Red Hat OpenShift Data Foundation

SPEAKER

TITLE

Red Hat Data Services

Red Hat Data Services in a nutshell

Data efficiency

- Erasure coding
- Compression
- Performance

Data resilience

- Snapshots
- Clones
- Backup
- Recovery
- Business continuity
- Disaster recovery

Data security

- At rest encryption
- In flight encryption
- Key management

Data governance

- WORM
- Auditing
- Compliance
- SEC & FINRA
- GDPR

Data discovery

- Cataloging
- Tagging
- Search

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Consistent experience across any infrastructure

	Infrastructure supported	Provisioning modes		Persistence		Raw block RBD	File RWX	Block RWO	Object S3	Multicloud gateway
		Dynamic	Static	Zone	Multi-zone					
ODF 4.x	Any	✔	✔	✔	✔	✔	✔	✔	✔	✔
NFS	Any	✘	✔	✘	✘	✘	✔	✘	✘	✘
EBS	AWS only	✔	✔	✔	✘	✘	✔	✔	✘	✘
vSphere Volume	VMware only	✔	✔	✘	✘	✘	✔	✔	✔ (3rd party)	✘

ODF 4.7 supports AWS, Azure, ARO, VMware, bare-metal infrastructure, Red Hat Virtualization, IBM Power and Z-series. Also in Technical Preview: Google Cloud Platform, Red Hat OpenStack, and managed service on IBM Cloud (public and satellite)
ODF 4 support on additional infrastructures planned for 2021 releases.

Data is the most significant asset in today's businesses—give it data services

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- Data services focuses on infrastructure and application needs so they can run and interact with ease and efficiency

- Data services provides a foundational layer for applications to function and interact with data in a simplified, consistent and scalable manner

- Red Hat Ceph Storage is a foundational component to drive data services

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What's new?

Data resilience with Red Hat OpenShift Data Foundation

FUNCTIONALITY

Greater control and manageability with over 15 new functionality features.

SECURITY

Enhanced protection with data encryption and external key management by Key management service.

PERFORMANCE

Reduced downtime with consistent experience, dynamic scale and faster handling of data.

EFFICIENCY

Improved productivity thanks to simplified and faster access to data.

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Data resilience with Red Hat OpenShift Data Foundation

FUNCTIONALITY

SECURITY

PERFORMANCE

EFFICIENCY

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FUNCTIONALITY

Metro DR-stretch cluster
Stretched cluster with arbiter

Support high availability when only two data centers can be used. An arbiter will be used to get a valid quorum between the two data centers.
This concept enables for near-zero recovery point objective (RPO) and recovery time objective (RTO).
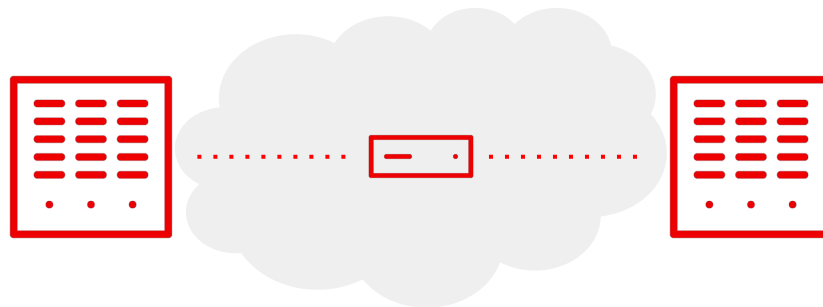
Metro DR–stretch cluster solution today

Sensitivity to app downtime (recovery time objective)

Days

Hours

Minutes

Logical failures

Backup

Regional-DR
RPO >0, RTO >0

WAN DR

Metro-DR Stretch Cluster
~0 RPO, ~0 RTO

Metro-DR

Minutes

Hours

Days

Sensitivity to data loss (recovery point objective)

