Red Hat Ceph Storage 7

Object Gateway Guide

Deploying, configuring, and administering a Ceph Object Gateway

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Abstract

This document provides guidance on deploying, configuring, and administering a Ceph Object Gateway environment. This guide uses a "Day Zero", "Day One", and "Day Two" organizational methodology, providing readers with a logical progression path. Day Zero is where research and planning are done before implementing a potential solution, see Chapters 1 and 2. Day One is where the actual deployment, and installation of the software happens, see Chapter 3. Day Two is where all the basic, and advanced configuration happens, see Chapters 4, 5, and 6. Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are

beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see our CTO Chris Wright's message

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CHAPTER 1. THE CEPH OBJECT GATEWAY

Ceph Object Gateway, also known as RADOS Gateway (RGW), is an object storage interface built on top of the **librados** library to provide applications with a RESTful gateway to Ceph storage clusters. Ceph Object Gateway supports three interfaces:

S3-compatibility:

Provides object storage functionality with an interface that is compatible with a large subset of the Amazon S3 RESTful API.

You can run S3 select to accelerate throughput. Users can run S3 select queries directly without a mediator. There are two S3 select workflows, one for CSV and one for Apache Parquet (Parquet), that provide S3 select operations with CSV and Parquet objects. For more details about these S3 select operations, see section *S3 select operations* in the *Red Hat Ceph Storage Developer Guide*.

Swift-compatibility:

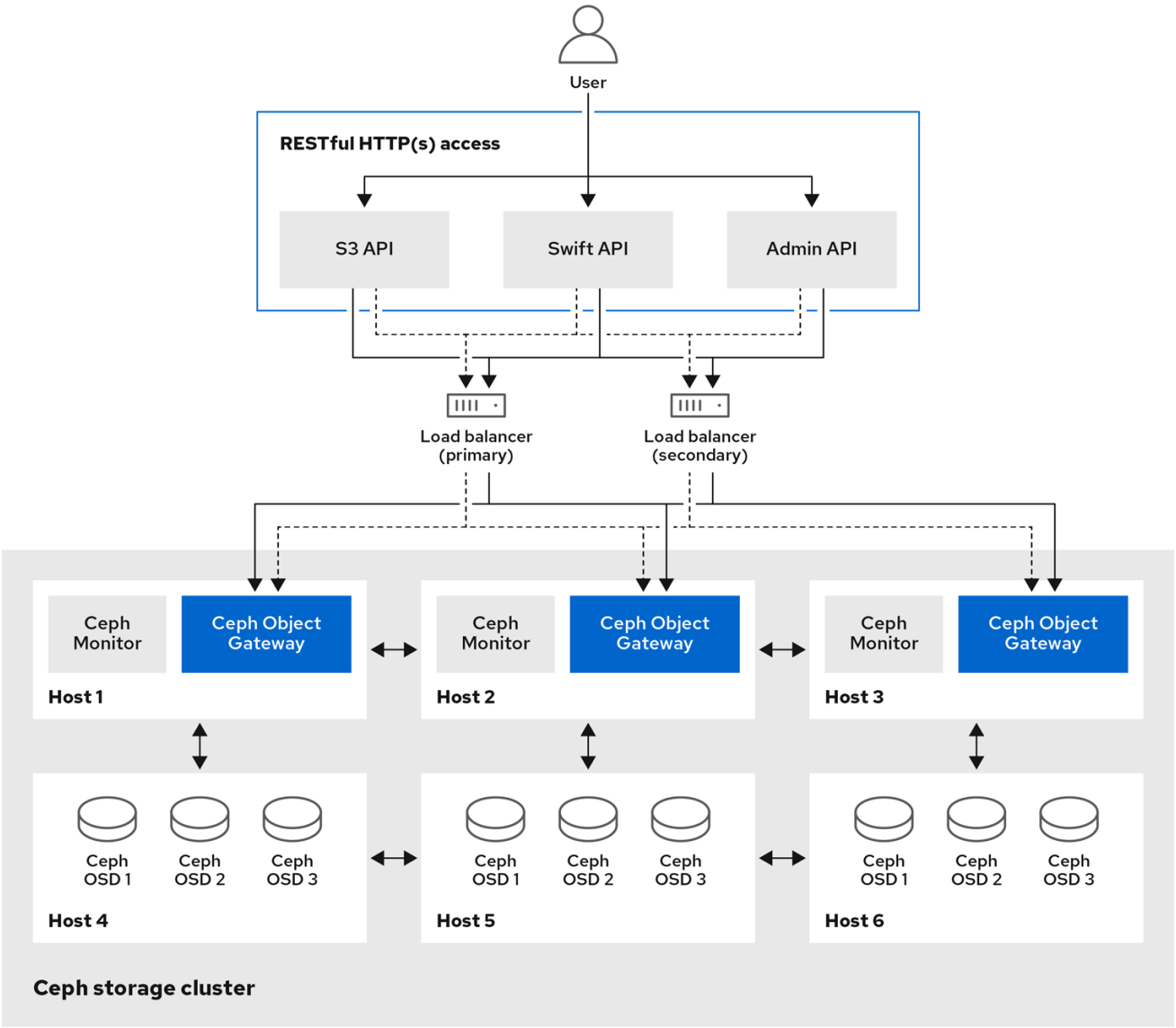
Provides object storage functionality with an interface that is compatible with a large subset of the OpenStack Swift API.

The Ceph Object Gateway is a service interacting with a Ceph storage cluster. Since it provides interfaces compatible with OpenStack Swift and Amazon S3, the Ceph Object Gateway has its own user management system. Ceph Object Gateway can store data in the same Ceph storage cluster used to store data from Ceph block device clients; however, it would involve separate pools and likely a different CRUSH hierarchy. The S3 and Swift APIs share a common namespace, so you can write data with one API and retrieve it with the other.

Administrative API:

Provides an administrative interface for managing the Ceph Object Gateways.

Administrative API requests are done on a URI that starts with the **admin** resource end point. Authorization for the administrative API mimics the S3 authorization convention. Some operations require the user to have special administrative capabilities. The response type can be either XML or JSON by specifying the format option in the request, but defaults to the JSON format.



Introduction to WORM

Write-Once-Read-Many (WORM) is a secured data storage model that is used to guarantee data protection and data retrieval even in cases where objects and buckets are compromised in production zones.

In Red Hat Ceph Storage, data security is achieved through the use of S3 Object Lock with read-only capability that is used to store objects and buckets using a Write-Once-Read-Many (WORM) model, preventing them from being deleted or overwritten. They cannot be deleted even by the Red Hat Ceph Storage administrator.

S3 Object Lock provides two retention modes:

- GOVERNANCE
- COMPLIANCE

These retention modes apply different levels of protection to your objects. You can apply either retention mode to any object version that is protected by Object Lock.

In GOVERNANCE, users cannot overwrite or delete an object version or alter its lock settings unless

they have special permissions. With GOVERNANCE mode, you can protect objects against deletion by most users, although you can still grant some users permission to alter the retention settings or delete the object if necessary.

In COMPLIANCE mode, a protected object version cannot be overwritten or deleted by any user. When an object is locked in COMPLIANCE mode, its retention mode cannot be changed or shortened.

Additional Resources

- See *Enabling object lock for S3* in the *Red Hat Ceph Storage Object Gateway Guide* for more details.

CHAPTER 2. CONSIDERATIONS AND RECOMMENDATIONS

As a storage administrator, a basic understanding about what to consider before running a Ceph Object Gateway and implementing a multi-site Ceph Object Gateway solution is important. You can learn the hardware and network requirements, knowing what type of workloads work well with a Ceph Object Gateway, and Red Hat's recommendations.

Prerequisites

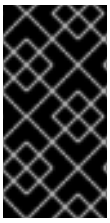
- Time to understand, consider, and plan a storage solution.

2.1. NETWORK CONSIDERATIONS FOR RED HAT CEPH STORAGE

An important aspect of a cloud storage solution is that storage clusters can run out of IOPS due to network latency, and other factors. Also, the storage cluster can run out of throughput due to bandwidth constraints long before the storage clusters run out of storage capacity. This means that the network hardware configuration must support the chosen workloads to meet price versus performance requirements.

Storage administrators prefer that a storage cluster recovers as quickly as possible. Carefully consider bandwidth requirements for the storage cluster network, be mindful of network link oversubscription, and segregate the intra-cluster traffic from the client-to-cluster traffic. Also consider that network performance is increasingly important when considering the use of Solid State Disks (SSD), flash, NVMe, and other high performing storage devices.

Ceph supports a public network and a storage cluster network. The public network handles client traffic and communication with Ceph Monitors. The storage cluster network handles Ceph OSD heartbeats, replication, backfilling, and recovery traffic. At a **minimum**, a single 10 GB Ethernet link should be used for storage hardware, and you can add additional 10 GB Ethernet links for connectivity and throughput.



IMPORTANT

Red Hat recommends allocating bandwidth to the storage cluster network, such that it is a multiple of the public network using the **osd_pool_default_size** as the basis for the multiple on replicated pools. Red Hat also recommends running the public and storage cluster networks on separate network cards.

IMPORTANT

Red Hat recommends using 10 GB Ethernet for Red Hat Ceph Storage deployments in production. A 1 GB Ethernet network is not suitable for production storage clusters.

In the case of a drive failure, replicating 1 TB of data across a 1 GB Ethernet network takes 3 hours, and 3 TB takes 9 hours. Using 3 TB is the typical drive configuration. By contrast, with a 10 GB Ethernet network, the replication times would be 20 minutes and 1 hour. Remember that when a Ceph OSD fails, the storage cluster recovers by replicating the data it contained to other OSDs within the same failure domain and device class as the failed OSD.

The failure of a larger domain such as a rack means that the storage cluster utilizes considerably more bandwidth. When building a storage cluster consisting of multiple racks, which is common for large storage implementations, consider utilizing as much network bandwidth between switches in a "fat tree" design for optimal performance. A typical 10 GB Ethernet switch has 48 10 GB ports and four 40 GB ports. Use the 40 GB ports on the spine for maximum throughput. Alternatively, consider aggregating

unused 10 GB ports with QSFP+ and SFP+ cables into more 40 GB ports to connect to other rack and spine routers. Also, consider using LACP mode 4 to bond network interfaces. Additionally, use jumbo frames, with a maximum transmission unit (MTU) of 9000, especially on the backend or cluster network.

Before installing and testing a Red Hat Ceph Storage cluster, verify the network throughput. Most performance-related problems in Ceph usually begin with a networking issue. Simple network issues like a kinked or bent Cat-6 cable could result in degraded bandwidth. Use a minimum of 10 GB ethernet for the front side network. For large clusters, consider using 40 GB ethernet for the backend or cluster network.

IMPORTANT

For network optimization, Red Hat recommends using jumbo frames for a better CPU per bandwidth ratio, and a non-blocking network switch back-plane. Red Hat Ceph Storage requires the same MTU value throughout all networking devices in the communication path, end-to-end for both public and cluster networks. Verify that the MTU value is the same on all hosts and networking equipment in the environment before using a Red Hat Ceph Storage cluster in production.

2.2. BASIC RED HAT CEPH STORAGE CONSIDERATIONS

The first consideration for using Red Hat Ceph Storage is developing a storage strategy for the data. A storage strategy is a method of storing data that serves a particular use case. If you need to store volumes and images for a cloud platform like OpenStack, you can choose to store data on faster Serial Attached SCSI (SAS) drives with Solid State Drives (SSD) for journals. By contrast, if you need to store object data for an S3- or Swift-compliant gateway, you can choose to use something more economical, like traditional Serial Advanced Technology Attachment (SATA) drives. Red Hat Ceph Storage can accommodate both scenarios in the same storage cluster, but you need a means of providing the fast storage strategy to the cloud platform, and a means of providing more traditional storage for your object store.

One of the most important steps in a successful Ceph deployment is identifying a price-to-performance profile suitable for the storage cluster's use case and workload. It is important to choose the right hardware for the use case. For example, choosing IOPS-optimized hardware for a cold storage application increases hardware costs unnecessarily. Whereas, choosing capacity-optimized hardware for its more attractive price point in an IOPS-intensive workload will likely lead to unhappy users complaining about slow performance.

Red Hat Ceph Storage can support multiple storage strategies. Use cases, cost versus benefit performance tradeoffs, and data durability are the primary considerations that help develop a sound storage strategy.

Use Cases

Ceph provides massive storage capacity, and it supports numerous use cases, such as:

- The Ceph Block Device client is a leading storage backend for cloud platforms that provides limitless storage for volumes and images with high performance features like copy-on-write cloning.
- The Ceph Object Gateway client is a leading storage backend for cloud platforms that provides a RESTful S3-compliant and Swift-compliant object storage for objects like audio, bitmap, video, and other data.
- The Ceph File System for traditional file storage.

Cost vs. Benefit of Performance

Faster is better. Bigger is better. High durability is better. However, there is a price for each superlative quality, and a corresponding cost versus benefit tradeoff. Consider the following use cases from a performance perspective: SSDs can provide very fast storage for relatively small amounts of data and journaling. Storing a database or object index can benefit from a pool of very fast SSDs, but proves too expensive for other data. SAS drives with SSD journaling provide fast performance at an economical price for volumes and images. SATA drives without SSD journaling provide cheap storage with lower overall performance. When you create a CRUSH hierarchy of OSDs, you need to consider the use case and an acceptable cost versus performance tradeoff.

