Business Unit
Xtra

What's New in Red Hat OpenShift Data Foundation 4.17

October 2024

Red Hat

Agenda

Part 1

- ▶ Red Hat OpenShift Data Foundation
- ▶ Red Hat OpenShift Platform Plus

Part 2

- ▶ What's new with
  OpenShift Data Foundation 4.17

What is OpenShift Data Foundation

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- Red Hat OpenShift Data Foundation is a data management solution that provides higher level data services and persistent storage for Red Hat OpenShift.

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

- Provides File, Block and Object Storage for applications and builtin Data Protection and Disaster Recovery.

- Red Hat OpenShift Data Foundation Essentials edition is included with Red Hat OpenShift Platform Plus at no additional cost

- Red Hat OpenShift Data Foundation is a tier-1 layered product, ODF supports new OCP minor releases after at most one month.

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Red Hat OpenShift Data Foundation is included with Red Hat OpenShift Platform Plus

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Platform Plus

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- **Red Hat OpenShift Platform Plus** includes

  - Red Hat OpenShift Container Platform
  - Red Hat OpenShift Data Foundation
  - Red Hat Advanced Cluster Management for Kubernetes
  - Red Hat Advanced Cluster Security for Kubernetes
  - Red Hat Quay

- **Red Hat OpenShift Data Foundation Essentials edition**
  Included with Red Hat OpenShift Platform Plus at no additional cost

- **Result**
  A consistent experience, regardless of the infrastructure platform, to kickstart and support your Kubernetes journey.

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OpenShift Data Foundation-Essentials edition

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Contains all basic elements that applications need to address data needs

Basic storage classes
Kubernetes RWO, Kubernetes RWX and
S3-compatible Object storage

Provides OpenShift **cluster level encryption**

Supports OpenShift Virtualization **live migration for VMs**
With RWX for block, as embedded default functionality.

Batteries included
Red Hat OpenShift Data Foundation Essentials edition is included
with Red Hat OpenShift Platform Plus **at no additional cost**

Read the Datasheet

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OpenShift Data Foundation-Advanced edition

Red Hat OpenShift Data Foundation Advanced
Extends the essentials edition with additional capabilities

- **Enhanced level of encryption**
  with Key Management Service (KMS) capabilities,
  as well as persistent volume level encryption.

- **Shared mode**—Share data across multiple OpenShift clusters

- **Mixed use**—Workloads outside OpenShift accessing the data

- **Regional and Metropolitan disaster recovery capabilities**
  with Red Hat Advanced Cluster Management for Kubernetes
  and Red Hat OpenShift Data Foundation Advanced

OpenShift Data Foundation and existing storage solutions

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What if your customer already has a storage solution?
Positioning Red Hat OpenShift Data Foundation still makes sense:

- **No rip-and-replace**
  Red Hat OpenShift Data Foundation uses existing storage resources and transforms these into a consistent Openshift Data Foundation. It does not replace existing storage investments.

- **Enriches**
  existing storage infrastructure into a broader set of capabilities.

- **Layered setup**
  with OpenShift Data Foundation on top of existing resources. Provides the **full set of storage classes** including PV level encryption, data protection and additional capabilities offered by OpenShift Data Foundation Advanced.

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About Tech preview

Tech Preview

Provides early access to upcoming product innovations, enabling customers to test functionality and provide feedback during the development process.

These features are not fully supported under Red Hat Subscription Level Agreements, may not be functionally complete, and are **not intended for production use**.

As Red Hat considers making future iterations of Technology Preview features generally available, we will attempt to resolve any issues that customers experience when using these features.

About Dev preview

Dev Preview

Development Preview releases are meant for customers who are willing to evaluate new products or releases of products in an early stage of product development.

It's a vehicle for developers that provides early access to new unreleased features.

These features are not supported under Red Hat Subscription Level Agreements, may not be functionally complete, and are not intended for production use.

Dev preview features are also not documented in the official release documentation.

Developer preview

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FUNCTIONALITY

FUNCTIONALITY

Flatten RBD clone

Red Hat OpenShift Data Foundation

Red Hat OpenShift Data Foundation
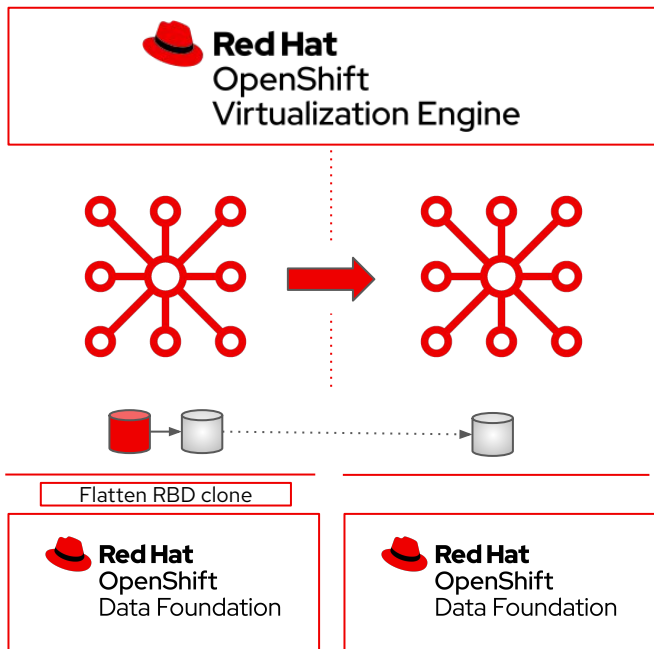
Regional DR solution for OpenShift virtualization

- **Openshift Virtualization**
  RWX Block - True block device performance without giving up live migration.

