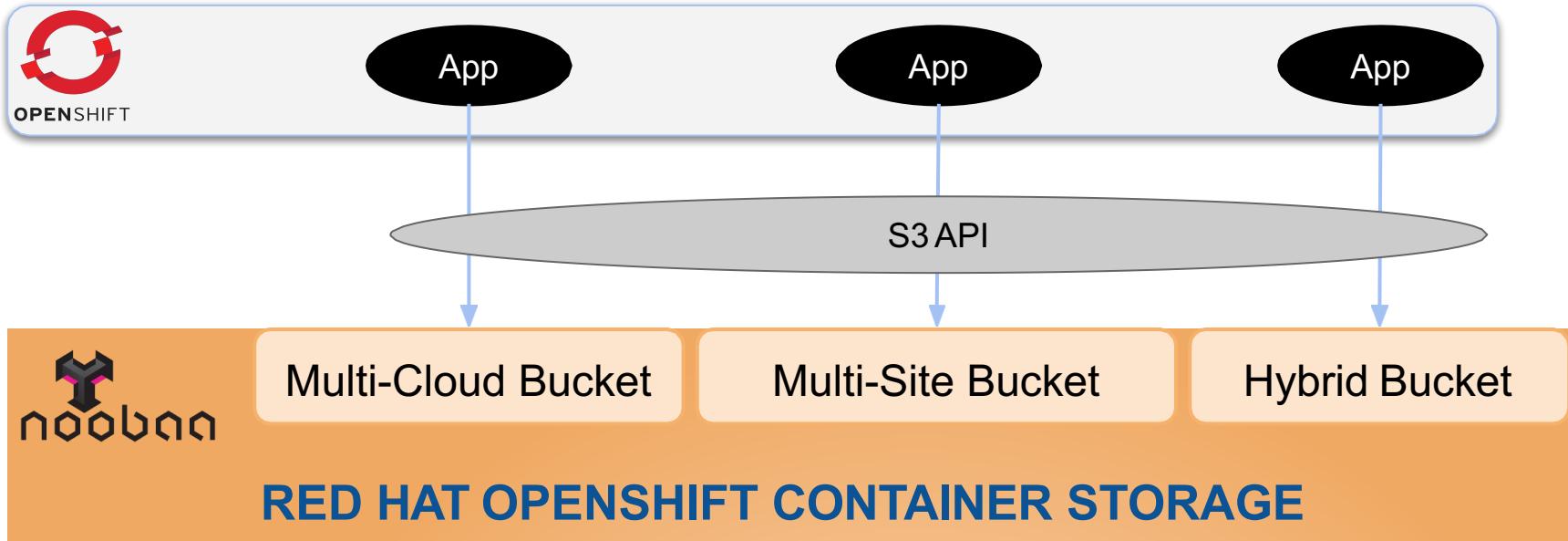
- **OCS MCG FUNCTIONALITY**

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



ACTIVE - ACTIVE MULTI CLOUD - READ/WRITE

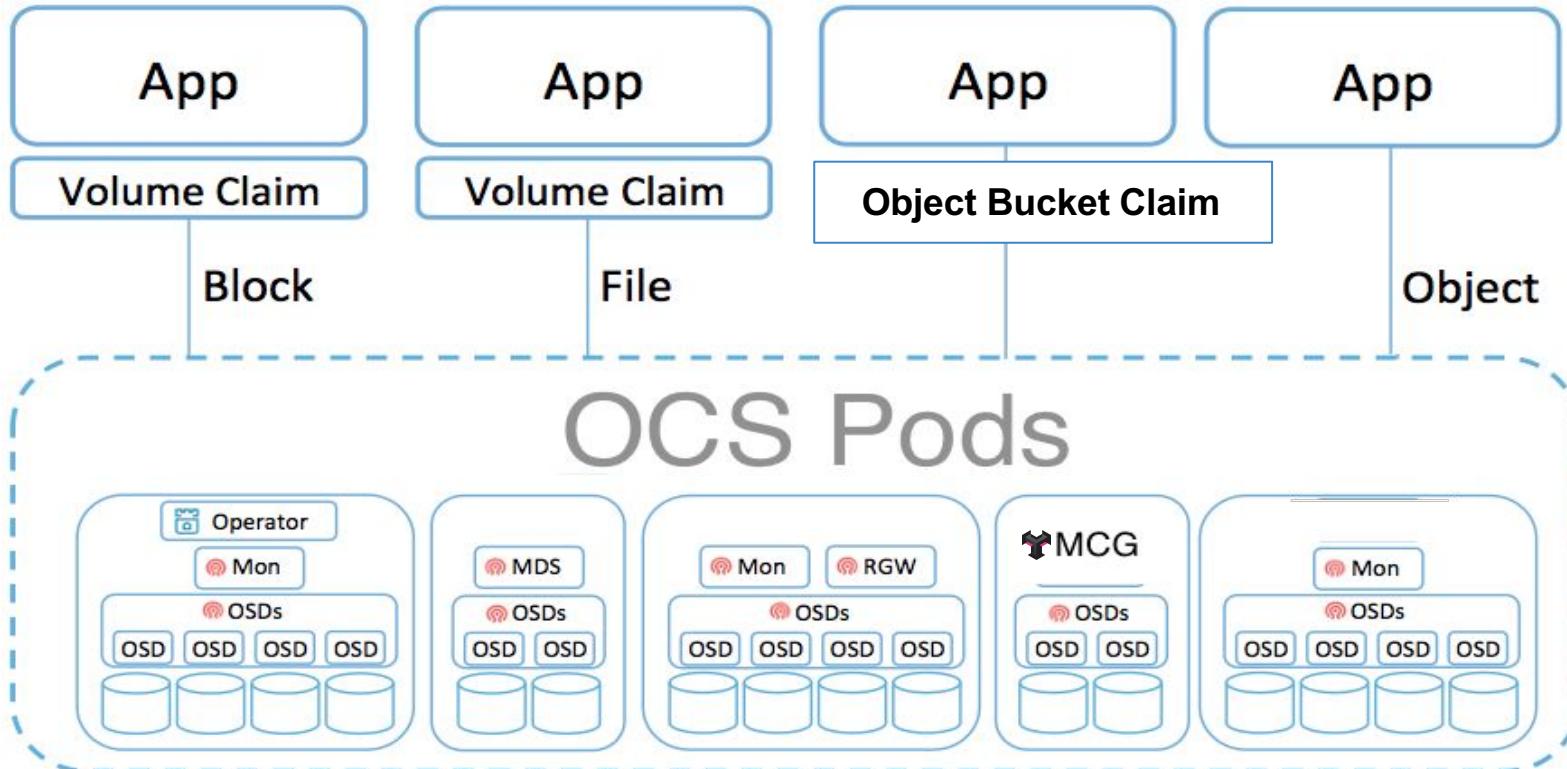
The background of the slide features a complex, abstract design composed of red and black geometric shapes. It includes several large, overlapping triangles and trapezoids that create a sense of depth and perspective. Some areas are filled with a fine grid pattern, while others are solid colors. The overall effect is modern and dynamic.

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 OperatorHub interface. The left sidebar navigation includes Home, Catalog (Developer Catalog, Installed Operators), OperatorHub (selected), Operator Management, Workloads, Networking, Storage, Builds, Monitoring, Compute, and Administration. The main content area displays the OperatorHub for the default project. A red circle highlights the "OCS Operator" card.

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

Integration & Delivery

Monitoring

Networking

OpenShift Optional

Streaming & Messaging

Other

Filter by Keyword...

INSTALL STATE

Installed (0)
 Not Installed (25)

PROVIDER TYPE

Red Hat (1)
 Certified (2)
 Community (22)

PROVIDER

Red Hat (13)
 CNCF (2)
 Couchbase (1)

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 manag...