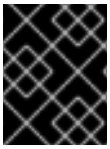
Data Durability

In large scale storage clusters, hardware failure is an expectation, not an exception. However, data loss and service interruption remain unacceptable. For this reason, data durability is very important. Ceph addresses data durability with multiple replica copies of an object or with erasure coding and multiple coding chunks. Multiple copies or multiple coding chunks present an additional cost versus benefit tradeoff: it is cheaper to store fewer copies or coding chunks, but it can lead to the inability to service write requests in a degraded state. Generally, one object with two additional copies, or two coding chunks can allow a storage cluster to service writes in a degraded state while the storage cluster recovers.

Replication stores one or more redundant copies of the data across failure domains in case of a hardware failure. However, redundant copies of data can become expensive at scale. For example, to store 1 petabyte of data with triple replication would require a cluster with at least 3 petabytes of storage capacity.

Erasure coding stores data as data chunks and coding chunks. In the event of a lost data chunk, erasure coding can recover the lost data chunk with the remaining data chunks and coding chunks. Erasure coding is substantially more economical than replication. For example, using erasure coding with 8 data chunks and 3 coding chunks provides the same redundancy as 3 copies of the data. However, such an encoding scheme uses approximately 1.5x the initial data stored compared to 3x with replication.

The CRUSH algorithm aids this process by ensuring that Ceph stores additional copies or coding chunks in different locations within the storage cluster. This ensures that the failure of a single storage device or host does not lead to a loss of all of the copies or coding chunks necessary to preclude data loss. You can plan a storage strategy with cost versus benefit tradeoffs, and data durability in mind, then present it to a Ceph client as a storage pool.



IMPORTANT

ONLY the data storage pool can use erasure coding. Pools storing service data and bucket indexes use replication.

IMPORTANT

Ceph's object copies or coding chunks make RAID solutions obsolete. Do not use RAID, because Ceph already handles data durability, a degraded RAID has a negative impact on performance, and recovering data using RAID is substantially slower than using deep copies or erasure coding chunks.

Additional Resources

- See the *Minimum hardware considerations for Red Hat Ceph Storage* section of the *Red Hat Ceph Storage Installation Guide* for more details.

2.2.1. Colocating Ceph daemons and its advantages

You can colocate containerized Ceph daemons on the same host. Here are the advantages of colocating some of Ceph's daemons:

- Significantly improves the total cost of ownership (TCO) at small scale.
- Can increase overall performance.
- Reduces the amount of physical hosts for a minimum configuration.
- Better resource utilization.
- Upgrading Red Hat Ceph Storage is easier.

By using containers you can colocate one daemon from the following list with a Ceph OSD daemon (**ceph-osd**). Additionally, for the Ceph Object Gateway (**radosgw**), Ceph Metadata Server (**ceph-mds**), and Grafana, you can colocate it either with a Ceph OSD daemon, plus a daemon from the list below.

- Ceph Metadata Server (**ceph-mds**)
- Ceph Monitor (**ceph-mon**)
- Ceph Manager (**ceph-mgr**)
- NFS Ganesha (**nfs-ganesha**)
- Ceph Manager (**ceph-grafana**)

Table 2.1. Daemon Placement Example

Host Name	Daemon	Daemon	Daemon
host1	OSD	Monitor & Manager	Prometheus
host2	OSD	Monitor & Manager	RGW
host3	OSD	Monitor & Manager	RGW
host4	OSD	Metadata Server	
host5	OSD	Metadata Server	

NOTE

Because **ceph-mon** and **ceph-mgr** work closely together, they are not considered two separate daemons for the purposes of colocation.

Colocating Ceph daemons can be done from the command line interface, by using the **--placement** option to the **ceph orch** command, or you can use a service specification YAML file.

Command line Example

```
[ceph: root@host01 /]# ceph orch apply mon --placement="host1 host2 host3"
```

Service Specification YAML File Example

```
service_type: mon
placement:
  hosts:
   - host01
   - host02
   - host03
```

```
[ceph: root@host01 /]# ceph orch apply -i mon.yml
```

Red Hat recommends colocating the Ceph Object Gateway with Ceph OSD containers to increase performance. To achieve the highest performance without incurring additional hardware cost, use two Ceph Object Gateway daemons per host.

Ceph Object Gateway Command line Example

```
[ceph: root@host01 /]# ceph orch apply rgw example --placement="6 host1 host2 host3"
```

Ceph Object Gateway Service Specification YAML File Example

```
service_type: rgw
service_id: example
placement:
  count: 6
  hosts:
   - host01
   - host02
   - host03
```

```
[ceph: root@host01 /]# ceph orch apply -i rgw.yml
```

The diagrams below shows the difference between storage clusters with colocated and non-colocated daemons.

Figure 2.1. Colocated Daemons

Figure 2.2. Non-colocated Daemons

Additional resources

- See the *Management of services using the Ceph Orchestrator* chapter in the *Red Hat Ceph Storage Operations Guide* for more details on using the **--placement** option.
- See the *Red Hat Ceph Storage RGW deployment strategies and sizing guidance* article for more information.

2.3. RED HAT CEPH STORAGE WORKLOAD CONSIDERATIONS

One of the key benefits of a Ceph storage cluster is the ability to support different types of workloads within the same storage cluster using performance domains. Different hardware configurations can be associated with each performance domain. Storage administrators can deploy storage pools on the

appropriate performance domain, providing applications with storage tailored to specific performance and cost profiles. Selecting appropriately sized and optimized servers for these performance domains is an essential aspect of designing a Red Hat Ceph Storage cluster.

To the Ceph client interface that reads and writes data, a Ceph storage cluster appears as a simple pool where the client stores data. However, the storage cluster performs many complex operations in a manner that is completely transparent to the client interface. Ceph clients and Ceph object storage daemons, referred to as Ceph OSDs, or simply OSDs, both use the Controlled Replication Under Scalable Hashing (CRUSH) algorithm for the storage and retrieval of objects. Ceph OSDs can run in containers within the storage cluster.

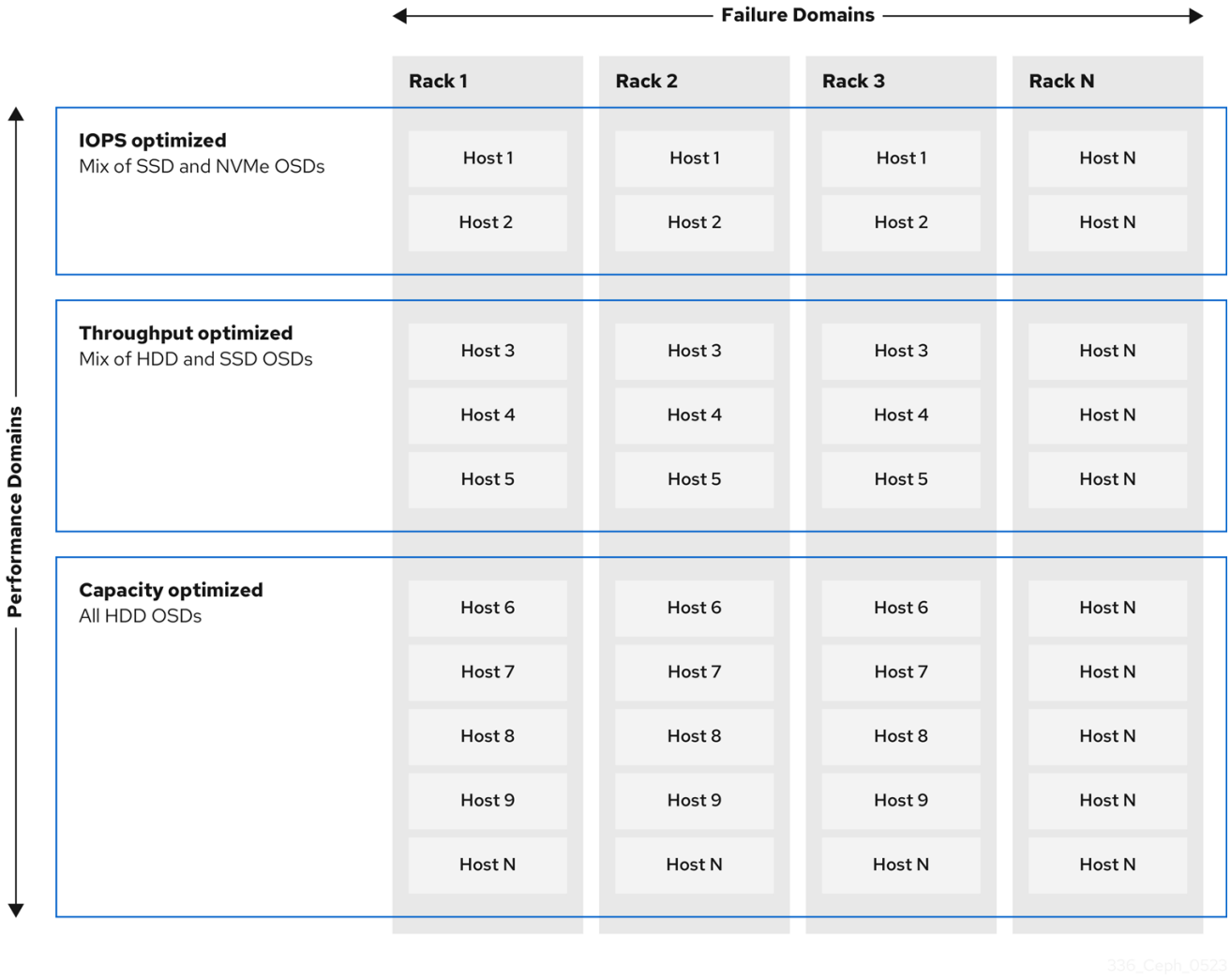
A CRUSH map describes a topography of cluster resources, and the map exists both on client hosts as well as Ceph Monitor hosts within the cluster. Ceph clients and Ceph OSDs both use the CRUSH map and the CRUSH algorithm. Ceph clients communicate directly with OSDs, eliminating a centralized object lookup and a potential performance bottleneck. With awareness of the CRUSH map and communication with their peers, OSDs can handle replication, backfilling, and recovery—allowing for dynamic failure recovery.

Ceph uses the CRUSH map to implement failure domains. Ceph also uses the CRUSH map to implement performance domains, which simply take the performance profile of the underlying hardware into consideration. The CRUSH map describes how Ceph stores data, and it is implemented as a simple hierarchy, specifically an acyclic graph, and a ruleset. The CRUSH map can support multiple hierarchies to separate one type of hardware performance profile from another. Ceph implements performance domains with device "classes".

For example, you can have these performance domains coexisting in the same Red Hat Ceph Storage cluster:

- Hard disk drives (HDDs) are typically appropriate for cost and capacity-focused workloads.
- Throughput-sensitive workloads typically use HDDs with Ceph write journals on solid state drives (SSDs).
- IOPS-intensive workloads, such as MySQL and MariaDB, often use SSDs.

Figure 2.3. Performance and Failure Domains



Workloads

Red Hat Ceph Storage is optimized for three primary workloads.

IMPORTANT

Carefully consider the workload being run by Red Hat Ceph Storage clusters **BEFORE** considering what hardware to purchase, because it can significantly impact the price and performance of the storage cluster. For example, if the workload is capacity-optimized and the hardware is better suited to a throughput-optimized workload, then hardware will be more expensive than necessary. Conversely, if the workload is throughput-optimized and the hardware is better suited to a capacity-optimized workload, then the storage cluster can suffer from poor performance.

- **IOPS optimized:** Input, output per second (IOPS) optimization deployments are suitable for cloud computing operations, such as running MYSQL or MariaDB instances as virtual machines on OpenStack. IOPS optimized deployments require higher performance storage such as 15k RPM SAS drives and separate SSD journals to handle frequent write operations. Some high IOPS scenarios use all flash storage to improve IOPS and total throughput.
  An IOPS-optimized storage cluster has the following properties:
  - Lowest cost per IOPS.

- Highest IOPS per GB.
- 99th percentile latency consistency.

Uses for an IOPS-optimized storage cluster are:

- Typically block storage.
- 3x replication for hard disk drives (HDDs) or 2x replication for solid state drives (SSDs).
- MySQL on OpenStack clouds.

- **Throughput optimized:** Throughput-optimized deployments are suitable for serving up significant amounts of data, such as graphic, audio, and video content. Throughput-optimized deployments require high bandwidth networking hardware, controllers, and hard disk drives with fast sequential read and write characteristics. If fast data access is a requirement, then use a throughput-optimized storage strategy. Also, if fast write performance is a requirement, using Solid State Disks (SSD) for journals will substantially improve write performance.
  A throughput-optimized storage cluster has the following properties:
  - Lowest cost per MBps (throughput).
  - Highest MBps per TB.
  - Highest MBps per BTU.
  - Highest MBps per Watt.
  - 97th percentile latency consistency.

  Uses for a throughput-optimized storage cluster are:
  - Block or object storage.
  - 3x replication.
  - Active performance storage for video, audio, and images.
  - Streaming media, such as 4k video.

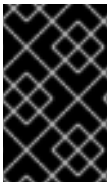
- **Capacity optimized:** Capacity-optimized deployments are suitable for storing significant amounts of data as inexpensively as possible. Capacity-optimized deployments typically trade performance for a more attractive price point. For example, capacity-optimized deployments often use slower and less expensive SATA drives and co-locate journals rather than using SSDs for journaling.
  A cost and capacity-optimized storage cluster has the following properties:
  - Lowest cost per TB.
  - Lowest BTU per TB.
  - Lowest Watts required per TB.