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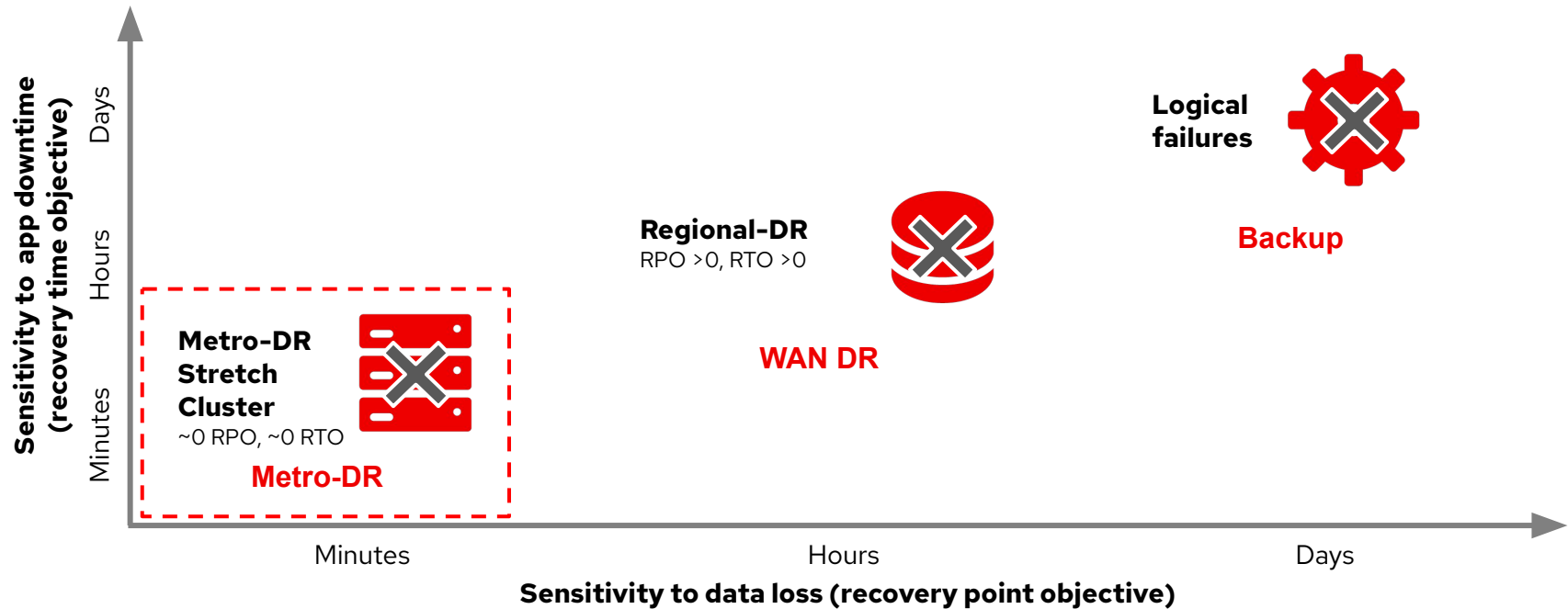
FUNCTIONALITY

Regional DR
Multi cluster persistent block volume async replication

Disaster recovery for persistent block volumes, using differential data for data transfer and time efficiency. Recovery point objective (RPO) and recovery time objective (RTO) times are within hours.

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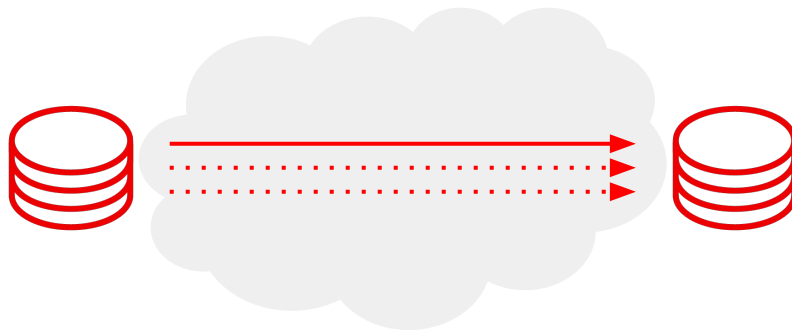
FUNCTIONALITY

Data protection
Multi cluster metro DR

Disaster recovery protection against systems failures and localized data center failures with a small blast radius.

OpenShift Data Foundation here is a stretch cluster, deployed in external mode and using Red Hat Ceph Storage.
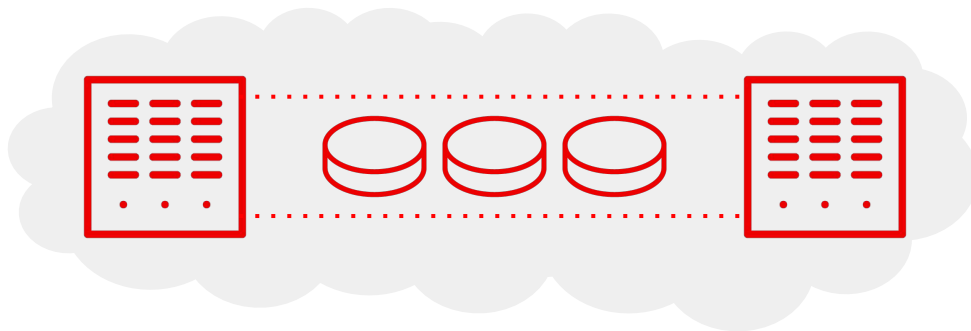
FUNCTIONALITY
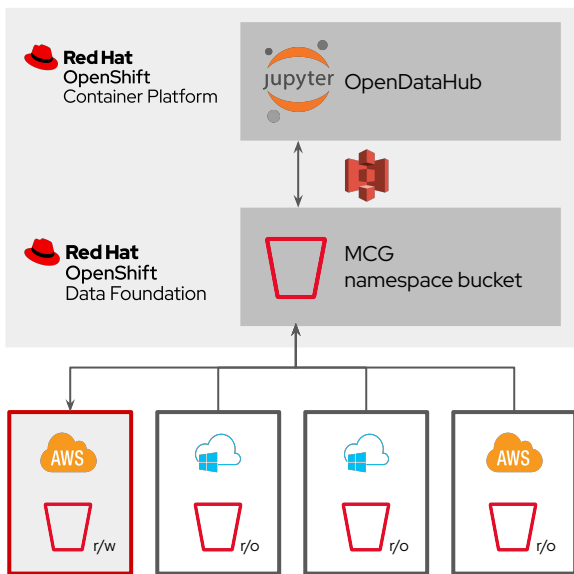
Multicloud object gateway (MCG)
Namespaces support