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 scen...

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 scen...

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, specifically the integrated monitoring and management section. On the left, a sidebar menu includes Home, Dashboards, Projects, Search, Events, Catalog, Workloads, Networking, Storage, Builds, Monitoring, Compute, and Administration. The Storage section is currently selected, with the 'OCS Dashboard' tab highlighted by a red circle. A mouse cursor is positioned over the 'Storage' tab. The main content area features several cards:

- Details:** Shows cluster information: Name (cluster-name), Provider (AWS Cloud), Region (region-name), Availability zone (zone-name), OpenShift version (v4.0), Kubernetes version (v1.12.4+670b342), and Operating system (RHEL Server).
- Health:** Displays two green status indicators: "Cluster is healthy" and "Cluster is compliant".
- Utilization:** Shows resource usage statistics and charts for CPU, Memory, Storage, and Network.
- Top consumers:** A chart showing CPU time consumption by Pod/VM, with pod-1 at 19.3%.
- Events:** A list of recent events from kubelet logs, such as pod migrations and memory utilization over 80%.

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

Health, Capacity, Performance, Configuration

33

OCS INTEGRATED DASHBOARD - ALERTS

The screenshot displays the Red Hat OpenShift OCS Integrated Dashboard. On the left, a dark sidebar menu lists various navigation options such as Home, Dashboards, Projects, Status, Search, Events, Catalog, Workloads, Networking, Storage, Builds, Monitoring, Compute, and Administration. The 'Dashboards' option is currently selected. The main content area is titled 'Dashboards' and features several cards:

- Overview**: Shows cluster details: Name (cluster-name), Provider (Bare Metal), and OCS version (v1.0). It also displays resource counts: 3 Nodes, 24 Disks, 20 Pods, 12 PVs, and 18 PVCs.
- Storage**: This card is active. It includes sections for **Health** (warning: OCS is health is degraded), **Alerts** (listing Node 2 is offline, 8 Disks are offline, Your cluster is running out of disk space, Alert 4, and Warning 2), **Capacity** (85% Used), **Data Resiliency** (Rebuilding in progress at 85.2%), and **Top Consumers** (a line chart showing used capacity over time for multiple projects).
- Performance**: Shows metrics over the last 6 hours, including IOPS (151,215 IOPS), Latency (3.35 ms), Throughput (2.32 Gi/s), and Recovery rate (7.5 Gi/s).
- Events**: Lists recent events: "rook-osd-10-328949 crashed" (a few seconds ago), "host-name-1 CPU utilization over 50%." (2 minutes ago), and "host-name-1 CPU utilization over 50%." (10 minutes ago).

A large red banner at the bottom left of the dashboard area reads "Monitoring and Alerts".