  Uses for a cost and capacity-optimized storage cluster are:
  - Typically object storage.
  - Erasure coding for maximizing usable capacity

- Object archive.
- Video, audio, and image object repositories.

2.4. CEPH OBJECT GATEWAY CONSIDERATIONS

Another important aspect of designing a storage cluster is to determine if the storage cluster will be in one data center site or span multiple data center sites. Multi-site storage clusters benefit from geographically distributed failover and disaster recovery, such as long-term power outages, earthquakes, hurricanes, floods or other disasters. Additionally, multi-site storage clusters can have an active-active configuration, which can direct client applications to the closest available storage cluster. This is a good storage strategy for content delivery networks. Consider placing data as close to the client as possible. This is important for throughput-intensive workloads, such as streaming 4k video.



IMPORTANT

Red Hat recommends identifying realm, zone group and zone names BEFORE creating Ceph's storage pools. Prepend some pool names with the zone name as a standard naming convention.

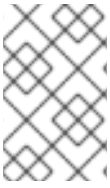
Additional Resources

- See the *Multi-site configuration and administration* section in the *Red Hat Ceph Storage Object Gateway Guide* for more information.

2.4.1. Administrative data storage

A Ceph Object Gateway stores administrative data in a series of pools defined in an instance's zone configuration. For example, the buckets, users, user quotas, and usage statistics discussed in the subsequent sections are stored in pools in the Ceph storage cluster. By default, Ceph Object Gateway creates the following pools and maps them to the default zone.

- **.rgw.root**
- **.default.rgw.control**
- **.default.rgw.meta**
- **.default.rgw.log**
- **.default.rgw.buckets.index**
- **.default.rgw.buckets.data**
- **.default.rgw.buckets.non-ec**



NOTE

The **.default.rgw.buckets.index** pool is created only after the bucket is created in Ceph Object Gateway, while the **.default.rgw.buckets.data** pool is created after the data is uploaded to the bucket.

Consider creating these pools manually so you can set the CRUSH ruleset and the number of placement groups. In a typical configuration, the pools that store the Ceph Object Gateway's administrative data

will often use the same CRUSH ruleset, and use fewer placement groups, because there are 10 pools for the administrative data.

Red Hat recommends that the **.rgw.root** pool and the service pools use the same CRUSH hierarchy, and use at least **node** as the failure domain in the CRUSH rule. Red Hat recommends using **replicated** for data durability, and NOT **erasure** for the **.rgw.root** pool, and the service pools.

The **mon_pg_warn_max_per_osd** setting warns you if you assign too many placement groups to a pool, **300** by default. You may adjust the value to suit your needs and the capabilities of your hardware where **n** is the maximum number of PGs per OSD.

```
mon_pg_warn_max_per_osd = n
```

NOTE

For service pools, including **.rgw.root**, the suggested PG count from the *Ceph placement groups (PGs) per pool calculator* is substantially less than the target PGs per Ceph OSD. Also, ensure the number of Ceph OSDs is set in step 4 of the calculator.

IMPORTANT

Garbage collection uses the **.log** pool with regular RADOS objects instead of OMAP. In future releases, more features will store metadata on the **.log** pool. Therefore, Red Hat recommends using NVMe/SSD Ceph OSDs for the **.log** pool.

.rgw.root Pool

The pool where the Ceph Object Gateway configuration is stored. This includes realms, zone groups, and zones. By convention, its name is not prepended with the zone name.

Service Pools

The service pools store objects related to service control, garbage collection, logging, user information, and usage. By convention, these pool names have the zone name prepended to the pool name.

- **.*ZONE_NAME*.rgw.control** : The control pool.
- **.*ZONE_NAME*.log** : The log pool contains logs of all bucket, container, and object actions, such as create, read, update, and delete.
- **.*ZONE_NAME*.rgw.buckets.index** : This pool stores index of the buckets.
- **.*ZONE_NAME*.rgw.buckets.data** : This pool stores data of the buckets.
- **.*ZONE_NAME*.rgw.meta** : The metadata pool stores user_keys and other critical metadata.
- **.*ZONE_NAME*.meta:users.uid** : The user ID pool contains a map of unique user IDs.
- **.*ZONE_NAME*.meta:users.keys** : The keys pool contains access keys and secret keys for each user ID.
- **.*ZONE_NAME*.meta:users.email** : The email pool contains email addresses associated to a user ID.
- **.*ZONE_NAME*.meta:users.swift** : The Swift pool contains the Swift subuser information for a user ID.

Additional Resources

- See the *About pools* section in the *Red Hat Ceph Storage Object Gateway Guide* for more details.
- See the *Red Hat Ceph Storage Storage Strategies Guide* for additional details.

2.4.2. Index pool

When selecting OSD hardware for use with a Ceph Object Gateway--irrespective of the use case--an OSD node that has at least one high performance drive, either an SSD or NVMe drive, is required for storing the index pool. This is particularly important when buckets contain a large number of objects.

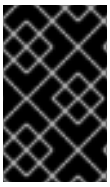
For Red Hat Ceph Storage running Bluestore, Red Hat recommends deploying an NVMe drive as a **block.db** device, rather than as a separate pool.

Ceph Object Gateway index data is written only into an object map (OMAP). OMAP data for BlueStore resides on the **block.db** device on an OSD. When an NVMe drive functions as a **block.db** device for an HDD OSD and when the index pool is backed by HDD OSDs, the index data will ONLY be written to the **block.db** device. As long as the **block.db** partition/lvm is sized properly at 4% of block, this configuration is all that is needed for BlueStore.

NOTE

Red Hat does not support HDD devices for index pools. For more information on supported configurations, see the *Red Hat Ceph Storage: Supported configurations* article.

An index entry is approximately 200 bytes of data, stored as an OMAP in **rocksdb**. While this is a trivial amount of data, some uses of Ceph Object Gateway can result in tens or hundreds of millions of objects in a single bucket. By mapping the index pool to a CRUSH hierarchy of high performance storage media, the reduced latency provides a dramatic performance improvement when buckets contain very large numbers of objects.



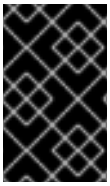
IMPORTANT

In a production cluster, a typical OSD node will have at least one SSD or NVMe drive for storing the OSD journal and the index pool or **block.db** device, which use separate partitions or logical volumes for the same physical drive.

2.4.3. Data pool

The data pool is where the Ceph Object Gateway stores the object data for a particular storage policy. The data pool has a full complement of placement groups (PGs), not the reduced number of PGs for service pools. Consider using erasure coding for the data pool, as it is substantially more efficient than replication, and can significantly reduce the capacity requirements while maintaining data durability.

To use erasure coding, create an erasure code profile. See the *Erasure Code Profiles* section in the *Red Hat Ceph Storage Storage Strategies Guide* for more details.



IMPORTANT

Choosing the correct profile is important because you cannot change the profile after you create the pool. To modify a profile, you must create a new pool with a different profile and migrate the objects from the old pool to the new pool.

The default configuration is two data chunks and one encoding chunk, which means only one OSD can be lost. For higher resiliency, consider a larger number of data and encoding chunks. For example, some large scale systems use 8 data chunks and 3 encoding chunks, which allows 3 OSDs to fail without losing data.

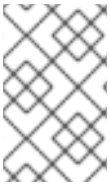
IMPORTANT

Each data and encoding chunk SHOULD get stored on a different node or host at a minimum. For smaller storage clusters, this makes using **rack** impractical as the minimum CRUSH failure domain for a larger number of data and encoding chunks. Consequently, it is common for the data pool to use a separate CRUSH hierarchy with **host** as the minimum CRUSH failure domain. Red Hat recommends **host** as the minimum failure domain. If erasure code chunks get stored on Ceph OSDs within the same host, a host failure, such as a failed journal or network card, could lead to data loss.

To create a data pool, run the **ceph osd pool create** command with the pool name, the number of PGs and PGPs, the **erasure** data durability method, the erasure code profile, and the name of the rule.

2.4.4. Data extra pool

The **data_extra_pool** is for data that cannot use erasure coding. For example, multi-part uploads allow uploading a large object, such as a movie in multiple parts. These parts must first be stored without erasure coding. Erasure coding applies to the whole object, not the partial uploads.



NOTE

The placement group (PG) per Pool Calculator recommends a smaller number of PGs per pool for the **data_extra_pool**; however, the PG count is approximately twice the number of PGs as the service pools and the same as the bucket index pool.

To create a data extra pool, run the **ceph osd pool create** command with the pool name, the number of PGs and PGPs, the **replicated** data durability method, and the name of the rule. For example:

```
# ceph osd pool create .us-west.rgw.buckets.non-ec 64 64 replicated rgw-service
```

2.5. DEVELOPING CRUSH HIERARCHIES

As a storage administrator, when deploying a Ceph storage cluster and an Object Gateway, typically the Ceph Object Gateway has a default zone group and zone. The Ceph storage cluster will have default pools, which in turn will use a CRUSH map with a default CRUSH hierarchy and a default CRUSH rule.

IMPORTANT

The default **rbd** pool can use the default CRUSH rule. **DO NOT** delete the default rule or hierarchy if Ceph clients have used them to store client data.

Production gateways typically use a custom realm, zone group and zone named according to the use and geographic location of the gateways. Additionally, the Ceph storage cluster will have a CRUSH map that has multiple CRUSH hierarchies.

- **Service Pools:** At least one CRUSH hierarchy will be for service pools and potentially for data. The service pools include **.rgw.root** and the service pools associated with the zone. Service pools typically fall under a single CRUSH hierarchy, and use replication for data durability. A data pool may also use the CRUSH hierarchy, but the pool will usually be configured with erasure coding for data durability.

- **Index:** At least one CRUSH hierarchy **SHOULD** be for the index pool, where the CRUSH hierarchy maps to high performance media, such as SSD or NVMe drives. Bucket indices can be a performance bottleneck. Red Hat recommends to use SSD or NVMe drives in this CRUSH hierarchy. Create partitions for indices on SSDs or NVMe drives used for Ceph OSD journals. Additionally, an index should be configured with bucket sharding.

- **Placement Pools:** The placement pools for each placement target include the bucket index, the data bucket, and the bucket extras. These pools can fall under separate CRUSH hierarchies. Since the Ceph Object Gateway can support multiple storage policies, the bucket pools of the storage policies may be associated with different CRUSH hierarchies, reflecting different use cases, such as IOPS-optimized, throughput-optimized, and capacity-optimized. The bucket index pool **SHOULD** use its own CRUSH hierarchy to map the bucket index pool to higher performance storage media, such as SSD or NVMe drives.

2.5.1. Creating CRUSH roots

From the command line on the administration node, create CRUSH roots in the CRUSH map for each CRUSH hierarchy. There **MUST** be at least one CRUSH hierarchy for service pools that may also potentially serve data storage pools. There **SHOULD** be at least one CRUSH hierarchy for the bucket index pool, mapped to high performance storage media, such as SSDs or NVMe drives.

For details on CRUSH hierarchies, see the *CRUSH Hierarchies* section in the *Red Hat Ceph Storage Storage Strategies Guide 7*.

To manually edit a CRUSH map, see the *Editing a CRUSH Map* section in the *Red Hat Ceph Storage Storage Strategies Guide 7*.

In the following examples, the hosts named **data0**, **data1**, and **data2** use extended logical names, such as **data0-sas-ssd**, **data0-index**, and so forth in the CRUSH map, because there are multiple CRUSH hierarchies pointing to the same physical hosts.

A typical CRUSH root might represent nodes with SAS drives and SSDs for journals. For example:

```
##
# SAS-SSD ROOT DECLARATION
##

root sas-ssd {
  id -1   # do not change unnecessarily
  # weight 0.000
  alg straw
  hash 0  # rjenkins1
  item data2-sas-ssd weight 4.000
  item data1-sas-ssd weight 4.000
  item data0-sas-ssd weight 4.000
}
```

A CRUSH root for bucket indexes **SHOULD** represent high performance media, such as SSD or NVMe drives. Consider creating partitions on SSD or NVMe media that store OSD journals. For example:

```
##
# INDEX ROOT DECLARATION
##

root index {
  id -2    # do not change unnecessarily
  # weight 0.000
  alg straw
  hash 0  # rjenkins1
  item data2-index weight 1.000
  item data1-index weight 1.000
  item data0-index weight 1.000
}
```

2.5.2. Using logical host names in a CRUSH map

In RHCS 3 and later releases, CRUSH supports the notion of a storage device "class," which is not supported in RHCS 2 and earlier releases. In RHCS 3 clusters with hosts or nodes that contain multiple classes of storage device, such as NVMe, SSD or HDD, use a single CRUSH hierarchy with device classes to distinguish different classes of storage device. This eliminates the need to use logical host names. In RHCS 2 and earlier releases, use multiple CRUSH hierarchies, one for each class of device, and logical host names to distinguish the hosts or nodes in the CRUSH hierarchy.

In RHCS 3 and later releases, CRUSH supports the notion of a storage device "class", which is not supported in RHCS 2 and earlier releases. In RHCS 3 clusters with hosts or nodes that contain multiple classes of a storage device, such as NVMe, SSD, or HDD, use a single CRUSH hierarchy with device classes to distinguish different classes of a storage device. This eliminates the need to use logical host names. In RHCS 2 and earlier releases, use multiple CRUSH hierarchies, one for each class of device, and logical host names to distinguish the hosts or nodes in the CRUSH hierarchy.