- **Solution background**
  In close partnership with OCP Virt team—The products are virtually developed next to each other—FOR each other

- **Regional DR for OpenShift Virtualization**
  DR for VMs for your architecture—with lowest possible RPO.

Red Hat OpenShift Data Foundation

BUSINESS VALUE

System administrator

As a system administrator, I prefer solutions that work well together–at best coming from a single vendor.

That way, daily tasks are made easy, due to clear interfaces and even if an issue comes up, I can open a support ticket with one vendor, instead of multiple. This helps me resolve issues much quicker.
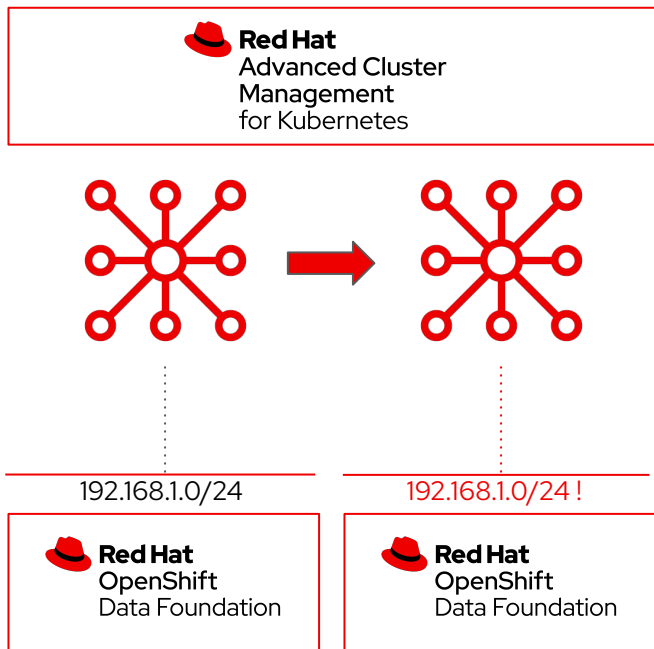
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FUNCTIONALITY

Red Hat
Advanced Cluster
Management
for Kubernetes

192.168.1.0/24   192.168.1.0/24 !

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Disaster Recovery
Automatically apply relevant configurations
for clusters with overlapping Pod/Service CIDR

- **Enables clients for easy DR configuration**
  For existing OpenShift deployments with overlapping
  Pod/Service CIDR. (Classless Inter-Domain Routing)

- **Checks and corrects application traffic routing
  configuration**
  Verifies that two clusters have non-overlapping CIDRs
  (service and cluster pod networks) when installing
  submariner and Ceph OSDs and MONs must use the new
  GlobalNet networks that are non-overlapping CIDRs.

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BUSINESS VALUE

IT Operations
Reduces time spend on manual verification and minimizes error chances, reducing downtimes, increases reliability and this lowers our operational costs.

System administrator
Automatic CIDR configuration checking reduces time and effort required for manual setup and adjustments.
This functionality allows our staff to focus on more strategic tasks rather than routine configuration work.

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Declarative versus Discovered application management
Red Hat OpenShift Data Foundation

Declarative application

- Specifies a desired system state

- Does not specify specific steps

- Utilizes YAML manifests which describe desired state.

- Involves resources such as pods, deployments, services, etcetera.

- When applied, OpenShift will bring the cluster to the desired state

Discovered application

- Uses specific commands to initiate actions.

- Specifies specific steps to run

- Does not specify a desired state

- Involves resources such as pods, deployments, services, etcetera.

- Discovered apps often make use of kubectl command-line commands, with specific parameters.

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Disaster Recovery for applications requiring Kube resource protection
For discovered application model.

Cluster resources belonging to application are protected and restored at a secondary cluster, using OpenShift API for Data Protection.

Ramen DR is an Upstream project
It provides automated DR recovery for **discovered** and **declarative** type applications.
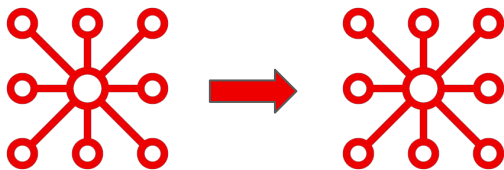
Ramen DR github link

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Application Disaster Recovery
Ability to disable DR for a given workload

- **Disable DR based placement and control**
  For applications deployed via ACM and DR enabled. Impacting discovered and declarative applications.

- **Application (AppSets and Subscriptions)**
  If disabled, the application stays behind in the cluster where it is deployed.

- **Dashboard user UI option**
  To disable DR for a given workload.

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BUSINESS VALUE

IT Operations

Disabling unnecessary DR operations for specific applications allows our business to quickly adapt to changing workloads by selecting DR functionality as required.

This also helps our business to control costs associated with maintenance and support.
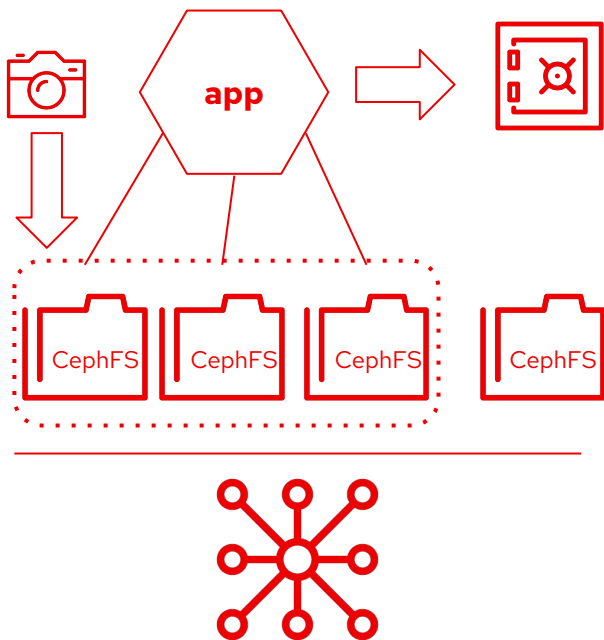
System administrator

Allows our team to tailor DR needs and performance. By disabling DR for non-relevant apps we can respond effectively to business demands and associated operational changes.