Jupyter Notebook example:

- Jupyter Notebook reads and writes to the same (namespaced) bucket

- Namespaced bucket has several underlying resources

- Writes are funnelled to a single bucket

- Namespace resources (object stores) are still available outside of the MCG namespaced bucket

FUNCTIONALITY

S3 endpoint

Caching

Multicloud object gateway

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Namespaces

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Container Platform
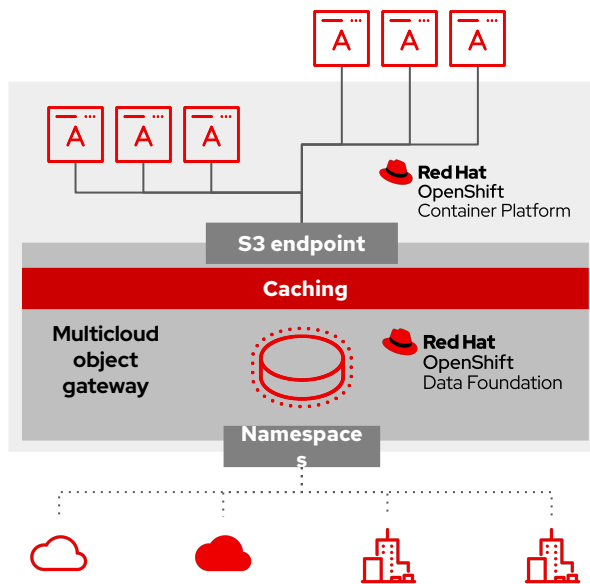
Multicloud object gateway (MCG)
Caching support

A caching object solution for customers where data gravity is required. This is particularly useful for those using artificial intelligence/machine learning (AI/ML) platforms.
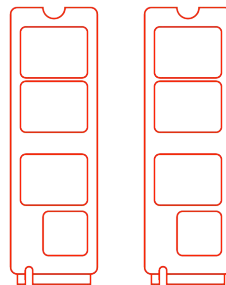
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FUNCTIONALITY

Mixed media—pool per disk type, SSD/NVME/HDD

Allows for using mixed media within clusters, reducing costs

Providing the well-performed devices to important workloads and relatively slower devices to less demanding workloads.

SSD

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FUNCTIONALITY

PLATFORM SUPPORT

IBM platform support
General availability support for IBM Power Systems users

- OpenShift Data Foundation can now be installed and managed using IBM Power Systems

- Check unsupported features list for more detailed information

FUNCTIONALITY

PLATFORM SUPPORT

IBM platform support
General availability support for IBM Z and LinuxONE

- OpenShift Data Foundation can now be installed and managed using IBM Z and LinuxONE

- Unsupported features apply, listed in documentation

FUNCTIONALITY

PLATFORM SUPPORT

VMware Vsphere 7 Platform support
General availability support for OpenShift Data Foundation users on Vsphere 7

What's new?

Data resilience with Red Hat OpenShift Data Foundation

FUNCTIONALITY

SECURITY

PERFORMANCE

EFFICIENCY
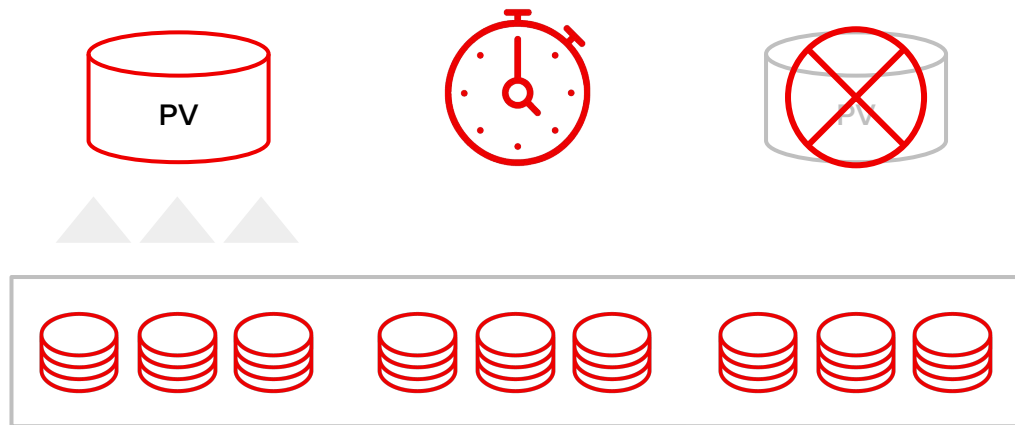
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PERFORMANCE