In the CRUSH map, host names must be unique and used only once. When the host serves multiple CRUSH hierarchies and use cases, a CRUSH map may use logical host names instead of the actual host name in order to ensure the host name is only used once. For example, a node may have multiple classes of drives such as SSDs, SAS drives with SSD journals, and SATA drives with co-located journals. To create multiple CRUSH hierarchies for the same host in RHCS 2 and earlier releases, the hierarchies need to use logical host names in lieu of the actual host names so the bucket names are unique within the CRUSH hierarchy. For example, if the host name is **data2**, the CRUSH hierarchy might use logical names, such as **data2-sas-ssd** and **data2-index**:

```
host data2-sas-ssd {
  id -11   # do not change unnecessarily
  # weight 0.000
  alg straw
  hash 0  # rjenkins1
  item osd.0 weight 1.000
  item osd.1 weight 1.000
  item osd.2 weight 1.000
  item osd.3 weight 1.000
}
```

In the foregoing example, the host **data2** uses the logical name **data2-sas-ssd** to map the SAS drives with journals on SSDs into one hierarchy. The OSD IDs **osd.0** through **osd.3** represent SAS drives using

SSD journals in a high throughput hardware configuration. These OSD IDs differ from the OSD ID in the following example.

In the following example, the host **data2** uses the logical name **data2-index** to map the SSD drive for a bucket index into a second hierarchy. The OSD ID **osd.4** represents an SSD drive or other high speed storage media used exclusively for a bucket index pool.

```
host data2-index {
  id -21   # do not change unnecessarily
  # weight 0.000
  alg straw
  hash 0  # rjenkins1
  item osd.4 weight 1.000
}
```

IMPORTANT

When using logical host names, ensure that one of the following settings is present in the Ceph configuration file to prevent the OSD startup scripts from using the actual host names upon startup and thereby, failing to locate data in the CRUSH map.

When the CRUSH map uses logical host names, as in the foregoing examples, prevent the OSD startup scripts from identifying the hosts according to their actual host names at initialization. In the **[global]** section of the Ceph configuration file, add the following setting:

```
osd_crush_update_on_start = false
```

An alternative method of defining a logical host name is to define the location of the CRUSH map for each OSD in the **[osd.<ID>]** sections of the Ceph configuration file. This will override any locations the OSD startup script defines. From the foregoing examples, the entries might look like the following:

```
[osd.0]
osd crush location = "host=data2-sas-ssd"

[osd.1]
osd crush location = "host=data2-sas-ssd"

[osd.2]
osd crush location = "host=data2-sas-ssd"

[osd.3]
osd crush location = "host=data2-sas-ssd"

[osd.4]
osd crush location = "host=data2-index"
```

IMPORTANT

If one of the foregoing approaches is not taken when a CRUSH map uses logical host names rather than actual host names, on restart, the Ceph Storage Cluster assumes that the OSDs map to the actual host names, the actual host names are not found in the CRUSH map, and Ceph Storage Cluster clients will not find the OSDs and their data.

2.5.3. Creating CRUSH rules

Like the default CRUSH hierarchy, the CRUSH map also contains a default CRUSH rule.

NOTE

The default **rbd** pool may use this rule. DO NOT delete the default rule if other pools have used it to store customer data.

For general details on CRUSH rules, see the CRUSH rules section in the *Red Hat Ceph Storage Storage Strategies Guide* for Red Hat Ceph Storage 7. To manually edit a CRUSH map, see the Editing a CRUSH map section in the *Red Hat Ceph Storage Storage Strategies Guide* for Red Hat Ceph Storage 7.

For each CRUSH hierarchy, create a CRUSH rule. The following example illustrates a rule for the CRUSH hierarchy that will store the service pools, including **.rgw.root**. In this example, the root **sas-ssd** serves as the main CRUSH hierarchy. It uses the name **rgw-service** to distinguish itself from the default rule. The **step take sas-ssd** line tells the pool to use the **sas-ssd** root created in Creating CRUSH roots, whose child buckets contain OSDs with SAS drives and high performance storage media, such as SSD or NVMe drives, for journals in a high throughput hardware configuration. The **type rack** portion of **step chooseleaf** is the failure domain. In the following example, it is a rack.

```
##
# SERVICE RULE DECLARATION
##

rule rgw-service {
 type replicated
 min_size 1
 max_size 10
 step take sas-ssd
 step chooseleaf firstn 0 type rack
 step emit
}
```

NOTE

In the foregoing example, if data gets replicated three times, there should be at least three racks in the cluster containing a similar number of OSD nodes.

TIP

The **type replicated** setting has **NOTHING** to do with data durability, the number of replicas, or the erasure coding. Only **replicated** is supported.

The following example illustrates a rule for the CRUSH hierarchy that will store the data pool. In this example, the root **sas-ssd** serves as the main CRUSH hierarchy—the same CRUSH hierarchy as the service rule. It uses **rgw-throughput** to distinguish itself from the default rule and **rgw-service**. The **step take sas-ssd** line tells the pool to use the **sas-ssd** root created in Creating CRUSH roots, whose child buckets contain OSDs with SAS drives and high performance storage media, such as SSD or NVMe drives, in a high throughput hardware configuration. The **type host** portion of **step chooseleaf** is the failure domain. In the following example, it is a host. Notice that the rule uses the same CRUSH hierarchy, but a different failure domain.

```
##
# THROUGHPUT RULE DECLARATION
##

rule rgw-throughput {
 type replicated
 min_size 1
 max_size 10
 step take sas-ssd
 step chooseleaf firstn 0 type host
 step emit
}
```

NOTE

In the foregoing example, if the pool uses erasure coding with a larger number of data and encoding chunks than the default, there should be at least as many racks in the cluster containing a similar number of OSD nodes to facilitate the erasure coding chunks. For smaller clusters, this may not be practical, so the foregoing example uses **host** as the CRUSH failure domain.

The following example illustrates a rule for the CRUSH hierarchy that will store the index pool. In this example, the root **index** serves as the main CRUSH hierarchy. It uses **rgw-index** to distinguish itself from **rgw-service** and **rgw-throughput**. The **step take index** line tells the pool to use the **index** root created in Creating CRUSH roots, whose child buckets contain high performance storage media, such as SSD or NVMe drives, or partitions on SSD or NVMe drives that also store OSD journals. The **type rack** portion of **step chooseleaf** is the failure domain. In the following example, it is a rack.

```
##
# INDEX RULE DECLARATION
##

rule rgw-index {
 type replicated
 min_size 1
 max_size 10
 step take index
 step chooseleaf firstn 0 type rack
 step emit
}
```

Additional Resources

- For general details on CRUSH hierarchies, see the CRUSH Administration section of the *Red Hat Ceph Storage Storage Strategies Guide*.

2.6. CEPH OBJECT GATEWAY MULTI-SITE CONSIDERATIONS

A Ceph Object Gateway multi-site configuration requires at least two Red Hat Ceph Storage clusters, and at least two Ceph Object Gateway instances, one for each Red Hat Ceph Storage cluster. Typically, the two Red Hat Ceph Storage clusters will be in geographically separate locations; however, this same multi-site configuration can work on two Red Hat Ceph Storage clusters located at the same physical site.

Multi-site configurations require a primary zone group and a primary zone. Additionally, each zone group requires a primary zone. Zone groups might have one or more secondary zones.

NOTE

You can configure multi-site either through the CLI or through the Red Hat Ceph Storage dashboard. See *Configuring a multi-site object gateway on the Ceph dashboard* for more details.

IMPORTANT

The primary zone within the primary zone group of a realm is responsible for storing the primary copy of the realm's metadata, including users, quotas, and buckets. This metadata gets synchronized to secondary zones and secondary zone groups automatically. Metadata operations issued with the **radosgw-admin** command line interface (CLI) **MUST** be issued on a node within the primary zone of the primary zone group to ensure that they synchronize to the secondary zone groups and zones. Currently, it is *possible* to issue metadata operations on secondary zones and zone groups, but it is **NOT** recommended because they **WILL NOT** be synchronized, which can lead to fragmentation of the metadata.

The diagrams below illustrate the possible one, and two realm configurations in multi-site Ceph Object Gateway environments.