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Dev Preview

FUNCTIONALITY

CephFS multi-volume consistency
For disaster recovery, data protection and interaction with backup solutions

Provides crash consistent multi-volume consistency groups for backup solutions, used by applications that are deployed across multiple CephFS volumes.

The involved CephFS volumes need to be consistent as a group, when taken into a backup for data protection.

Applications may be deployed over multiple volumes. Multi-volume consistency groups for DR are required in such cases.

Dev Preview
With Red Hat OpenShift Data Foundation 4.17

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BUSINESS VALUE

System administrator

Consistent snapshots of multiple volumes are essential for effective backup and recovery processes.

If backup processes are taken from inconsistent states, restoring data can result in further inconsistencies and complications during recovery.
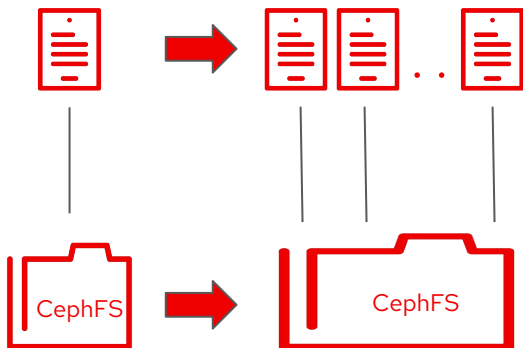
Vital functionality for system administrators to ensure data integrity and application reliability.

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FUNCTIONALITY

Multiple Metadata Server instances
Metadata (MDS) service scaling for CephFS

CephFS

CephFS

- **OpenShift RWX volumes for file**
  When CephFS based volumes scale, additional metadata servers (MDS) can be added to prevent performance degradation at a larger volume scale.

- **Command line option**
  With OpenShift Data Foundation 4.17

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BUSINESS VALUE

System administrator

As file service capacities increase, the amount of metadata about files, like names, sizes, permissions, also grows.

MDS scaling can accommodate future growth without degradation in performance.

A scalable metadata service ensures that metadata operations can be handled efficiently and prevent bottlenecks that could slow down overall system performance.

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Dev Preview

FUNCTIONALITY
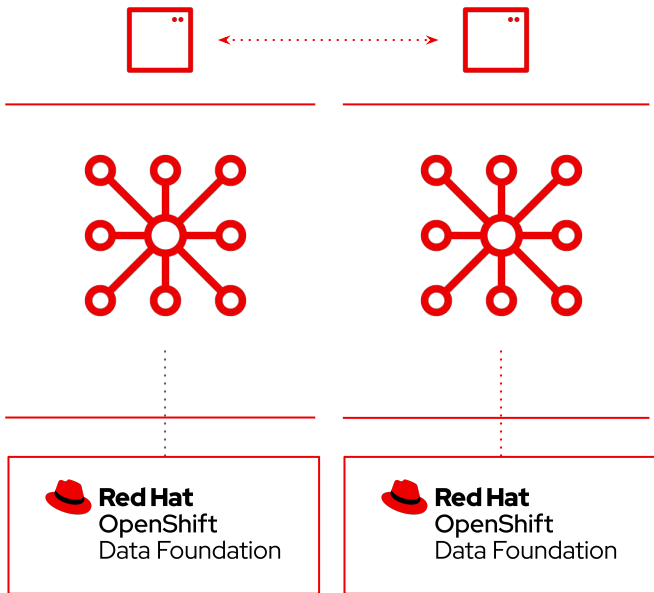
CephFS RWX Persistent Volumes
shared across clusters, with concurrent IOs

- **Shared volume for multi-instance Applications running on different clusters**
  Active-Active high availability between different instances of an application.

- **Provides a CephFS based RWX volume**
  Simultaneously mounted on different pods in different clusters. Handling concurrent IOs, by multiple application instances.

- **Application I/O handling responsibility**
  The application is responsible for I/O synchronization and write ordering.

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BUSINESS VALUE

IT Operations

Shared volumes across different clusters enables teams to access and collaborate on the same data in real-time, fostering better communication and teamwork.

System administrator

With shared volumes across clusters, clients can easily access and share files without needs for complex file transfers, leading to operational efficiency.

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Dev Preview

FUNCTIONALITY

https://bucket123/storageservice.com/object

RGW service

Access buckets with DNS subdomain style
Virtual host style, for Ceph RADOS Gateway

- **Access buckets using virtual host style in RGW**
  Modern applications often require object bucket data access by using virtual host-style methodology.

- **Virtual Host Style Access**
  Access objects using a URL format which incorporates the bucket name directly into the domain name

- **Example of a virtual host style url**
  https://bucket-name.storage-domain/object-key
  Bucket is part of the domain, this enables clients for easier access.