Ceph File System performance improvement

Faster persistent volume (PV) creation and deletion times

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What's new?
Data resilience with Red Hat OpenShift Data Foundation

FUNCTIONALITY

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SECURITY

Key management system (KMS) support for object storage daemon (OSD) encryption
OSD encryption as introduced in previous release, currently enabled for use with KMS

KMS for multicloud object gateway (MCG)
KMS support with MCG, usable to encrypt MCG master key

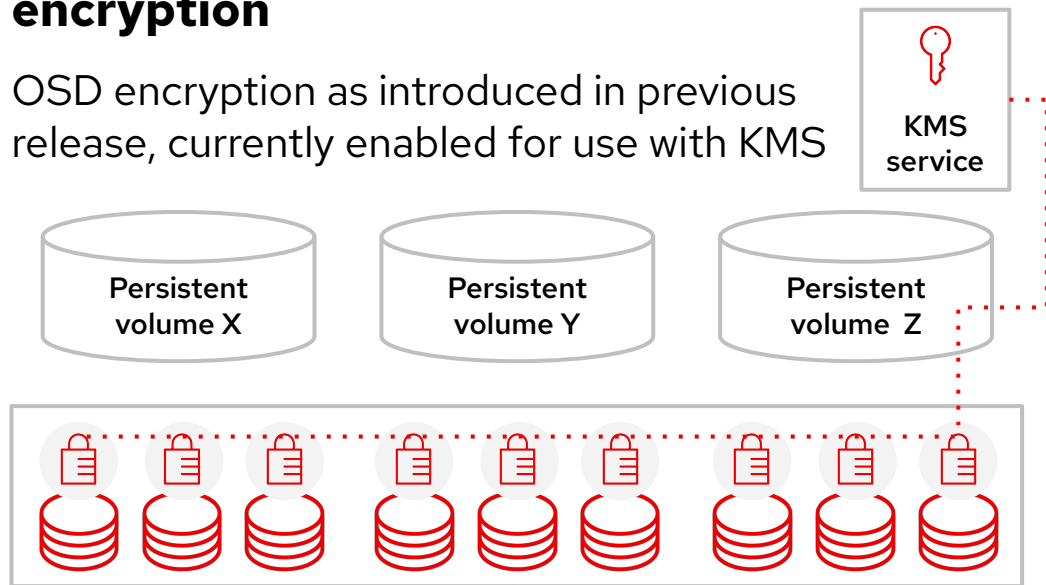**KMS support for RADOS block device (RBD) persistent volume encryption**
Using KMS type Hashicorp Vault

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SECURITY

Key management service (KMS) support for object storage daemon (OSD) encryption

OSD encryption as introduced in previous release, currently enabled for use with KMS

KMS service

Persistent volume X

Persistent volume Y

Persistent volume Z

SECURITY

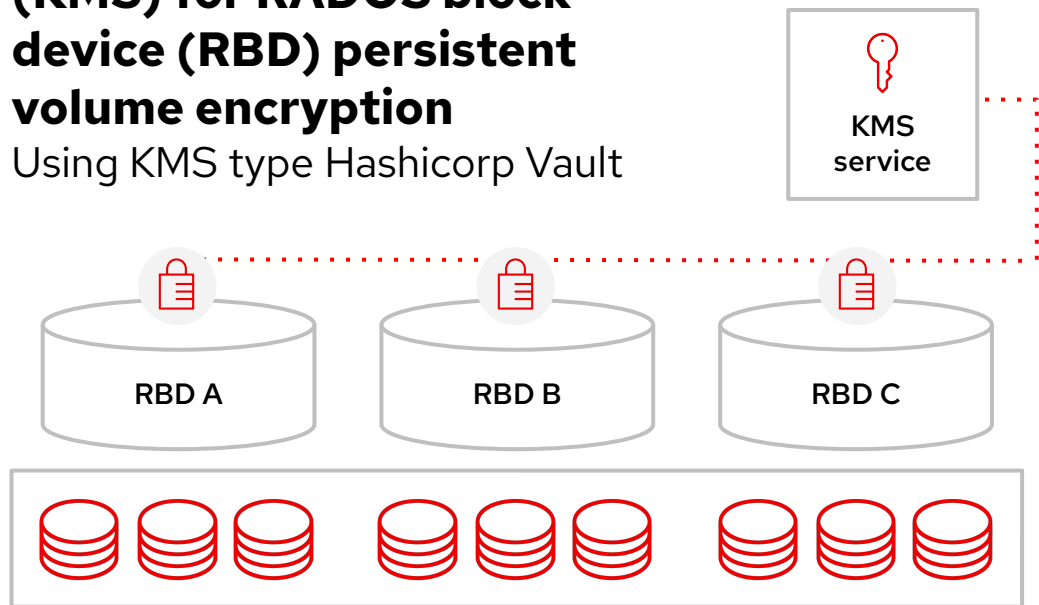## Key management service (KMS) support for multicloud object gateway (MCG)