Figure 2.4. One Realm

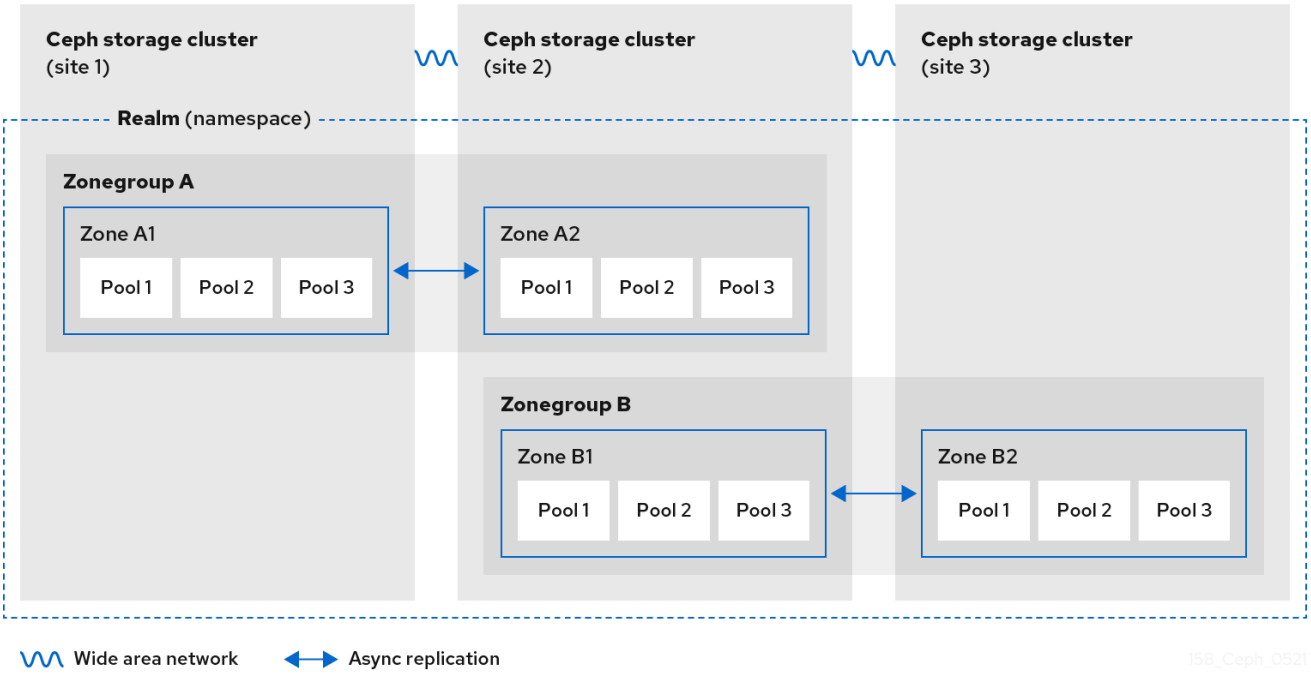


Figure 2.5. Two Realms

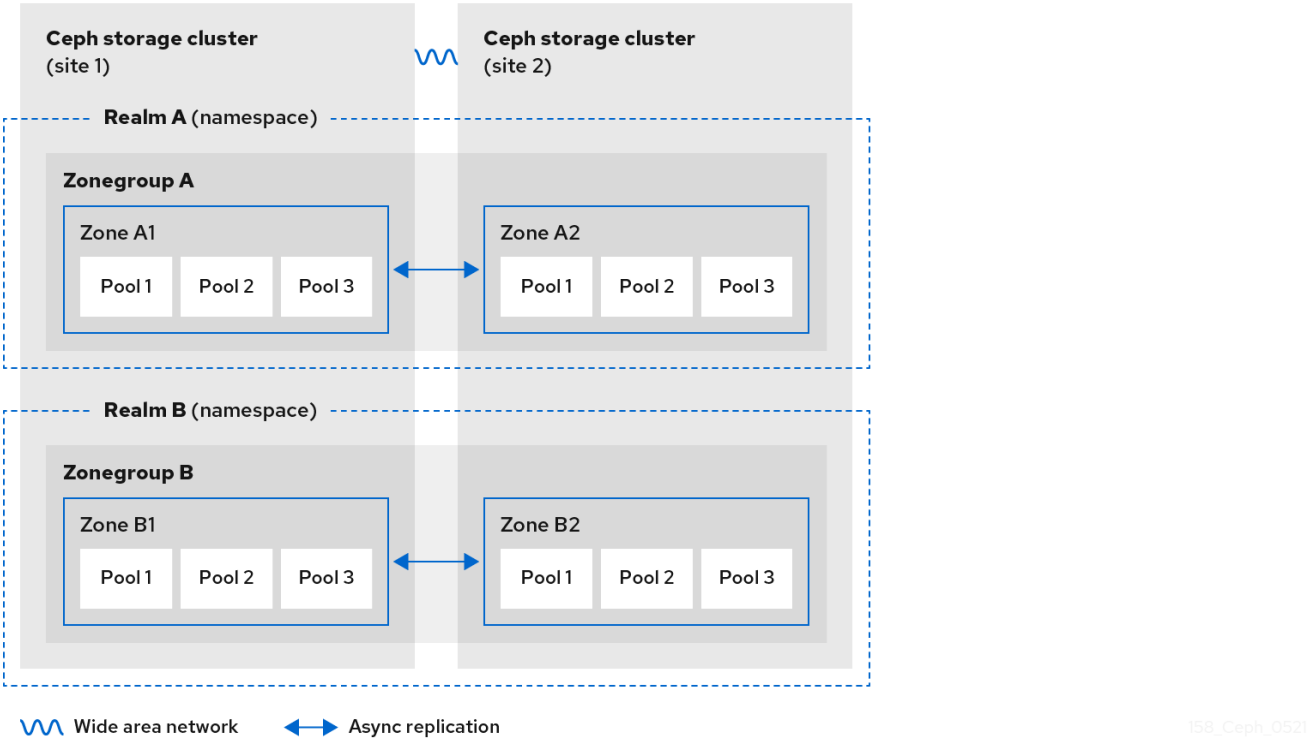
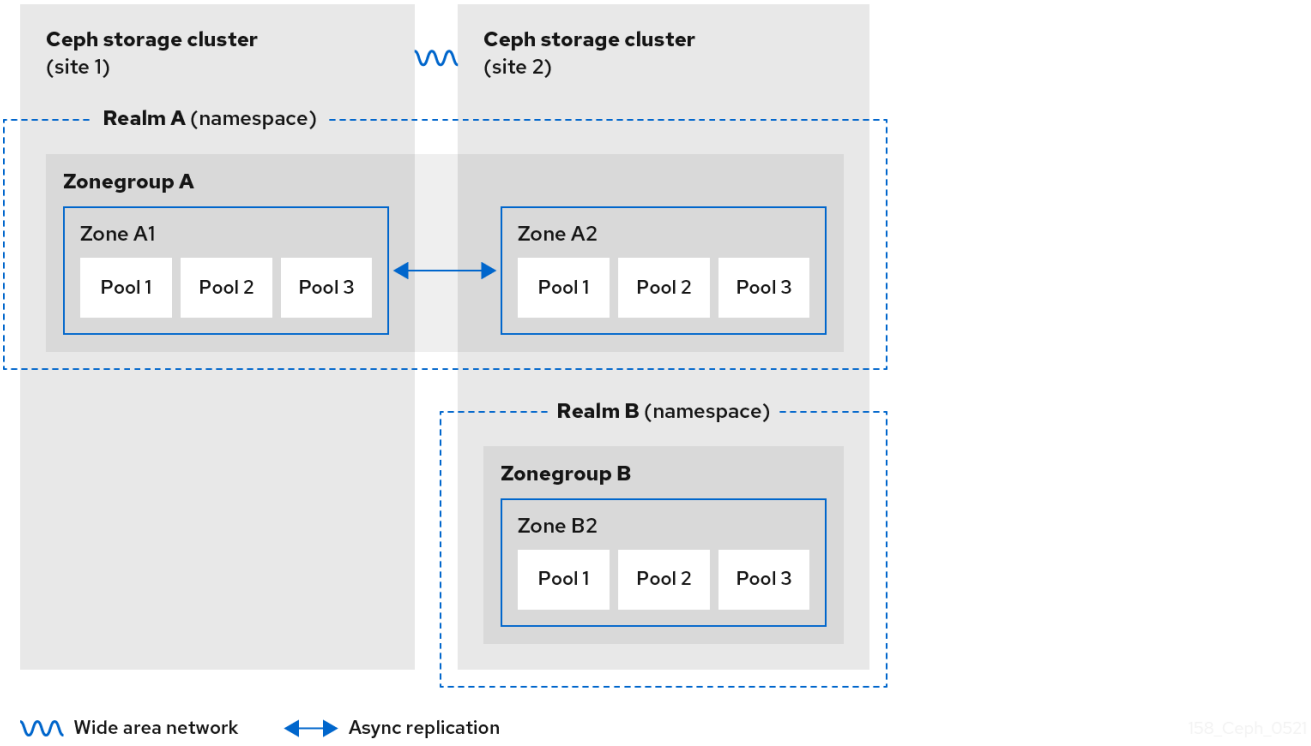


Figure 2.6. Two Realms Variant



2.7. CONSIDERING STORAGE SIZING

One of the most important factors in designing a cluster is to determine the storage requirements (sizing). Ceph Storage is designed to scale into petabytes and beyond. The following examples are common sizes for Ceph storage clusters.

- **Small:** 250 terabytes
- **Medium:** 1 petabyte
- **Large:** 2 petabytes or more

Sizing includes current needs and near future needs. Consider the rate at which the gateway client will add new data to the cluster. That can differ from use-case to use-case. For example, recording 4k videos or storing medical images can add significant amounts of data faster than less storage-intensive information, such as financial market data. Additionally, consider that the data durability methods, such as replication versus erasure coding, can have a significant impact on the storage media required.

For additional information on sizing, see the *Red Hat Ceph Storage Hardware Guide* and its associated links for selecting OSD hardware.

2.8. CONSIDERING STORAGE DENSITY

Another important aspect of Ceph's design, includes storage density. Generally, a storage cluster stores data across at least 10 nodes to ensure reasonable performance when replicating, backfilling, and recovery. If a node fails, with at least 10 nodes in the storage cluster, only 10% of the data has to move to the surviving nodes. If the number of nodes is substantially less, a higher percentage of the data must move to the surviving nodes. Additionally, the **full_ratio** and **near_full_ratio** options need to be set to accommodate a node failure to ensure that the storage cluster can write data. For this reason, it is important to consider storage density. Higher storage density is not necessarily a good idea.

Another factor that favors more nodes over higher storage density is erasure coding. When writing an object using erasure coding and using **node** as the minimum CRUSH failure domain, the Ceph storage cluster will need as many nodes as data and coding chunks. For example, a cluster using **k=8, m=3** should have at least 11 nodes so that each data or coding chunk is stored on a separate node.

Hot-swapping is also an important consideration. Most modern servers support drive hot-swapping. However, some hardware configurations require removing more than one drive to replace a drive. Red Hat recommends avoiding such configurations, because they can bring down more Ceph OSDs than required when swapping out failed disks.

2.9. CONSIDERING DISKS FOR THE CEPH MONITOR NODES

Ceph Monitors use **rocksdb**, which is sensitive to synchronous write latency. Red Hat strongly recommends using SSD disks to store the Ceph Monitor data. Choose SSD disks that have sufficient sequential write and throughput characteristics.

2.10. ADJUSTING BACKFILL AND RECOVERY SETTINGS

I/O is negatively impacted by both backfilling and recovery operations, leading to poor performance and unhappy end users. To help accommodate I/O demand during a cluster expansion or recovery, set the following options and values in the Ceph Configuration file:

```
[osd]
osd_max_backfills = 1
osd_recovery_max_active = 1
osd_recovery_op_priority = 1
```

2.11. ADJUSTING THE CLUSTER MAP SIZE

By default, the **ceph-osd** daemon caches 500 previous osdmaps. Even with deduplication, the map might consume a lot of memory per daemon. Tuning the cache size in the Ceph configuration might help reduce memory consumption significantly. For example:

```
[ceph: root@host01 /]# ceph config set global osd_map_message_max 10
[ceph: root@host01 /]# ceph config set osd osd_map_cache_size 20
[ceph: root@host01 /]# ceph config set osd osd_map_share_max_epochs 10
[ceph: root@host01 /]# ceph config set osd osd_pg_epoch_persisted_max_stale 10
```

For Red Hat Ceph Storage version 3 and later, the **ceph-manager** daemon handles PG queries, so the cluster map should not impact performance.

2.12. ADJUSTING SCRUBBING

By default, Ceph performs light scrubbing daily and deep scrubbing weekly. Light scrubbing checks object sizes and checksums to ensure that PGs are storing the same object data. Over time, disk sectors can go bad irrespective of object sizes and checksums. Deep scrubbing checks an object's content with that of its replicas to ensure that the actual contents are the same. In this respect, deep scrubbing ensures data integrity in the manner of **fsck**, but the procedure imposes an I/O penalty on the cluster. Even light scrubbing can impact I/O.

The default settings may allow Ceph OSDs to initiate scrubbing at inopportune times, such as peak operating times or periods with heavy loads. End users may experience latency and poor performance when scrubbing operations conflict with end user operations.

To prevent end users from experiencing poor performance, Ceph provides a number of scrubbing settings that can limit scrubbing to periods with lower loads or during off-peak hours. For details, see the *Scrubbing the OSD* section in the *Red Hat Ceph Storage Configuration Guide*.

If the cluster experiences high loads during the day and low loads late at night, consider restricting scrubbing to night time hours. For example:

```
[osd]
osd_scrub_begin_hour = 23   #23:01H, or 10:01PM.
osd_scrub_end_hour = 6      #06:01H or 6:01AM.
```

If time constraints aren't an effective method of determining a scrubbing schedule, consider using the **osd_scrub_load_threshold**. The default value is **0.5**, but it could be modified for low load conditions. For example:

```
[osd]
osd_scrub_load_threshold = 0.25
```

2.13. INCREASE OBJECTER_INFLIGHT_OPS

To improve scalability, you can edit the value of the **objecter_inflight_ops** parameter, which specifies the maximum number of unsent I/O requests allowed. This parameter is used for client traffic control.

```
objecter_inflight_ops = 24576
```

2.14. INCREASE RGW_THREAD_POOL_SIZE

To improve scalability, you can edit the value of the **rgw_thread_pool_size** parameter, which is the size of the thread pool. The new **beast** frontend is not restricted by the thread pool size to accept new connections.

```
rgw_thread_pool_size = 512
```

2.15. TUNING CONSIDERATIONS FOR THE LINUX KERNEL WHEN RUNNING CEPH

Production Red Hat Ceph Storage clusters generally benefit from tuning the operating system, specifically around limits and memory allocation. Ensure that adjustments are set for all hosts within the storage cluster. You can also open a case with Red Hat support asking for additional guidance.

Increase the File Descriptors

The Ceph Object Gateway can hang if it runs out of file descriptors. You can modify the **/etc/security/limits.conf** file on Ceph Object Gateway hosts to increase the file descriptors for the Ceph Object Gateway.

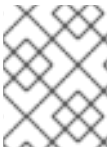
```
ceph      soft    nofile     unlimited
```

Adjusting the ulimit value for Large Storage Clusters

When running Ceph administrative commands on large storage clusters, for example, with 1024 Ceph OSDs or more, create an **/etc/security/limits.d/50-ceph.conf** file on each host that runs administrative commands with the following contents:

```
USER_NAME      soft    nproc     unlimited
```

Replace *USER_NAME* with the name of the non-root user account that runs the Ceph administrative commands.



NOTE

The root user's **ulimit** value is already set to **unlimited** by default on Red Hat Enterprise Linux.

Additional Resources

- For more details about Ceph's various internal components and the strategies around those components, see the *Red Hat Ceph Storage Storage Strategies Guide*.

CHAPTER 3. DEPLOYMENT

As a storage administrator, you can deploy the Ceph Object Gateway using the Ceph Orchestrator with the command line interface or the service specification. You can also configure multi-site Ceph Object Gateways, and remove the Ceph Object Gateway using the Ceph Orchestrator.

The **cephadm** command deploys the Ceph Object Gateway as a collection of daemons that manages a single-cluster deployment or a particular realm and zone in a multi-site deployment.

NOTE

With **cephadm**, the Ceph Object Gateway daemons are configured using the Ceph Monitor configuration database instead of the **ceph.conf** file or the command line options. If the configuration is not in the **client.rgw** section, then the Ceph Object Gateway daemons start up with default settings and bind to port **80**.

This section covers the following administrative tasks:

- *Deploying the Ceph Object Gateway using the command line interface .*
- *Deploying the Ceph Object Gateway using the service specification .*
- *Deploying a multi-site Ceph Object Gateway using the Ceph Orchestrator .*
- *Removing the Ceph Object Gateway using the Ceph Orchestrator .*
- *Using the Ceph Manager **rgw** module.*

Prerequisites

- A running, and healthy Red Hat Ceph Storage cluster.
- Root-level access to all the nodes.
- Available nodes on the storage cluster.
- All the managers, monitors, and OSDs are deployed in the storage cluster.

3.1. DEPLOYING THE CEPH OBJECT GATEWAY USING THE COMMAND LINE INTERFACE

Using the Ceph Orchestrator, you can deploy the Ceph Object Gateway with the **ceph orch** command in the command line interface.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to all the nodes.
- Hosts are added to the cluster.
- All manager, monitor and OSD daemons are deployed.