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**

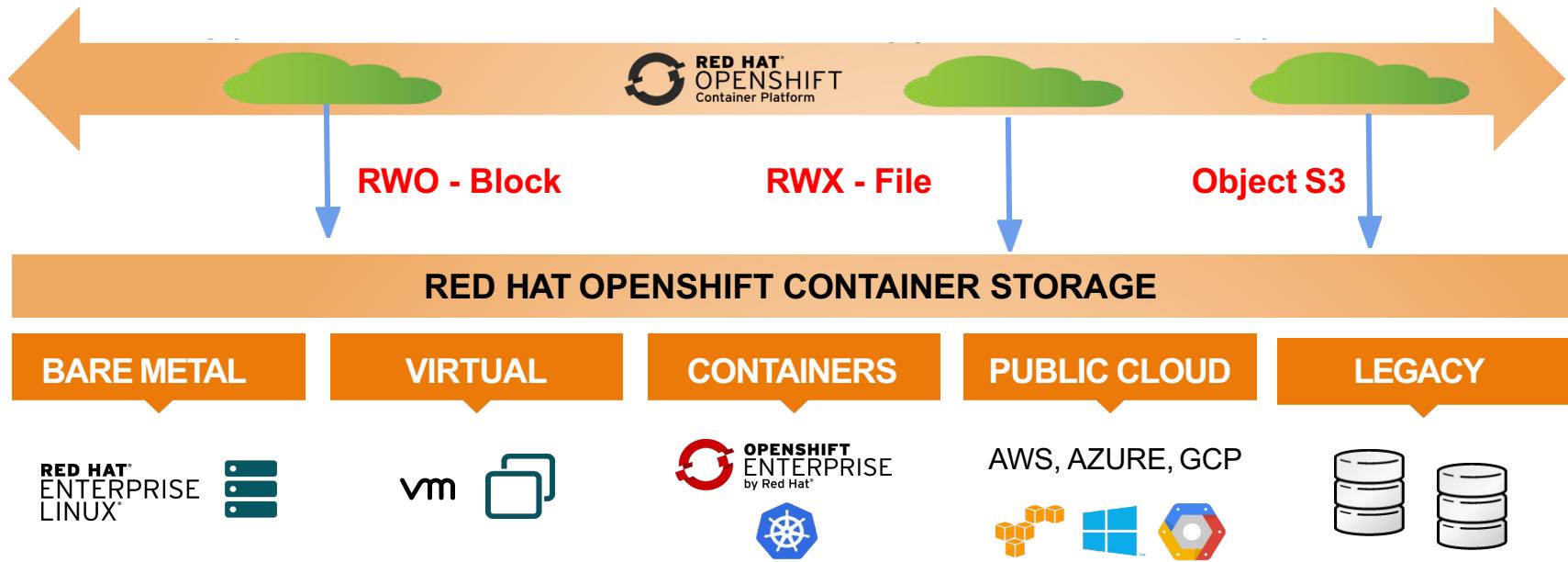
- supported in all public cloud environments where OCS 3 is supported today,
including AWS (OCS 4.2),
Azure and Google Cloud (OCS4.3)

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 OCPCLUSTER
- 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



youtube.com/user/RedHatVideos



facebook.com/redhatinc



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 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 complex, abstract design composed of various shades of red and black. It includes several large, angular shapes that resemble stylized buildings or facets of a crystal. A prominent feature is a large, dark red shape on the right side that tapers to a point. In the lower center, there is a curved, light red shape that looks like a stylized tower or a bridge arch. The overall effect is modern and architectural.

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

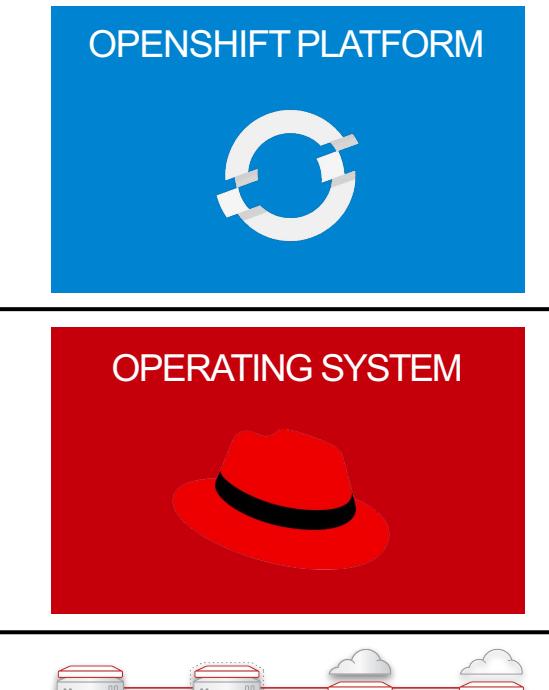
- Hybrid, Multi-Cluster Management
- Operator Framework
- Operator Hub & Certified ISVs