Key management service support with MCG, to encrypt MCG master key

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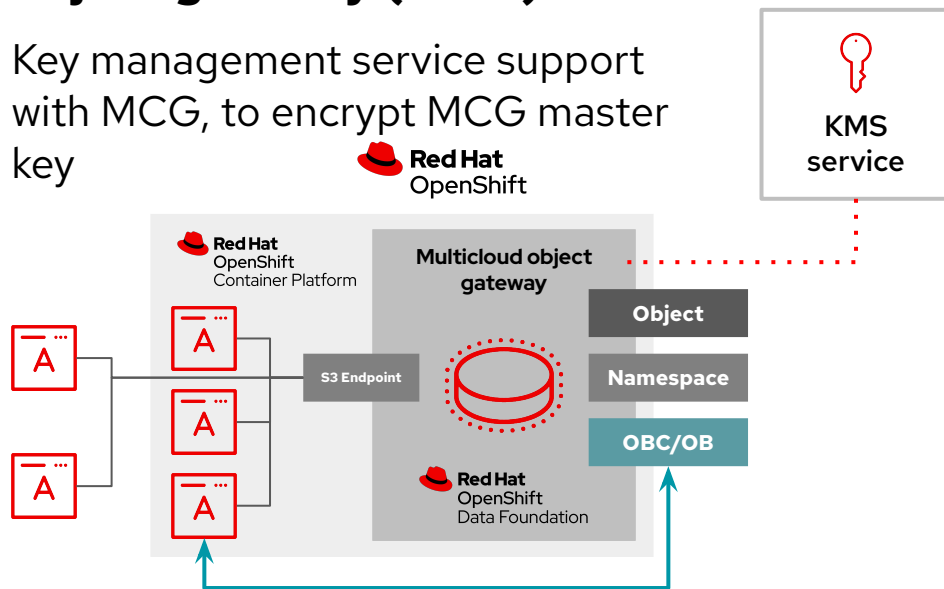
SECURITY

Key management service (KMS) for RADOS block device (RBD) persistent volume encryption

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What's new?

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FUNCTIONALITY

SECURITY
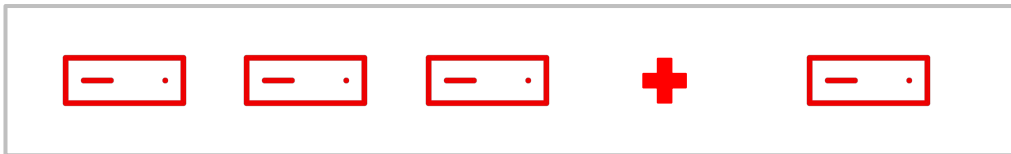
PERFORMANCE

EFFICIENCY

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EFFICIENCY

Flexible failure domain
An easy way to scale with single nodes instead of multiples of 3

- Scale by one node or disk and maintain resiliency

- Only in a single zone scenario, default replica-3 remains

- For new clusters, explicitly configured to take advantage of this feature

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OpenShift Data Foundation editions

Feature	Essentials	Advanced
Block & File	✓	✓
Object	✓	✓
Multi Cloud Gateway	✓	✓
Node and Disk resiliency	✓	✓
Storage Operators based automation	✓	✓
Compression	✓	✓
Deduplication	future	future
Local Snapshots & Clones	✓	✓
Basic Cluster-wide Encryption	✓	✓
Advanced Granular Encryption with KMS support		✓
Regional DR (replication)		✓
Metro HA & DR - Stretched Clusters		✓
Metro HA & DR - Multi Clusters		✓

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Multicloud object gateway (MCG)

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MCG provides a data service that enables object data access and backend data flows to different buckets across hybrid and multicloud environments, based on bucket policies.