Procedure

1. Log into the Cephadm shell:

   Example

   ```
   [root@host01 ~]# cephadm shell
   ```

2. You can deploy the Ceph object gateway daemons in three different ways:

Method 1

- Create realm, zone group, zone, and then use the placement specification with the host name:

  a. Create a realm:

  Syntax

  ```
  radosgw-admin realm create --rgw-realm=REALM_NAME --default
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin realm create --rgw-realm=test_realm --default
  ```

  b. Create a zone group:

  Syntax

  ```
  radosgw-admin zonegroup create --rgw-zonegroup=ZONE_GROUP_NAME  --master --default
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin zonegroup create --rgw-zonegroup=default  --master --default
  ```

  c. Create a zone:

  Syntax

  ```
  radosgw-admin zone create --rgw-zonegroup=ZONE_GROUP_NAME --rgw-zone=ZONE_NAME --master --default
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin zone create --rgw-zonegroup=default --rgw-zone=test_zone --master --default
  ```

  d. Commit the changes:

  Syntax

```
radosgw-admin period update --rgw-realm=REALM_NAME --commit
```

Example

```
[ceph: root@host01 /]# radosgw-admin period update --rgw-realm=test_realm --commit
```

e. Run the **ceph orch apply** command:

Syntax

```
ceph orch apply rgw NAME [--realm=REALM_NAME] [--zone=ZONE_NAME] [--
zonegroup=ZONE_GROUP_NAME] --placement="NUMBER_OF_DAEMONS
[HOST_NAME_1 HOST_NAME_2]"
```

Example

```
[ceph: root@host01 /]# ceph orch apply rgw test --realm=test_realm --zone=test_zone --
zonegroup=default --placement="2 host01 host02"
```

Method 2

- Use an arbitrary service name to deploy two Ceph Object Gateway daemons for a single cluster deployment:

Syntax

```
ceph orch apply rgw SERVICE_NAME
```

Example

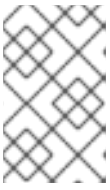
```
[ceph: root@host01 /]# ceph orch apply rgw foo
```

Method 3

- Use an arbitrary service name on a labeled set of hosts:

Syntax

```
ceph orch host label add HOST_NAME_1 LABEL_NAME
ceph orch host label add HOSTNAME_2 LABEL_NAME
ceph orch apply rgw SERVICE_NAME --placement="label:LABEL_NAME count-per-
host:NUMBER_OF_DAEMONS" --port=8000
```



NOTE

NUMBER_OF_DAEMONS controls the number of Ceph object gateways deployed on each host. To achieve the highest performance without incurring an additional cost, set this value to 2.

Example

```
[ceph: root@host01 /]# ceph orch host label add host01 rgw  # the 'rgw' label can be anything
[ceph: root@host01 /]# ceph orch host label add host02 rgw
[ceph: root@host01 /]# ceph orch apply rgw foo --placement="label:rgw count-per-host:2" --
port=8000
```

Verification

- List the service:

  Example

  ```
  [ceph: root@host01 /]# ceph orch ls
  ```

- List the hosts, daemons, and processes:

  Syntax

  ```
  ceph orch ps --daemon_type=DAEMON_NAME
  ```

  Example

  ```
  [ceph: root@host01 /]# ceph orch ps --daemon_type=rgw
  ```

3.2. DEPLOYING THE CEPH OBJECT GATEWAY USING THE SERVICE SPECIFICATION

You can deploy the Ceph Object Gateway using the service specification with either the default or the custom realms, zones, and zone groups.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to the bootstrapped host.
- Hosts are added to the cluster.
- All manager, monitor, and OSD daemons are deployed.

Procedure

1. As a root user, create a specification file:

   Example

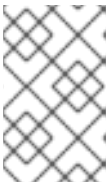
   ```
   [root@host01 ~]# touch radosgw.yml
   ```

2. Edit the **radosgw.yml** file to include the following details for the default realm, zone, and zone group:

   Syntax

   ```
   
   ```

```
service_type: rgw
service_id: REALM_NAME.ZONE_NAME
placement:
  hosts:
  - HOST_NAME_1
  - HOST_NAME_2
  count_per_host: NUMBER_OF_DAEMONS
spec:
  rgw_realm: REALM_NAME
  rgw_zone: ZONE_NAME
  rgw_zonegroup: ZONE_GROUP_NAME
  rgw_frontend_port: FRONT_END_PORT
networks:
  -  NETWORK_CIDR # Ceph Object Gateway service binds to a specific network
```



NOTE

NUMBER_OF_DAEMONS controls the number of Ceph Object Gateways deployed on each host. To achieve the highest performance without incurring an additional cost, set this value to 2.

Example

```
service_type: rgw
service_id: default
placement:
  hosts:
  - host01
  - host02
  - host03
  count_per_host: 2
spec:
  rgw_realm: default
  rgw_zone: default
  rgw_zonegroup: default
  rgw_frontend_port: 1234
networks:
  - 192.169.142.0/24
```

3. Optional: For custom realm, zone, and zone group, create the resources and then create the **radosgw.yml** file:

   a. Create the custom realm, zone, and zone group:

   Example

   ```
   [root@host01 ~]# radosgw-admin realm create --rgw-realm=test_realm --default
   [root@host01 ~]# radosgw-admin zonegroup create --rgw-zonegroup=test_zonegroup --default
   [root@host01 ~]# radosgw-admin zone create --rgw-zonegroup=test_zonegroup --rgw-zone=test_zone --default
   [root@host01 ~]# radosgw-admin period update --rgw-realm=test_realm --commit
   ```

   b. Create the **radosgw.yml** file with the following details:

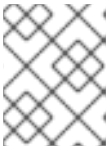
Example

```
service_type: rgw
service_id: test_realm.test_zone
placement:
  hosts:
  - host01
  - host02
  - host03
  count_per_host: 2
spec:
  rgw_realm: test_realm
  rgw_zone: test_zone
  rgw_zonegroup: test_zonegroup
  rgw_frontend_port: 1234
networks:
  - 192.169.142.0/24
```

4. Mount the **radosgw.yml** file under a directory in the container:

Example

```
[root@host01 ~]# cephadm shell --mount radosgw.yml:/var/lib/ceph/radosgw/radosgw.yml
```



NOTE

Every time you exit the shell, you have to mount the file in the container before deploying the daemon.

5. Deploy the Ceph Object Gateway using the service specification:

Syntax

```
ceph orch apply -i FILE_NAME.yml
```

Example

```
[ceph: root@host01 /]# ceph orch apply -i /var/lib/ceph/radosgw/radosgw.yml
```

Verification

- List the service:

Example

```
[ceph: root@host01 /]# ceph orch ls
```

- List the hosts, daemons, and processes:

Syntax

```
ceph orch ps --daemon_type=DAEMON_NAME
```

-

Example

```
[ceph: root@host01 /]# ceph orch ps --daemon_type=rgw
```

3.3. DEPLOYING A MULTI-SITE CEPH OBJECT GATEWAY USING THE CEPH ORCHESTRATOR

Ceph Orchestrator supports multi-site configuration options for the Ceph Object Gateway.

You can configure each object gateway to work in an active-active zone configuration allowing writes to a non-primary zone. The multi-site configuration is stored within a container called a realm.

The realm stores zone groups, zones, and a time period. The **rgw** daemons handle the synchronization eliminating the need for a separate synchronization agent, thereby operating with an active-active configuration.

You can also deploy multi-site zones using the command line interface (CLI).

NOTE

The following configuration assumes at least two Red Hat Ceph Storage clusters are in geographically separate locations. However, the configuration also works on the same site.

Prerequisites

- At least two running Red Hat Ceph Storage clusters.
- At least two Ceph Object Gateway instances, one for each Red Hat Ceph Storage cluster.
- Root-level access to all the nodes.
- Nodes or containers are added to the storage cluster.
- All Ceph Manager, Monitor and OSD daemons are deployed.

Procedure

1. In the **cephadm** shell, configure the primary zone:
   a. Create a realm:

      Syntax

      ```
      radosgw-admin realm create --rgw-realm=REALM_NAME --default
      ```

      Example

      ```
      [ceph: root@host01 /]# radosgw-admin realm create --rgw-realm=test_realm --default
      ```

      If the storage cluster has a single realm, then specify the **--default** flag.

b. Create a primary zone group:

Syntax

```
radosgw-admin zonegroup create --rgw-zonegroup=ZONE_GROUP_NAME --endpoints=http://RGW_PRIMARY_HOSTNAME:RGW_PRIMARY_PORT_NUMBER_1 --master --default
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup create --rgw-zonegroup=us --endpoints=http://rgw1:80 --master --default
```

c. Create a primary zone:

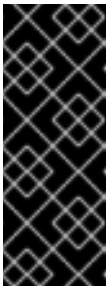
Syntax

```
radosgw-admin zone create --rgw-zonegroup=PRIMARY_ZONE_GROUP_NAME --rgw-zone=PRIMARY_ZONE_NAME --endpoints=http://RGW_PRIMARY_HOSTNAME:RGW_PRIMARY_PORT_NUMBER_1 --access-key=SYSTEM_ACCESS_KEY --secret=SYSTEM_SECRET_KEY
```

Example

```
[ceph: root@host01 /]# radosgw-admin zone create --rgw-zonegroup=us --rgw-zone=us-east-1 --endpoints=http://rgw1:80 --access-key=LIPEYZJLTWXRKXS9LPJC --secret-key=IsAje0AVDNXNw48LjMAimpCpI7VaxJYSnfD0FFKQ
```

d. Optional: Delete the default zone, zone group, and the associated pools.



IMPORTANT

Do not delete the default zone and its pools if you are using the default zone and zone group to store data. Also, removing the default zone group deletes the system user.

To access old data in the **default** zone and zonegroup, use **--rgw-zone default** and **--rgw-zonegroup default** in **radosgw-admin** commands.

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup delete --rgw-zonegroup=default
[ceph: root@host01 /]# ceph osd pool rm default.rgw.log default.rgw.log --yes-i-really-really-mean-it
[ceph: root@host01 /]# ceph osd pool rm default.rgw.meta default.rgw.meta --yes-i-really-really-mean-it
[ceph: root@host01 /]# ceph osd pool rm default.rgw.control default.rgw.control --yes-i-really-really-mean-it
[ceph: root@host01 /]# ceph osd pool rm default.rgw.data.root default.rgw.data.root --yes-i-really-really-mean-it
[ceph: root@host01 /]# ceph osd pool rm default.rgw.gc default.rgw.gc --yes-i-really-really-mean-it
```

e. Create a system user:

Syntax

```
radosgw-admin user create --uid=USER_NAME --display-name="USER_NAME" --
access-key=SYSTEM_ACCESS_KEY --secret=SYSTEM_SECRET_KEY --system
```

Example

```
[ceph: root@host01 /]# radosgw-admin user create --uid=zone.user --display-
name="Zone user" --system
```

Make a note of the **access_key** and **secret_key**.

f. Add the access key and system key to the primary zone:

Syntax

```
radosgw-admin zone modify --rgw-zone=PRIMARY_ZONE_NAME --access-
key=ACCESS_KEY --secret=SECRET_KEY
```

Example

```
[ceph: root@host01 /]# radosgw-admin zone modify --rgw-zone=us-east-1 --access-
key=NE48APYCAODEPLKBCZVQ--
secret=u24GHQWRE3yxxNBnFBzjM4jn14mFIckQ4EKL6LoW
```

g. Commit the changes:

Syntax

```
radosgw-admin period update --commit
```

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

h. Outside the **cephadm** shell, fetch the **FSID** of the storage cluster and the processes:

Example

```
[root@host01 ~]#  systemctl list-units | grep ceph
```

i. Start the Ceph Object Gateway daemon:

Syntax

```
systemctl start ceph-FSID@DAEMON_NAME
systemctl enable ceph-FSID@DAEMON_NAME
```

Example

```
[root@host01 ~]# systemctl start ceph-62a081a6-88aa-11eb-a367-
001a4a000672@rgw.test_realm.us-east-1.host01.ahdtsw.service
[root@host01 ~]# systemctl enable ceph-62a081a6-88aa-11eb-a367-
001a4a000672@rgw.test_realm.us-east-1.host01.ahdtsw.service
```

2. In the Cephadm shell, configure the secondary zone.

   a. Pull the primary realm configuration from the host:

      Syntax

      ```
      radosgw-admin realm pull --rgw-realm=PRIMARY_REALM --
      url=URL_TO_PRIMARY_ZONE_GATEWAY --access-key=ACCESS_KEY --secret-
      key=SECRET_KEY --default
      ```

      Example

      ```
      [ceph: root@host04 /]# radosgw-admin realm pull --rgw-realm=test_realm --
      url=http://10.74.249.26:80 --access-key=LIPEYZJLTWXRKXS9LPJC --secret-
      key=IsAje0AVDNXNw48LjMAimpCpI7VaxJYSnfD0FFKQ --default
      ```

   b. Pull the primary period configuration from the host:

      Syntax

      ```
      radosgw-admin period pull --url=URL_TO_PRIMARY_ZONE_GATEWAY --access-
      key=ACCESS_KEY --secret-key=SECRET_KEY
      ```

      Example

      ```
      [ceph: root@host04 /]# radosgw-admin period pull --url=http://10.74.249.26:80 --access-
      key=LIPEYZJLTWXRKXS9LPJC --secret-
      key=IsAje0AVDNXNw48LjMAimpCpI7VaxJYSnfD0FFKQ
      ```

   c. Configure a secondary zone:

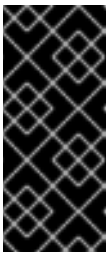
      Syntax

      ```
      radosgw-admin zone create --rgw-zonegroup=ZONE_GROUP_NAME \
                --rgw-zone=SECONDARY_ZONE_NAME --
      endpoints=http://RGW_SECONDARY_HOSTNAME:RGW_PRIMARY_PORT_NUMBER
      _1 \
                --access-key=SYSTEM_ACCESS_KEY --secret=SYSTEM_SECRET_KEY \
                --endpoints=http://FQDN:80 \
                [--read-only]
      ```

      Example

      ```
      [ceph: root@host04 /]# radosgw-admin zone create --rgw-zonegroup=us --rgw-zone=us-
      east-2 --endpoints=http://rgw2:80 --access-key=LIPEYZJLTWXRKXS9LPJC --secret-
      key=IsAje0AVDNXNw48LjMAimpCpI7VaxJYSnfD0FFKQ
      ```

d. Optional: Delete the default zone.



IMPORTANT

Do not delete the default zone and its pools if you are using the default zone and zone group to store data.

To access old data in the **default** zone and zonegroup, use **--rgw-zone default** and **--rgw-zonegroup default** in **radosgw-admin** commands.

Example