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BUSINESS VALUE

IT Security Practitioner

Subdomains can be configured with specific security policies, allowing our business to implement tailored access controls and security measures for different objects. This helps to protect sensitive data and to ensure compliance with regulations.
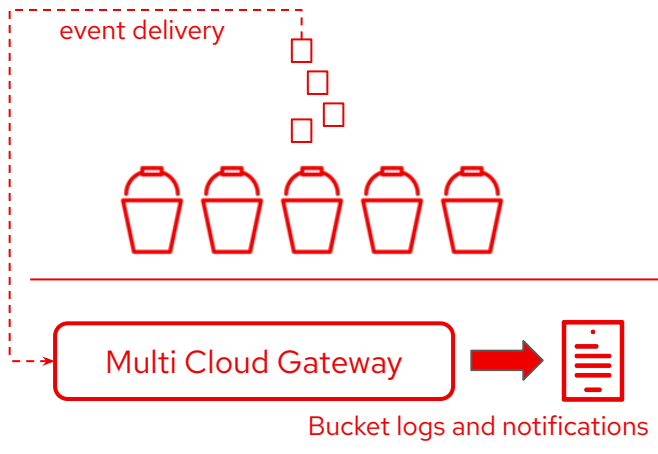
System Administrator

Managing objects through DNS subdomains simplifies administrative tasks and allows for centralized management of resources, making it more easy for administrators to implement changes and updates.

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Tech Preview

FUNCTIONALITY

event delivery

Multi Cloud Gateway

Bucket logs and notifications

Multi cloud gateway guaranteed bucket event delivery

- **Bucket event delivery purpose**
  Bucket event delivery is required for bucket logging and bucket notifications.

- **Current AWS::S3 implementation**
  In the current AWS::S3 implementation, events are not guaranteed, under certain circumstances, bucket logging could miss an event.

- **Importance**
  Guaranteed bucket event delivery is a requirement for the bucket notifications feature.

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BUSINESS VALUE

IT Operations

Reliable information is key to reduce time spent on follow-ups and clarifications.

Guaranteed delivery of events reduces risk of errors and improves overall reliability.

Reducing the incidence of information delays or loss leads to increased reliability and lower operational costs.

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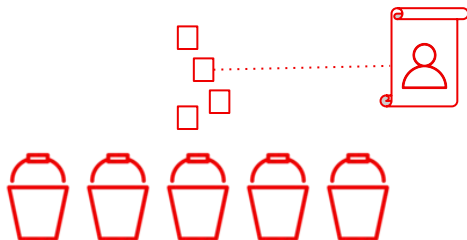
FUNCTIONALITY

Multi Cloud Gateway

Multi cloud gateway
Object ownership identification

- **Store relevant owner metadata for objects**
  Enables clients to keep track of object ownership,
  via the S3 API.

- **Implementation**
  The functionality assigns the object bucket claim name
  or access key as the object owner.

- **Importance**
  System administrator ability to validate which account
  uploaded a given object into a Multicloud Gateway
  bucket.

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BUSINESS VALUE

System administrator

Ability to lookup ownership helps in managing resources more effectively, leading to better resource utilization.

In the event of issues or failures, knowing the owner of a object can expedite the troubleshooting process. Our team can quickly reach out to the responsible party for insights or assistence, reducing a need for additional efforts and downtime.

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FUNCTIONALITY

namespace buckets

data buckets

Multi Cloud Gateway

Multi Cloud Gateway
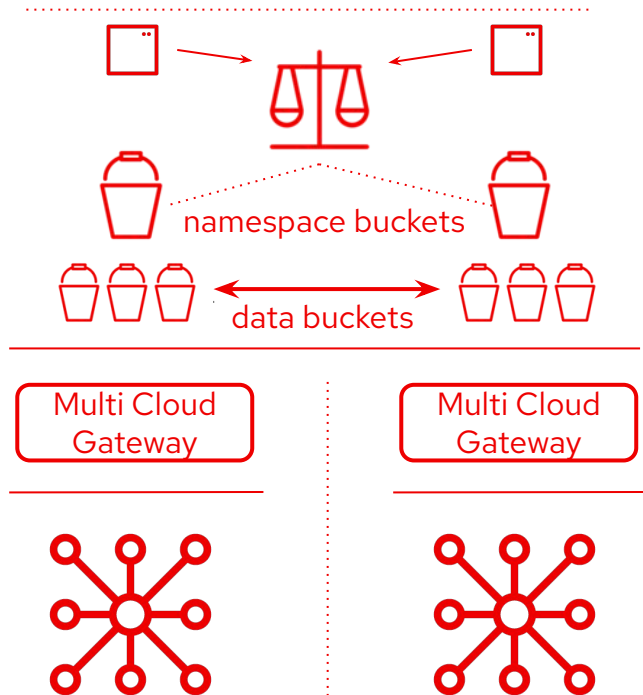
Multicloud Gateway option to set account credentials
for seamless bucket access across locations

- **Use case**
  Active-Active Object Disaster Recovery solution.
  Enables to access a local or remote s3 endpoint.

- **Implementation**
  Object DR solution allowing application writes to s3 endpoints via load balancer and replicate object data in the background.

- **Multicloud Gateway ability**
  Commandline option to set credentials manually to an account. Required because credentials could differ on either side.

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BUSINESS VALUE

System administrator

Synchronous account credentials across site ensure consistency, reducing risk and complexity of different credentials.

It also simplifies our administrative processes, making it easier to update, revoke or manage permissions to users across sites.

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FUNCTIONALITY

ALERT !

Volume capacity alert threshold
Adjust alert trigger setting

- **PersistentVolumeUsageCritical**
  Alert trigger threshold adjusted from 85% to 95%, or user-configurable.

- **PersistentVolumeUsageNearFull**
  Alert trigger threshold adjusted from 85% to 95%, or user-configurable.