EMPOWERING DEVELOPERS TO INNOVATE

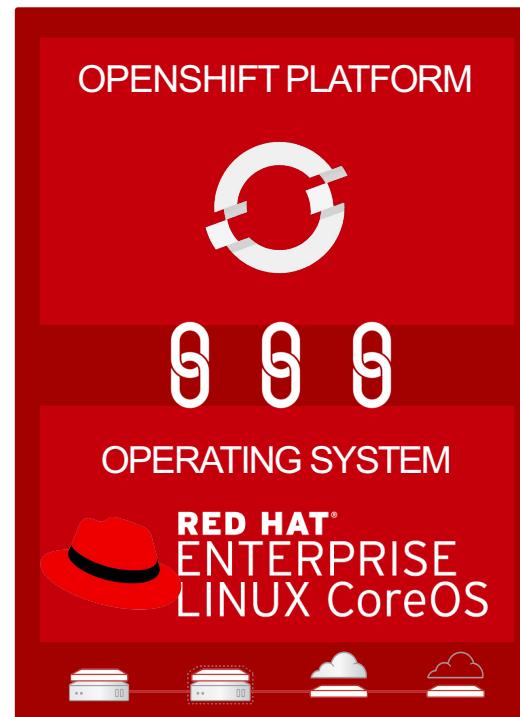
- OpenShift Service Mesh (Istio)
- OpenShift Serverless (Knative)
- CodeReady Workspaces (Che)