Flexible capabilities across multiple backends

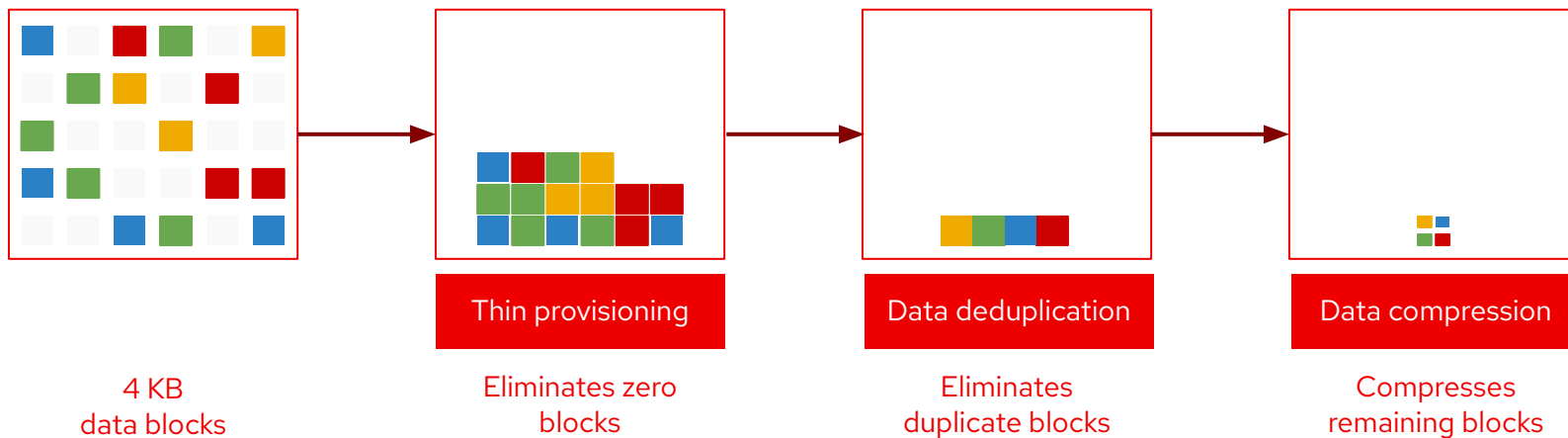**Consistent experience everywhere**

Simplified management of siloed data

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Multicloud object gateway

How it works
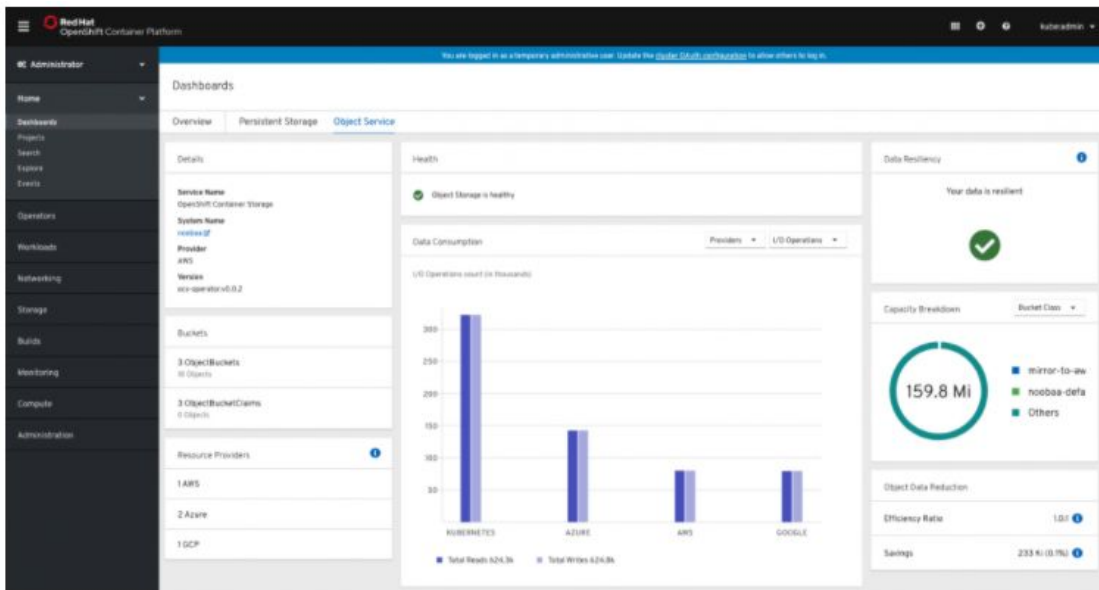
- Object service application programming interface (API) which is compatible with Amazon AWS S3 API

- Provides a consistent object service API for Red Hat OpenShift—regardless of the underlying infrastructure provider

- Delivers object buckets and supports object bucket claims similar to persistent volume (PV) claims

- Object bucket claims request an S3 compatible object bucket

- Extended capabilities for backend object routing and handling

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Compression and deduplication

4 KB
data blocks

Thin provisioning

Eliminates zero
blocks

Data deduplication

Eliminates
duplicate blocks

Data compression

Compresses
remaining blocks

Based on VDO technologies from Permabit acquisition

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Integrated monitoring and management

- Multicloud object gateway (MCG) leverages the Kubernetes operator to automate complex workflows, monitoring and resource management

- MCG is integrated into the OpenShift Data Foundation dashboard to provide an instant view of the current object usage, alerts and resource allocations