- **Solution background**
  At 85%, there can still be plenty of space available while alerts are generated needlessly when there is still enough volume space available. Those alerts may distract cluster administrators.

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BUSINESS VALUE

IT Operations

Needless disk capacity data warnings could lead to incorrect assessment, resulting in unnecessary planned downtime.

Our business needs to rely on accurate data for timely decision making and planning.

The option to adjust capacity alert thresholds helps us to calibrate to our situation and needs.

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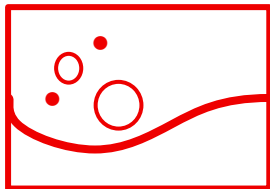
FUNCTIONALITY

OpenShift Data Foundation
Consumed storage capacity trends

- **Capacity forecasting**
  Estimating the number of days until usable storage capacity is exhausted, based on consumption rate and remaining storage.

- **Functional value**
  Help clients proactively plan for potential storage shortages and make informed decisions based on the forecasting.

- **Importance**
  Capacity planning is important for on-premises infrastructures, where hardware ordering is involved, which will require a lead time.

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BUSINESS VALUE

IT Operations

By understanding consumed capacity we can more effectively allocate resources. It also ensures that our teams have the necessary tools to meet business demands.

Accurate reporting allows our organization to better forecast future needs resulting in informed decision-making regarding hardware procurement and project planning.

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FUNCTIONALITY

Spinning HDD disks   Solid State Devices

Local Storage   Operator (LSO)
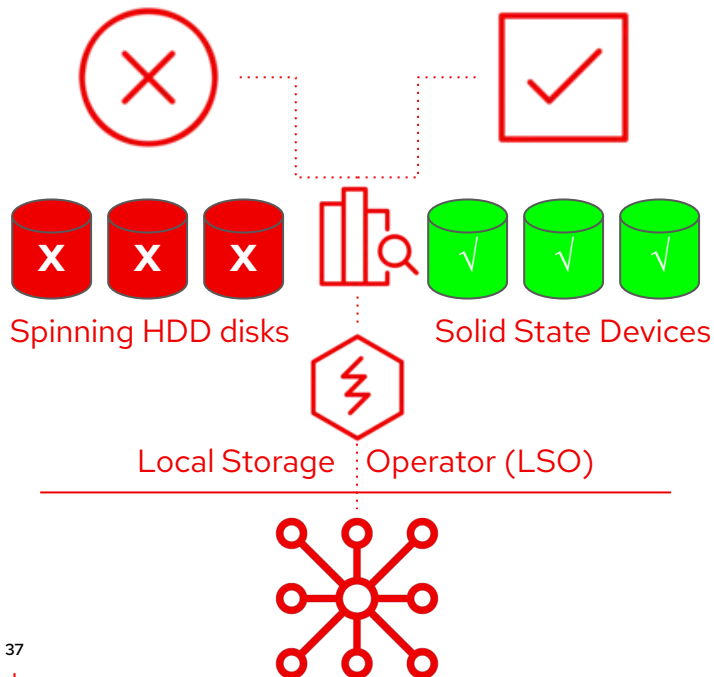
OpenShift Data Foundation
Spinning storage device (HDD) warning and prevent OpenShift Data Foundation installation

- **Functionality**
  Prevents deployment when spinning Hard Disk Drives are detected as storage target devices.

- **Why spinning HDD devices cannot be used**
  Spinning hard disk drives as backend storage for ODF "Internal Mode" deployment are non-supported.

- **How it works: Local Storage Operator**
  LSO is purposed for discovery of device/disk types. UI/CLI creates a LocalVolumeDiscovery CR and then reads devices and their properties from LVDR LocalVolumeDiscoveryResult CRs.

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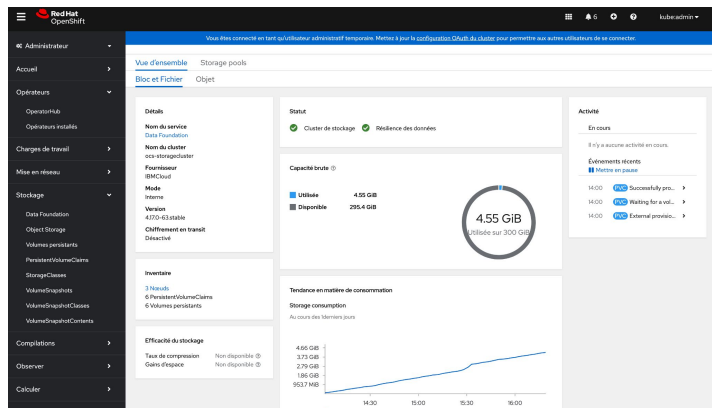
BUSINESS VALUE

System administrator

Spinning storage device warnings helps our team to prevent accidental or coincidental installation of OpenShift Data Foundation on rotating disks, which results in an unsupported configuration.

It helps our team to stay fully supported with product installation requirements.

FUNCTIONALITY

OpenShift Data Foundation
Availability of French and Spanish locales in ODF console Dashboard User Interface

- **French**
  French locale for the OpenShift Data Foundation UI has been added with 4.17

- **Spanish**
  Spanish locale for the OpenShift Data Foundation UI has been added with 4.17

- **Japanese/Chinese/Korean translations**
  Are already available and supported in the OpenShift Data Foundation UI. ODF v4.17 now extends with French and Spanish as additional locales.

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BUSINESS VALUE

IT Operations

Users can better understand the data and insights presented in the dashboard UI console when it is in their native language.

This can lead to more informed decision making and effective communication within teams.

Our organization can comply with regions where services in the local language are a legal requirement.