```
[ceph: root@host04 /]# radosgw-admin zone rm --rgw-zone=default
[ceph: root@host04 /]# ceph osd pool rm default.rgw.log default.rgw.log --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.meta default.rgw.meta --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.control default.rgw.control --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.data.root default.rgw.data.root --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.gc default.rgw.gc --yes-i-really-really-mean-it
```

e. Update the Ceph configuration database:

Syntax

```
ceph config set SERVICE_NAME rgw_zone SECONDARY_ZONE_NAME
```

Example

```
[ceph: root@host04 /]# ceph config set rgw rgw_zone us-east-2
```

f. Commit the changes:

Syntax

```
radosgw-admin period update --commit
```

Example

```
[ceph: root@host04 /]# radosgw-admin period update --commit
```

g. Outside the Cephadm shell, fetch the FSID of the storage cluster and the processes:

Example

```
[root@host04 ~]#  systemctl list-units | grep ceph
```

h. Start the Ceph Object Gateway daemon:

Syntax

```
systemctl start ceph-FSID@DAEMON_NAME
systemctl enable ceph-FSID@DAEMON_NAME
```

Example

```
[root@host04 ~]# systemctl start ceph-62a081a6-88aa-11eb-a367-001a4a000672@rgw.test_realm.us-east-2.host04.ahdtsw.service
[root@host04 ~]# systemctl enable ceph-62a081a6-88aa-11eb-a367-001a4a000672@rgw.test_realm.us-east-2.host04.ahdtsw.service
```

3. Optional: Deploy multi-site Ceph Object Gateways using the placement specification:

Syntax

```
ceph orch apply rgw NAME --realm=REALM_NAME --zone=PRIMARY_ZONE_NAME --placement="NUMBER_OF_DAEMONS HOST_NAME_1 HOST_NAME_2"
```

Example

```
[ceph: root@host04 /]# ceph orch apply rgw east --realm=test_realm --zone=us-east-1 --placement="2 host01 host02"
```

Verification

- Check the synchronization status to verify the deployment:

Example

```
[ceph: root@host04 /]# radosgw-admin sync status
```

3.4. REMOVING THE CEPH OBJECT GATEWAY USING THE CEPH ORCHESTRATOR

You can remove the Ceph object gateway daemons using the **ceph orch rm** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to all the nodes.
- Hosts are added to the cluster.
- At least one Ceph object gateway daemon deployed on the hosts.

Procedure

1. Log into the Cephadm shell:

Example

```
[root@host01 ~]# cephadm shell
```

2. List the service:

Example

```
[ceph: root@host01 /]# ceph orch ls
```

3. Remove the service:

Syntax

```
ceph orch rm SERVICE_NAME
```

Example

```
[ceph: root@host01 /]# ceph orch rm rgw.test_realm.test_zone_bb
```

Verification

- List the hosts, daemons, and processes:

Syntax

```
ceph orch ps
```

Example

```
[ceph: root@host01 /]# ceph orch ps
```

Additional Resources

- See *Deploying the Ceph object gateway using the command line interface* section in the *Red Hat Ceph Storage Operations Guide* for more information.
- See *Deploying the Ceph object gateway using the service specification* section in the *Red Hat Ceph Storage Operations Guide* for more information.

3.5. USING THE CEPH MANAGER RGW MODULE

As a storage administrator, you can deploy Ceph Object Gateway, single site and multi-site, using the **rgw** module. It helps with bootstrapping and configuring Ceph Object realm, zonegroup, and the different related entities.

You can use the available tokens for the newly created or existing realms. This token is a base64 string that encapsulates the realm information and its master zone endpoint authentication data.

In a multi-site configuration, these tokens can be used to pull a realm to create a secondary zone on a different cluster that syncs with the master zone on the primary cluster by using the **rgw zone create** command.

3.5.1. Deploying Ceph Object Gateway using the rgw module

Bootstrapping Ceph Object Gateway realm creates a new realm entity, a new zonegroup, and a new zone. The **rgw** module instructs the orchestrator to create and deploy the corresponding Ceph Object Gateway daemons.

Enable the **rgw** module using the **ceph mgr module enable rgw** command. After enabling the **rgw** module, either pass the arguments in the command line or use the **yaml** specification file to bootstrap the realm.

Prerequisites

- A running Red Hat Ceph Storage cluster with at least one OSD deployed.

Procedure

1. Log into the Cephadm shell:

   Example

   ```
   [root@host01 ~]# cephadm shell
   ```

2. Enable the` rgw`module:

   Example

   ```
   [ceph: root@host01 /]# ceph mgr module enable rgw
   ```

3. Bootstrap the Ceph Object Gateway realm using either the command-line or the yaml specification file:

   - Option 1: Use the command-line interface:

     Syntax

     ```
     ceph rgw realm bootstrap [--realm name REALM_NAME] [--zonegroup-name ZONEGROUP_NAME] [--zone-name ZONE_NAME] [--port PORT_NUMBER] [--placement HOSTNAME] [--start-radosgw]
     ```

     Example

     ```
     [ceph: root@host01 /]# ceph rgw realm bootstrap --realm-name myrealm --zonegroup-name myzonegroup --zone-name myzone --port 5500 --placement="host01 host02" --start-radosgw
     Realm(s) created correctly. Please, use 'ceph rgw realm tokens' to get the token.
     ```

   - Option 2: Use the yaml specification file:

     a. As a root user, create the yaml file:

     Syntax

     ```
     rgw_realm: REALM_NAME
     ```

```
rgw_zonegroup: ZONEGROUP_NAME
rgw_zone: ZONE_NAME
placement:
  hosts:
   - HOSTNAME_1
   - HOSTNAME_2
```

Example

```
[root@host01 ~]# cat rgw.yaml

rgw_realm: myrealm
rgw_zonegroup: myzonegroup
rgw_zone: myzone
placement:
  hosts:
   - host01
   - host02
```

b. Mount the YAML file under a directory in the container:

Example

```
[root@host01 ~]# cephadm shell --mount rgw.yaml:/var/lib/ceph/rgw/rgw.yaml
```

c. Bootstrap the realm:

Example

```
[ceph: root@host01 /]# ceph rgw realm bootstrap -i /var/lib/ceph/rgw/rgw.yaml
```

NOTE

The specification file used by the **rgw** module has the same format as the one used by the orchestrator. Thus, you can provide any orchestration supported Ceph Object Gateway parameters including advanced configuration features such as SSL certificates.

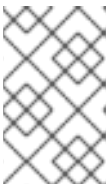
4. List the available tokens:

Example

```
[ceph: root@host01 /]# ceph rgw realm tokens | jq

[
  {
    "realm": "myrealm",
    "token":
"ewogICAgInJlYWxtX25hbWUiOiAibXlyZWFsbSIsCiAgICAicmVhbG1faWQiOiAiZDA3YzAwZW
YtOTA0MS00ZjZlLTg4MDQtN2Q0MDI0MDU1NmFlIiwKICAgICJlbmRwb2ludCI6ICJodHRwOi
8vdm0tMDA6NDMyMSIsCiAgICAiYWNjZXNzX2tleSI6ICI5NTY1VFZSMVFWTExFRzdVNFIxR
CIsCiAgICAic2VjcmV0IjogImQ3b0FJQXZrNEdYeXpyd3Q2QVZ6bEZNQmNnRG53RVdMMHF
```

```
DenE3cjUiCn1="
  }
]
```



NOTE

If you run the above command before the Ceph Object Gateway daemons get deployed, it displays a message that there are no tokens as there are no endpoints yet.

Verification

- Verify Object Gateway deployment:

  Example

```
[ceph: root@host01 /]# ceph orch list --daemon-type=rgw
NAME                                                HOST                        PORTS  STATUS
REFRESHED   AGE  MEM USE  MEM LIM  VERSION          IMAGE ID      CONTAINER ID
rgw.myrealm.myzonegroup.ceph-saya-6-osd-host01.eburst  ceph-saya-6-osd-host01  *:80
running (111m)     9m ago  111m    82.3M        -  17.2.6-22.el9cp  2d5b080de0b0
2f3eaca7e88e
```

3.5.2. Deploying Ceph Object Gateway multi-site using the rgw module

Bootstrapping Ceph Object Gateway realm creates a new realm entity, a new zonegroup, and a new zone. It configures a new system user that can be used for multi-site sync operations. The **rgw** module instructs the orchestrator to create and deploy the corresponding Ceph Object Gateway daemons.

Enable the **rgw** module using the **ceph mgr module enable rgw** command. After enabling the **rgw** module, either pass the arguments in the command line or use the **yaml** specification file to bootstrap the realm.

Prerequisites

- A running Red Hat Ceph Storage cluster with at least one OSD deployed.

Procedure

1. Log into the Cephadm shell:

   Example

```
[root@host01 ~]# cephadm shell
```

2. Enable the` rgw`module:

   Example

```
[ceph: root@host01 /]# ceph mgr module enable rgw
```

3. Bootstrap the Ceph Object Gateway realm using either the command-line or the yaml specification file:

- Option 1: Use the command-line interface:

  Syntax

  ```
  ceph rgw realm bootstrap [--realm name REALM_NAME] [--zonegroup-name
  ZONEGROUP_NAME] [--zone-name ZONE_NAME] [--port PORT_NUMBER] [--
  placement HOSTNAME] [--start-radosgw]
  ```

  Example

  ```
  [ceph: root@host01 /]# ceph rgw realm bootstrap --realm-name myrealm --zonegroup-
  name myzonegroup --zone-name myzone --port 5500 --placement="host01 host02" --
  start-radosgw
  Realm(s) created correctly. Please, use 'ceph rgw realm tokens' to get the token.
  ```

- Option 2: Use the yaml specification file:

  a. As a root user, create the yaml file:

  Syntax

  ```
  rgw_realm: REALM_NAME
  rgw_zonegroup: ZONEGROUP_NAME
  rgw_zone: ZONE_NAME
  placement:
    hosts:
     - HOSTNAME_1
     - HOSTNAME_2
  spec:
    rgw_frontend_port: PORT_NUMBER
  zone_endpoints: http://RGW_HOSTNAME_1:RGW_PORT_NUMBER_1,
  http://RGW_HOSTNAME_2:RGW_PORT_NUMBER_2
  ```

  Example

  ```
  [root@host01 ~]# cat rgw.yaml

  rgw_realm: myrealm
  rgw_zonegroup: myzonegroup
  rgw_zone: myzone
  placement:
    hosts:
     - host01
     - host02
  spec:
    rgw_frontend_port: 5500
  zone_endpoints: http://<rgw_host1>:<rgw_port1>, http://<rgw_host2>:<rgw_port2>
  ```

  b. Mount the YAML file under a directory in the container:

  Example

  ```
  [root@host01 ~]# cephadm shell --mount rgw.yaml:/var/lib/ceph/rgw/rgw.yaml
  ```

c. Bootstrap the realm:

Example

```
[ceph: root@host01 /]# ceph rgw realm bootstrap -i /var/lib/ceph/rgw/rgw.yaml
```

NOTE

The specification file used by the **rgw** module has the same format as the one used by the orchestrator. Thus, you can provide any orchestration supported Ceph Object Gateway parameters including advanced configuration features such as SSL certificates.

4. List the available tokens:

Example

```
[ceph: root@host01 /]# ceph rgw realm tokens | jq

[
  {
    "realm": "myrealm",
    "token":
"ewogICAgInJlYWxtX25hbWUiOiAibXlyZWFsbSIsCiAgICAicmVhbG1faWQiOiAiZDA3YzAwZW
YtOTA0MS00ZjZlLTg4MDQtN2Q0MDI0MDU1NmFlIiwKICAgICJlbmRwb2ludCI6ICJodHRwOi
8vdm0tMDA6NDMyMSIsCiAgICAiYWNjZXNzX2tleSI6ICI5NTY1VFZSMVFWTExFRzdVNFIxR
CIsCiAgICAic2VjcmV0IjogImQ3b0FJQXZrNEdYeXpyd3Q2QVZ6bEZNQmNnRG53RVdMMHF
DenE3cjUiCn1="
  }
]
```

NOTE

If you run the above command before the Ceph Object Gateway daemons get deployed, it displays a message that there are no tokens as there are no endpoints yet.

5. Create the secondary zone using these tokens and join the existing realms:

a. As a root user, create the yaml file:

Example

```
[root@host01 ~]# cat zone-spec.yaml
rgw_zone: my-secondary-zone
rgw_realm_token: <token>
placement:
  hosts:
   - ceph-node-1
   - ceph-node-2
spec:
  rgw_frontend_port: 5500
```

b. Mount the **zone-spec.yaml** file under a directory in the container:

Example