FULL STACK AUTOMATED INSTALL + UPGRADE

OPENShift 3



OPENSIFT 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

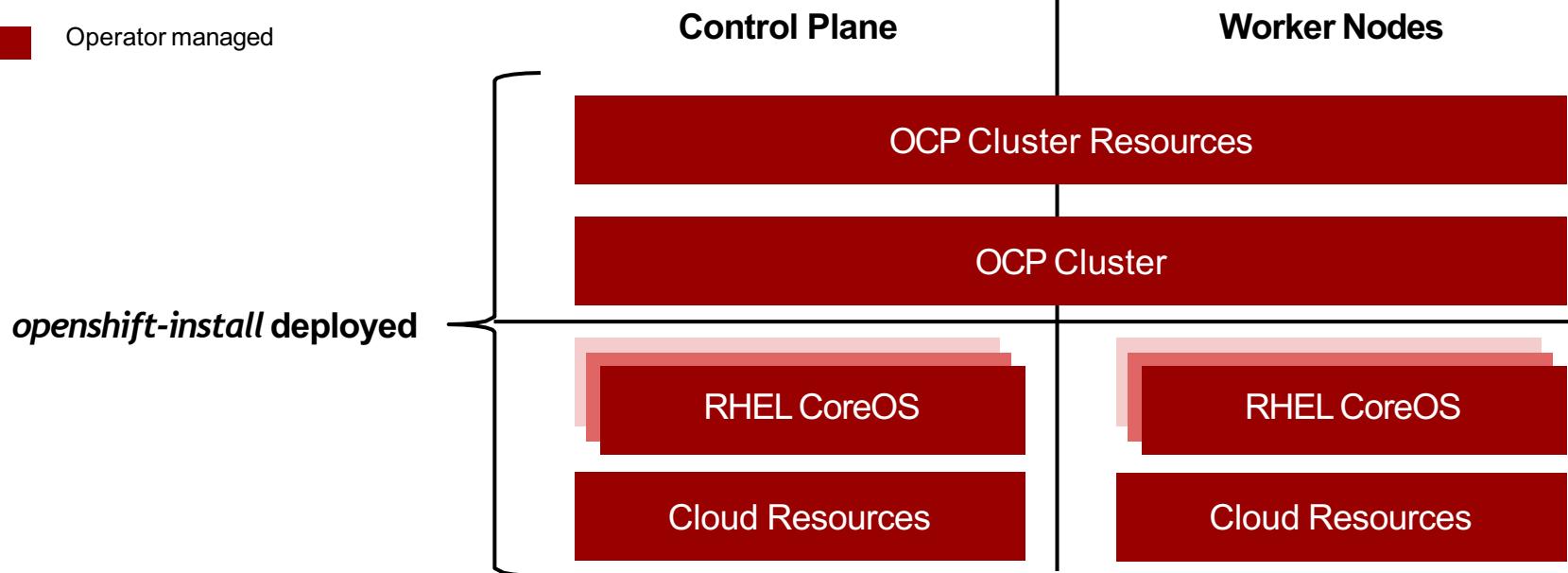


Red Hat
Enterprise
Linux

IPI: FULL STACK AUTOMATED DEPLOYMENT

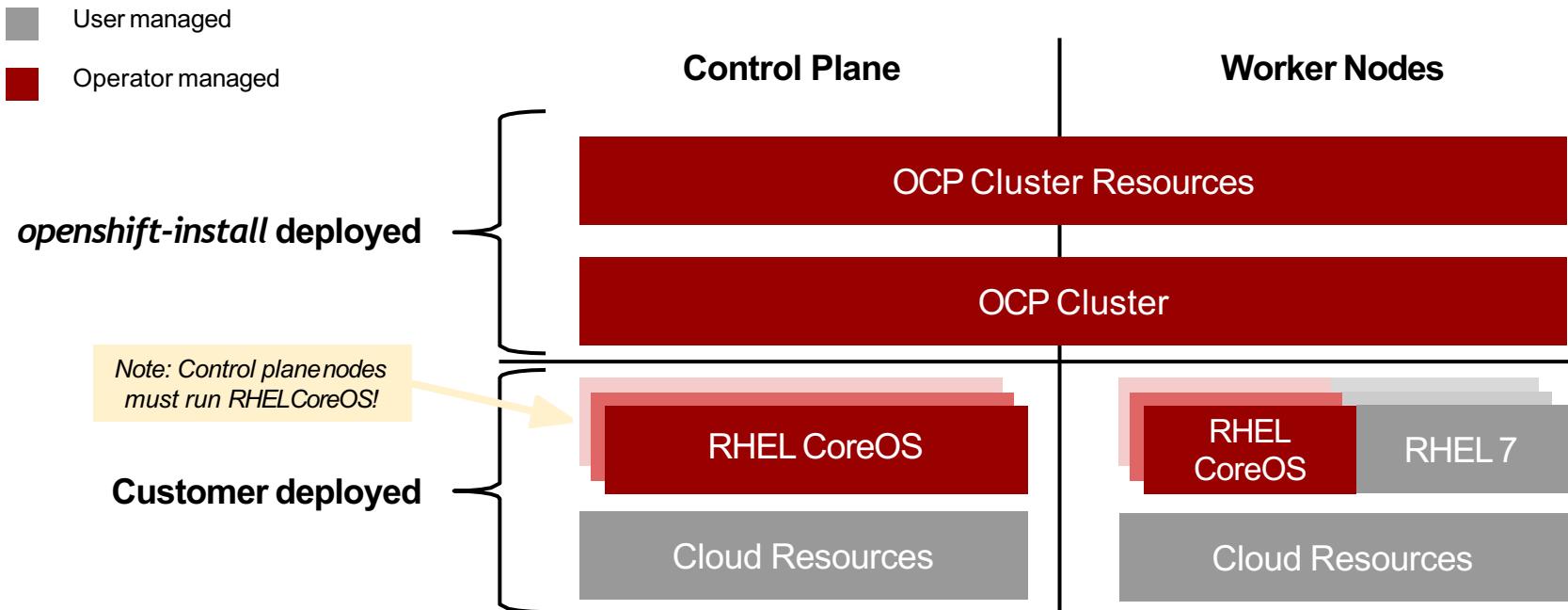
Day 1:openshift-install - Day 2: Operators

- 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[®] ENTERPRISE LINUX[®]

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[®] 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



OPENSIFT 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.