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FUNCTIONALITY

in upcoming
z-stream release(s)

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FUNCTIONALITY

Managed Red Hat OpenShift

Self-managed internal mode ODF

amazon web services

OpenShift Data Foundation - internal mode -
on ROSA Hosted ControlPlane (HCP)

Enables for ODF internal mode as self-managed storage resourcing on the ROSA platform.

ROSA
Fully-managed Red Hat OpenShift service,
natively running on Amazon Web Services (AWS).

Available on the ROSA platform for any customer.
Default options are offered for the installation.

General availability with OpenShift Data Foundation 4.17.z

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BUSINESS VALUE

System administrator

As system administrator, I need the ability to implement Red Hat OpenShift Data Foundation on ROSA platform to provide our user audiences similar functionality and use like we also offer on-premises.

ROSA
Red Hat OpenShift Service
on Amazon Web Services

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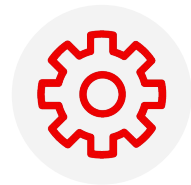
PERFORMANCE

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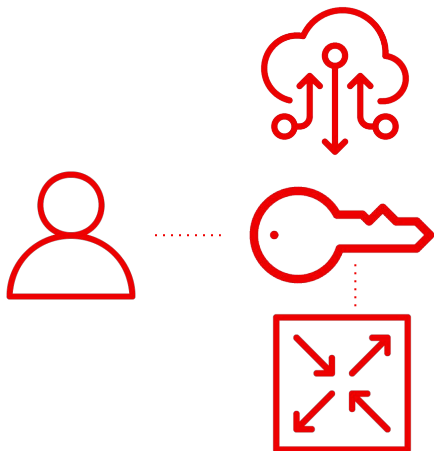
SECURITY

SECURITY

STS support for Multi Cloud Gateway client
Security Token Service integration

- **Multi Cloud Gateway**
  MCG client supportability for Security Token Service. (STS)

- **Functionality**
  This is STS for client, where MCG is the service
  Managing permissions at sub-user levels within MCG.

BUSINESS VALUE

IT Security Practitioner

Corporate security policies require the use of Security Token Service where this is available. Our infrastructure components therefore need to be able to adapt to integration with STS.

System Administrator

Leverage OpenShift's capabilities around STS, combined with ODF Multi Cloud Gateway, for client use of IAM functionalities.
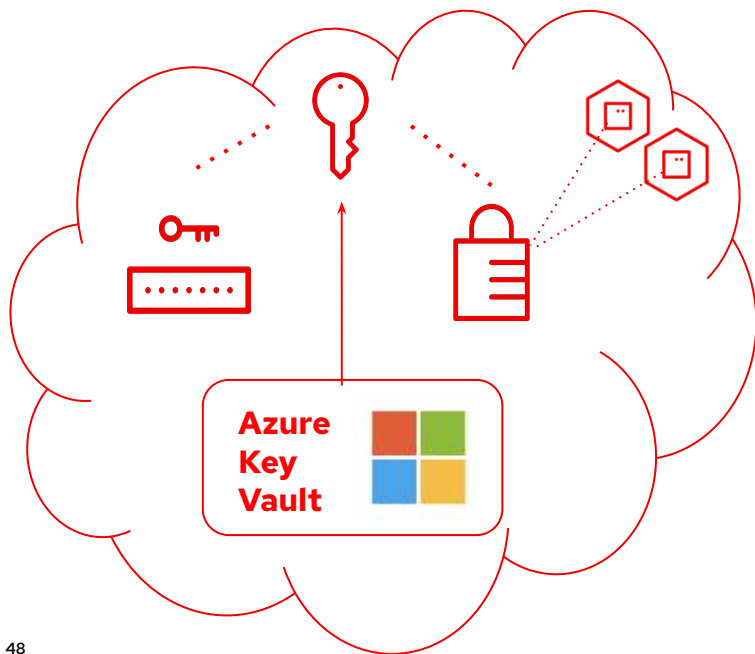
Vital for safeguarding our digital assets, maintaining compliance and prevention of unauthorized access to our systems and data.

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SECURITY

Azure Key Vault KMS support

Key Management Service support for KMIP vendors has been further extended.

Amongst others, Red Hat OpenShift Data Foundation now also offers integration with **Azure Key Vault** as a supported OpenShift Data Foundation Key Management Service.

BUSINESS VALUE

IT Operations

Our company uses **Azure Key Vault** as primary KMS solution, hence we want to maintain only one solution instead of multiple KMS solutions from different vendors.
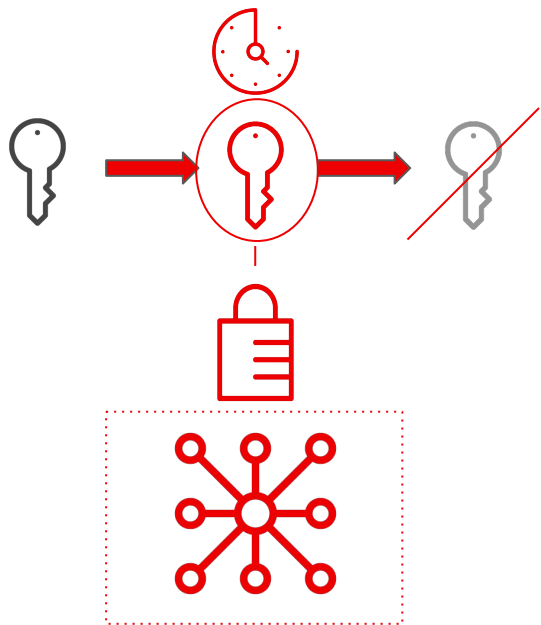
System administrator

As OpenShift administrator on Azure infrastructure, I need the ability to easily use cluster wide encryption and PV encryption by using **Azure Key Vault**.