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Mirroring and spreading for hybrid and multicloud buckets
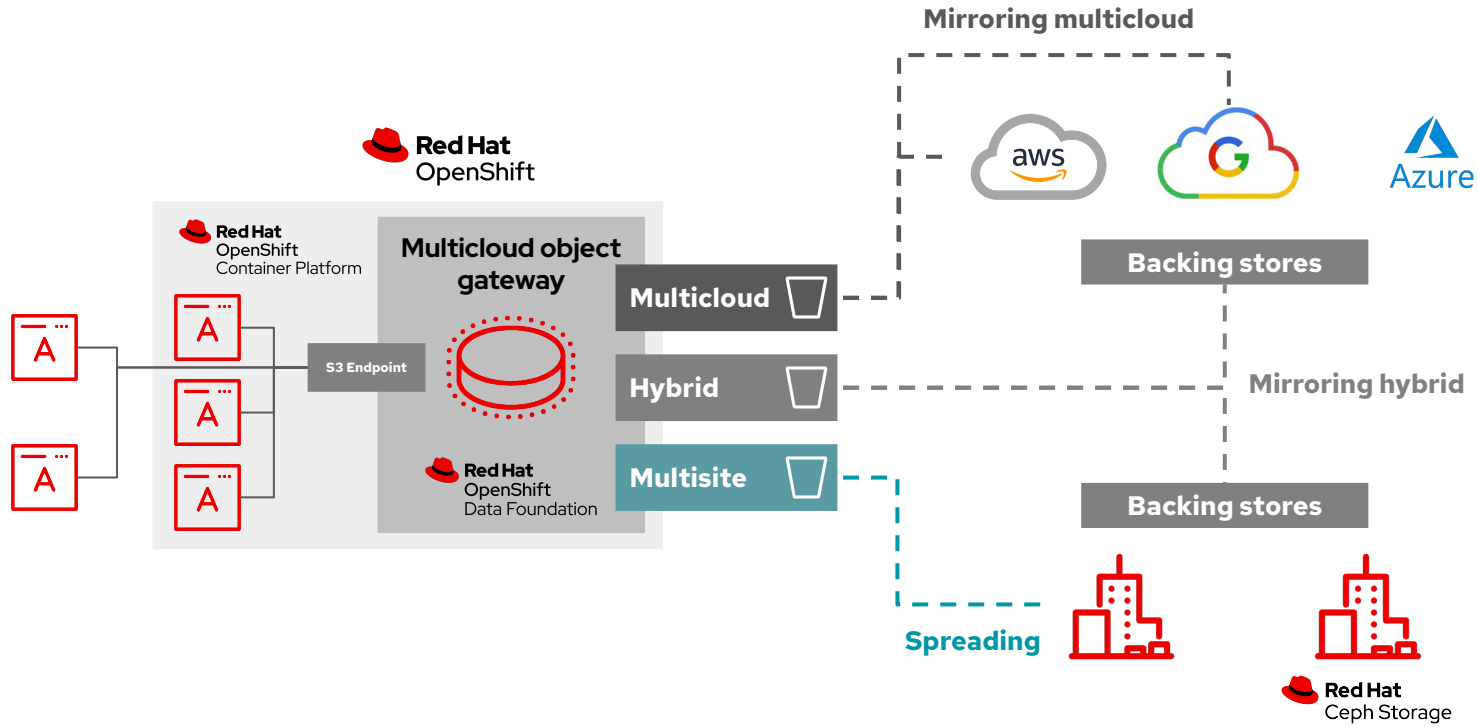
Multicloud object gateway
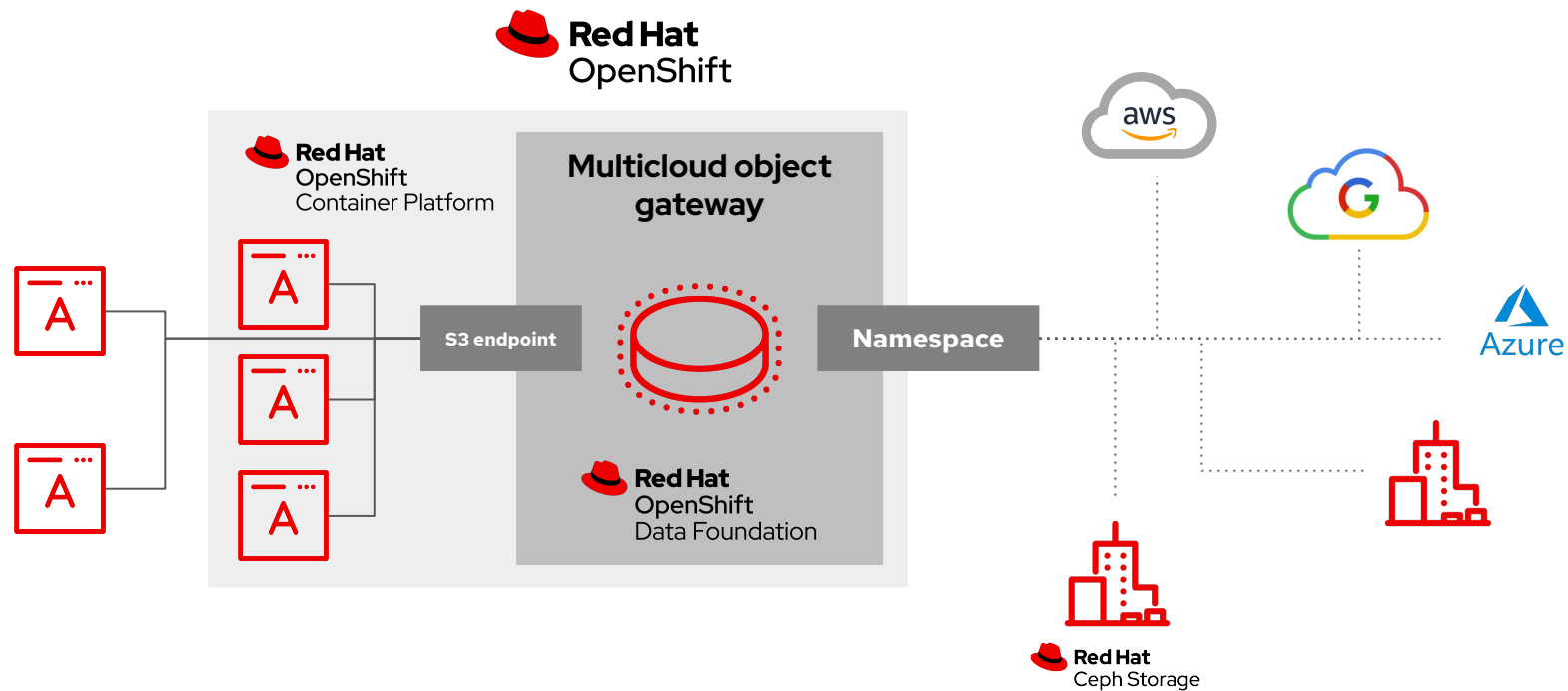
Multicloud object gateway (MCG)