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SECURITY

Encryption key rotation
for cluster-wide encryption

- All components with encryption support use a **master key** and an **encryption key**.

- Common security practices advise key rotation for the **encryption key**. Certain clients may face regulatory requirements for key rotation.

- Using the same **encryption key** for longer periods of time is a non-recommended practice.

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BUSINESS VALUE

IT Security Practitioner

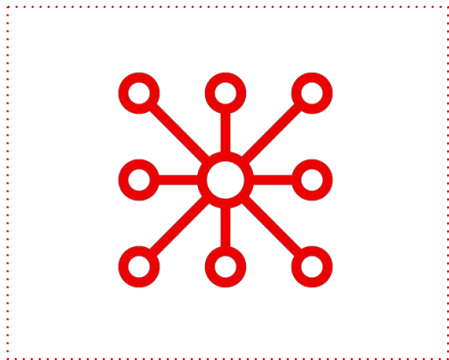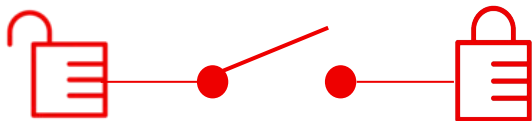Our business requires mandatory encryption-key rotation on a weekly basis, by regulatory policy.

We need to be compliant to this policy as it impacts our credibility regarding security measurements and also our customers trust.

Dev Preview

SECURITY

Post deployment ability to disable/enable in-transit encryption

- **Disable and Enable in-transit encryption**
  Afterwards deployment, supporting existing clients.

- **Functional value**
  Clients with earlier OpenShift Data Foundation versions and without encryption in transit can now opt-in after deployment.

- **In-transit encryption**
  In-cluster communication is not encrypted by default.

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BUSINESS VALUE

IT Security Practitioner

With this new functionality we can enhance earlier installations of OpenShift Data Foundation by enabling in-transit encryption, as a post-installation ability.

In-transit encryption is an important asset to have in place, to maintain confidentiality of sensitive data, as component of our layered security approach.

It reduces the likelihood of data breaches during transmission.

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EFFICIENCY
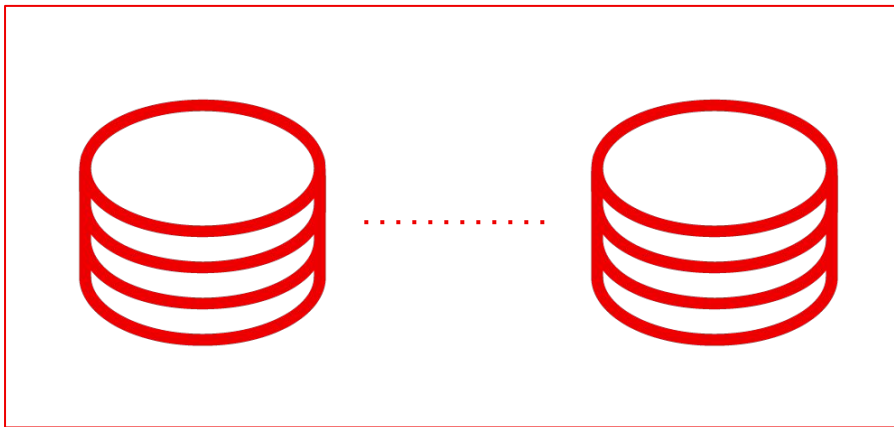
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EFFICIENCY

- **CephFS**
  StorageClass

Replica-2
Two-fold replication for CephFS StorageClass

Provides clients with an easy way to create a new CephFS based StorageClass using 2 replicas.
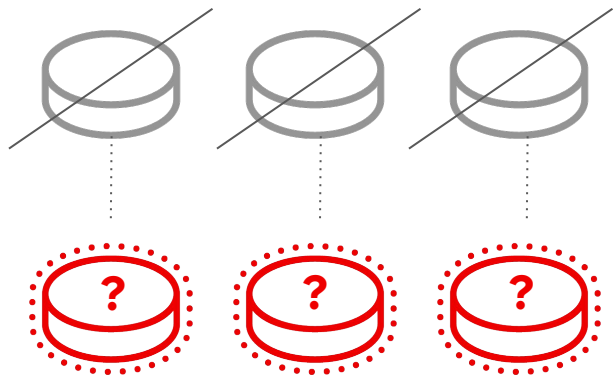
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BUSINESS VALUE

System administrator

With replica-2 Storage Classes we are able to provide **improved storage efficiency**, specifically in use-cases where only the CephFS filesystem is being used.

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EFFICIENCY

Ceph-CSI capability to address stale orphaned subvolumes

- **Orphaned subvolumes**
  Clients can sometimes face stale volumes in the ODF cluster. Stale volumes require removal by a built-in maintenance process.

- **Practical examples of stale volumes**
  RBD images or CephFS subvolumes
  that do not have a parent PVC anymore.