Changes solves with MCG namespace buckets

Multiple clouds in use
Organizations use multiple clouds, or combinations of cloud and on premise

Data becomes siloed
Many workloads are using multiple data sources which may reside in more than one cloud siloing data and making data management a challenge.
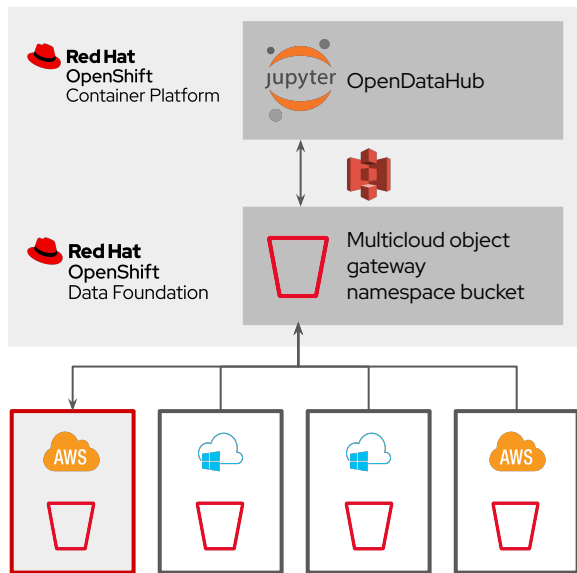Replication is not always possible or reasonable

MCG
MCG namespace buckets provide flexible data federation over multiple clouds and data object stores

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Multicloud object gateway (MCG)
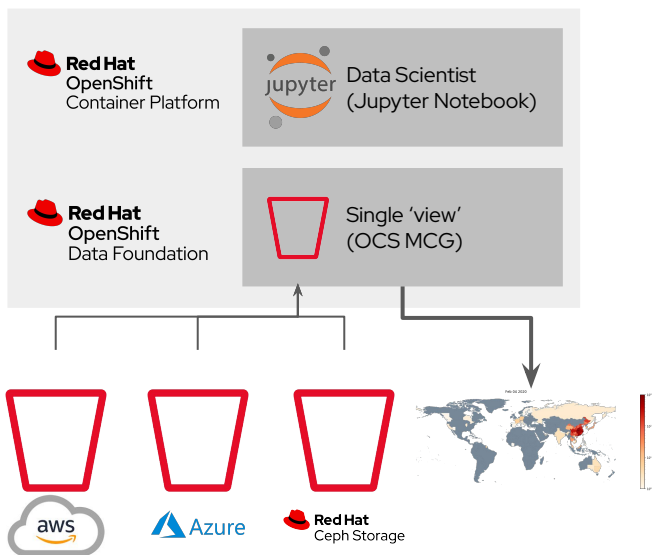
Namespace buckets

Jupyter Notebook Example:

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Container Platform

jupyter OpenDataHub

Red Hat
OpenShift
Data Foundation

Multicloud object gateway namespace bucket

AWS

AWS

Red Hat
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Multicloud object gateway (MCG)

COVID–19 mapping spread example

- Simple image generator for tracking outbreak distribution and spread

- Data source from John Hopkins University

- **Inputs:** CSV data (daily counts) from multiple public cloud data sources

- **Outputs:** map images, each image is an outbreak intensity heat map

Thank you

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Red Hat a trusted adviser to the Fortune 500.

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