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BUSINESS VALUE

IT Operations

Stale volumes refer to the unused RBD images or CephFS subvolumes which have no parent PVC. These volumes don't have a respective k8s reference attached and can be deleted to free up the resources.
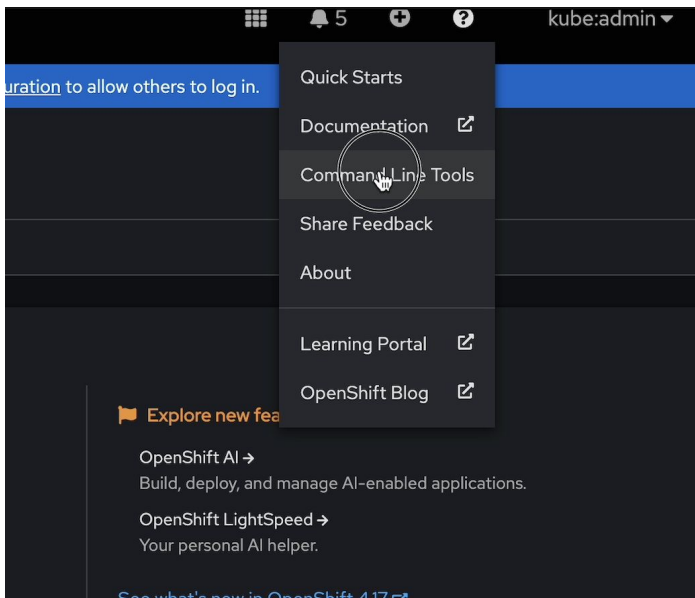
Identification and removal allows our organization to optimize our IT infrastructure to become more efficient and effective.

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EFFICIENCY

Ability to download OpenShift Data Foundation CLI tool
from the ODF Dashboard UI console

- **Functionality**
  Option for downloading the OpenShift Data Foundation Command Line interface by using the web console.

  The ODF CLI tool provides configuration and troubleshooting commands for OpenShift Data Foundation.

- **Motivation for this addition**
  The feature is intended for clients who want to use the ODF-CLI tool but find it hard to look for the right download link in the Red Hat client portal.

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BUSINESS VALUE

System administrator

More ease of use for our clients and users, when they do not have to find out where to fetch CLI tooling elsewhere, outside OpenShift Data Foundation.

The new menu option helps our users to fetch the tooling more faster, increasing their overall efficiency.

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SUMMARY

General Available

- ODF internal mode on ROSA Hosted ControlPlane.

- Regional DR solution, for OpenShift virtualization with flattened RBD images.

- Disaster Recovery Automatically apply relevant configurations for clusters with overlapping Pod/Service CIDR.

- Disaster Recovery Ability to disable DR for a given application workload.

- Multiple Metadata Server instances. Metadata (MDS) service scaling for CephFS

- Multi Cloud Gateway object ownership identification via S3 API.

- Multi Cloud Gateway option to set account credentials for seamless bucket access across different locations.

- Volume capacity alert threshold, alert trigger setting option.

- OpenShift Data Foundation Consumed storage capacity trends, for capacity forecasting.

- OpenShift Data Foundation Spinning storage device (HDD) warning and preventing ODF installation.

- French and Spanish locales in ODF console Dashboard User Interface.

- Multi Cloud Gateway Client Security Token Service integration support.

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SUMMARY

General Available (continued)

- Azure Key Vault KMS support

- Encryption key rotation for cluster–wide encryption

- Replica-2 for CephFS Storage Class

- Ceph-CSI capability to address stale orphaned subvolumes

- Ability to download OpenShift Data Foundation CLI tool from the ODF Dashboard UI console

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SUMMARY

Tech Preview

- Multi Cloud Gateway guaranteed bucket event delivery.

Dev Preview

- CephFS multi-volume consistency for data protection, backup solutions and disaster recovery.

- CephFS RWX Persistent Volumes, shared across clusters, with concurrent IOs

Dev Preview

- Access buckets with DNS subdomain style Virtual host style, for Ceph RGW.

- Post deployment ability to disable/enable in-transit encryption

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OpenShift Data Foundation roadmap

Released (4.16)
June–July 2024

- Self managed ODF for ROSA HCP [TP]
- Disaster Resiliency
  - RDR solution for OpenShift virtualization
- Key rotation support for cluster wide encryption
- Ephemeral storage support
- Cross storage class clone/restore
- Support for OSD expansion
- Custom taints
- Multi-Volume consistency readiness for partners test (**behind feature gate**)
- Azure Key Vault support (TP)
- Bucket logging support and object replication optimization for NooBaa bucket (TP)

Near Term (4.17)
Nov 2024

- Self managed ODF for ROSA HCP – GA
- vSphere 8
- Replica 2 for CephFS
- Key rotation support for PV encryption
- Azure Key Vault support (GA)
- Capacity usage trend information
- Supportability
  - Multiple MDS
  - Improved CLI
- Multicloud Object Gateway
  - Support for client STS
  - Support for account replication across clusters
- Disaster Recovery
  - Support for ACM-discovered applications

Mid Term (4.18)
Feb 2025

- Disaster Recovery
  - RDR Recipes for complex applications
    - Application specific DR logic
    - Support application consistency
  - Multi Volume support for backup
  - Enhanced visibility for data replication
- Key rotation support for cluster wide encryption
- Multicloud Object Gateway
  - Object browser
  - Bucket notifications
  - Support Azure Identity
  - Support versioning in bucket replication
- Multus support for assigned subnets
- Support multi device classes for storage tiering, data isolation and mixture of SAN and local devices.

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OpenShift Data Foundation roadmap

Released platforms

Near term platform support releases

- **GA**
  - vSphere UPI/IPI, AWS, Bare metal, Azure, GCP
  - VMWare 6.5/**8** – Approved with SE
  - IBM Power/Z DR, FIPS mode
  - Managed service on IBM ROKS
  - BM IPI /UPI
  - Any platform supported by OpenShift can use ODF agnostic deployment and it will be supported
- **Tech Preview**
  - OSP with internal mode / external mode [Deprecated]
- **ARO – unmanaged ODF in ARO managed service for OCP**

- ROSA – **self managed ODF for ROSA**

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