```
[root@host01 ~]# cephadm shell --mount zone-spec.yaml:/var/lib/ceph/radosgw/zone-spec.yaml
```

c. Enable the ` rgw `module on the secondary zone:

Example

```
[ceph: root@host01 /]# ceph mgr module enable rgw
```

d. Create the secondary zone:

Example

```
[ceph: root@host01 /]# ceph rgw zone create -i /var/lib/ceph/radosgw/zone-spec.yaml
```

Verification

- Verify Object Gateway multi-site deployment:

Example

```
[ceph: root@host01 /]# radosgw-admin realm list
{
"default_info": "d07c00ef-9041-4f6e-8804-7d40240556ae",
"realms": [
"myrealm"
]
}
```

CHAPTER 4. BASIC CONFIGURATION

As a storage administrator, learning the basics of configuring the Ceph Object Gateway is important. You can learn about the defaults and the embedded web server called Beast. For troubleshooting issues with the Ceph Object Gateway, you can adjust the logging and debugging output generated by the Ceph Object Gateway. Also, you can provide a High-Availability proxy for storage cluster access using the Ceph Object Gateway.

Prerequisites

- A running, and healthy Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software package.

4.1. ADD A WILDCARD TO THE DNS

You can add the wildcard such as hostname to the DNS record of the DNS server.

Prerequisite

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway installed.
- Root-level access to the admin node.

Procedure

1. To use Ceph with S3-style subdomains, add a wildcard to the DNS record of the DNS server that the **ceph-radosgw** daemon uses to resolve domain names:

   Syntax

   ```
   bucket-name.domain-name.com
   ```

   For **dnsmasq**, add the following address setting with a dot (.) prepended to the host name:

   Syntax

   ```
   address=/.HOSTNAME_OR_FQDN/HOST_IP_ADDRESS
   ```

   Example

   ```
   address=/.gateway-host01/192.168.122.75
   ```

   For **bind**, add a wildcard to the DNS record:

   Example

   ```
   $TTL    604800
   @       IN      SOA     gateway-host01. root.gateway-host01. (
                                 2         ; Serial
                            604800         ; Refresh
   ```

```
                    86400         ; Retry
                   2419200         ; Expire
                    604800 )       ; Negative Cache TTL
;
@       IN      NS      gateway-host01.
@       IN      A       192.168.122.113
*       IN      CNAME   @
```

2. Restart the DNS server and ping the server with a subdomain to ensure that the **ceph-radosgw** daemon can process the subdomain requests:

   Syntax

   ```
   ping mybucket.HOSTNAME
   ```

   Example

   ```
   [root@host01 ~]# ping mybucket.gateway-host01
   ```

3. If the DNS server is on the local machine, you might need to modify /**etc**/**resolv.conf** by adding a nameserver entry for the local machine.

4. Add the host name in the Ceph Object Gateway zone group:

   a. Get the zone group:

      Syntax

      ```
      radosgw-admin zonegroup get --rgw-zonegroup=ZONEGROUP_NAME > zonegroup.json
      ```

      Example

      ```
      [ceph: root@host01 /]# radosgw-admin zonegroup get --rgw-zonegroup=us > zonegroup.json
      ```

   b. Take a back-up of the JSON file:

      Example

      ```
      [ceph: root@host01 /]# cp zonegroup.json zonegroup.backup.json
      ```

   c. View the **zonegroup.json** file:

      Example

      ```
      [ceph: root@host01 /]# cat zonegroup.json
      {
          "id": "d523b624-2fa5-4412-92d5-a739245f0451",
          "name": "asia",
          "api_name": "asia",
          "is_master": "true",
          "endpoints": [],
      ```

```
    "hostnames": [],
    "hostnames_s3website": [],
    "master_zone": "d2a3b90f-f4f3-4d38-ac1f-6463a2b93c32",
    "zones": [
        {
            "id": "d2a3b90f-f4f3-4d38-ac1f-6463a2b93c32",
            "name": "india",
            "endpoints": [],
            "log_meta": "false",
            "log_data": "false",
            "bucket_index_max_shards": 11,
            "read_only": "false",
            "tier_type": "",
            "sync_from_all": "true",
            "sync_from": [],
            "redirect_zone": ""
        }
    ],
    "placement_targets": [
        {
            "name": "default-placement",
            "tags": [],
            "storage_classes": [
                "STANDARD"
            ]
        }
    ],
    "default_placement": "default-placement",
    "realm_id": "d7e2ad25-1630-4aee-9627-84f24e13017f",
    "sync_policy": {
        "groups": []
    }
}
```

d. Update the **zonegroup.json** file with new host name:

Example

```
"hostnames": ["host01", "host02","host03"],
```

e. Set the zone group back in the Ceph Object Gateway:

Syntax

```
radosgw-admin zonegroup set --rgw-zonegroup=ZONEGROUP_NAME --
infile=zonegroup.json
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup set --rgw-zonegroup=us --
infile=zonegroup.json
```

f. Update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

g. Restart the Ceph Object Gateway so that the DNS setting takes effect.

Additional Resources

- See the *The Ceph configuration database* section in the *Red Hat Ceph Storage Configuration Guide* for more details.

4.2. THE BEAST FRONT-END WEB SERVER

The Ceph Object Gateway provides Beast, a C/C embedded front-end web server. Beast uses the `Boost.Beast` C library to parse HTTP, and **Boost.Asio** for asynchronous network I/O.

Additional Resources

- Boost C++ Libraries

4.3. BEAST CONFIGURATION OPTIONS

The following Beast configuration options can be passed to the embedded web server in the Ceph configuration file for the RADOS Gateway. Each option has a default value. If a value is not specified, the default value is empty.

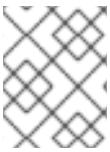
Option	Description	Default
endpoint and **ssl_endpoint**	Sets the listening address in the form **address[:port]** where the address is an IPv4 address string in dotted decimal form, or an IPv6 address in hexadecimal notation surrounded by square brackets. The optional port defaults to **8080** for **endpoint** and **443** for **ssl_endpoint**. It can be specified multiple times as in **endpoint=[::1] endpoint=192.168.0.100:8000**.	EMPTY
ssl_certificate	Path to the SSL certificate file used for SSL-enabled endpoints.	EMPTY
ssl_private_key	Optional path to the private key file used for SSL-enabled endpoints. If one is not given the file specified by **ssl_certificate** is used as the private key.	EMPTY
tcp_nodelay	Performance optimization in some environments.	EMPTY

Example /etc/ceph/ceph.conf file with Beast options using SSL:

```
...

[client.rgw.node1]
```

```
rgw frontends = beast ssl_endpoint=192.168.0.100:443 ssl_certificate=<path to SSL certificate>
```



NOTE

By default, the Beast front end writes an access log line recording all requests processed by the server to the RADOS Gateway log file.

Additional Resources

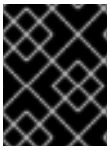
- See Using the Beast front end for more information.

4.4. CONFIGURING SSL FOR BEAST

You can configure the Beast front-end web server to use the OpenSSL library to provide Transport Layer Security (TLS). To use Secure Socket Layer (SSL) with Beast, you need to obtain a certificate from a Certificate Authority (CA) that matches the hostname of the Ceph Object Gateway node. Beast also requires the secret key, server certificate, and any other CA in a single **.pem** file.

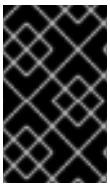
IMPORTANT

Prevent unauthorized access to the **.pem** file, because it contains the secret key hash.



IMPORTANT

Red Hat recommends obtaining a certificate from a CA with the Subject Alternative Name (SAN) field, and a wildcard for use with S3-style subdomains.



IMPORTANT

Red Hat recommends only using SSL with the Beast front-end web server for small to medium sized test environments. For production environments, you must use HAProxy and **keepalived** to terminate the SSL connection at the HAProxy.

If the Ceph Object Gateway acts as a client and a custom certificate is used on the server, set the **rgw_verify_ssl** parameter to **false** because injecting a custom CA to Ceph Object Gateways is currently unavailable.

Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_verify_ssl false
```

Prerequisites

- A running, and healthy Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software package.
- Installation of the OpenSSL software package.
- Root-level access to the Ceph Object Gateway node.

Procedure

1. Create a new file named **rgw.yml** in the current directory:

   Example

   ```
   [ceph: root@host01 /]# touch rgw.yml
   ```

2. Open the **rgw.yml** file for editing, and customize it for the environment:

   Syntax

   ```
   service_type: rgw
   service_id: SERVICE_ID
   service_name: SERVICE_NAME
   placement:
     hosts:
     - HOST_NAME
   spec:
     ssl: true
     rgw_frontend_ssl_certificate: CERT_HASH
   ```

   Example

   ```
   service_type: rgw
   service_id: foo
   service_name: rgw.foo
   placement:
     hosts:
     - host01
   spec:
     ssl: true
     rgw_frontend_ssl_certificate: |
       -----BEGIN RSA PRIVATE KEY-----
       MIIEpAIBAAKCAQEA+Cf4l9OagD6x67HhdCy4Asqw89Zz9ZuGbH50/7ltIMQpJJU0
       gu9ObNtIoC0zabJ7n1jujueYgIpOqGnhRSvsGJiEkgN81NLQ9rqAVaGpadjrNLcM
       bpgqJCZj0vzzmtFBCtenpb5l/EccMFcAydGtGeLP33SaWiZ4Rne56GBInk6SATI/
       JSKweGD1y5GiAWipBR4C74HiAW9q6hCOuSdp/2WQxWT3T1j2sjlqxkHdtInUtwOm
       j5Ism276IndeQ9hR3reFR8PJnKIPx73oTBQ7p9CMR1J4ucq9Ny0J12wQYT00fmJp
       -----END RSA PRIVATE KEY-----
       -----BEGIN CERTIFICATE-----
       MIIEBTCCAu2gAwIBAgIUGfYFsj8HyA9Zv2l600hxzT8+gG4wDQYJKoZIhvcNAQEL

   BQAwgYkxCzAJBgNVBAYTAklOMQwwCgYDVQQIDANLQVIxDDAKBgNVBAcMA0JMUjEM

   MAoGA1UECgwDUkhUMQswCQYDVQQLDAJCVTEkMCIGA1UEAwwbY2VwaC1zc2wtcmhj
       czUtOGRjeHY2LW5vZGU1MR0wGwYJKoZIhvcNAQkBFg5hYmNAcmVkaGF0LmNvbTAe
       -----END CERTIFICATE-----
   ```

3. Deploy the Ceph Object Gateway using the service specification file:

   Example

   ```
   [ceph: root@host01 /]# ceph orch apply -i rgw.yml
   ```

4.5. D3N DATA CACHE

Datacenter-Data-Delivery Network (D3N) uses high-speed storage, such as **NVMe**, to cache datasets on the access side. Such caching allows big data jobs to use the compute and fast-storage resources available on each Rados Gateway node at the edge. The Rados Gateways act as cache servers for the back-end object store (OSDs), storing data locally for reuse.

NOTE

Each time the Rados Gateway is restarted the content of the cache directory is purged.

4.5.1. Adding D3N cache directory

To enable D3N cache on RGW, you need to also include the D3N cache directory in **podman unit.run**.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway installed.
- Root-level access to the admin node.
- A fast NVMe drive in each RGW node to serve as the local cache storage.

Procedure

1. Create a mount point for the NVMe drive.

   Syntax

   ```
   mkfs.ext4 nvme-drive-path
   ```

   Example

   ```
   [ceph: root@host01 /]# mkfs.ext4 /dev/nvme0n1
   mount /dev/nvme0n1 /mnt/nvme0n1/
   ```

2. Create a cache directory path.

   Syntax

   ```
   mkdir <nvme-mount-path>/cache-directory-name
   ```

   Example

   ```
   [ceph: root@host01 /]# mkdir /mnt/nvme0n1/rgw_datacache
   ```

3. Provide *a+rwx* permission to **nvme-mount-path** and **rgw_d3n_l1_datacache_persistent_path**.

   Syntax

```
chmod a+rwx nvme-mount-path ; chmod a+rwx rgw_d3n_l1_datacache_persistent_path
```

Example

```
[ceph: root@host01 /]# chmod a+rwx /mnt/nvme0n1 ; chmod a+rwx
/mnt/nvme0n1/rgw_datacache/
```

4. Create/Modify a RGW specification file with **extra_container_args** to add **rgw_d3n_l1_datacache_persistent_path** into **podman unit.run**.

Syntax

```
"extra_container_args:
        "-v"
        "rgw_d3n_l1_datacache_persistent_path:rgw_d3n_l1_datacache_persistent_path"
  "
```

Example

```
[ceph: root@host01 /]# cat rgw-spec.yml
 service_type: rgw
 service_id: rgw.test
 placement:
  hosts:
     host1
     host2
  extra_container_args:
     "-v"
     "/mnt/nvme0n1/rgw_datacache/:/mnt/nvme0n1/rgw_datacache/"
```

NOTE

If there are multiple instances of RGW in a single host, then a separate **rgw_d3n_l1_datacache_persistent_path** has to be created for each instance and add each path in **extra_container_args**.

Example:

For two instances of RGW in each host, create two separate *cache-directory* under **rgw_d3n_l1_datacache_persistent_path**: **/mnt/nvme0n1/rgw_datacache/rgw1** and **/mnt/nvme0n1/rgw_datacache/rgw2**

Example for "extra_container_args" in rgw specification file:

```
"extra_container_args:
 "-v"
 "/mnt/nvme0n1/rgw_datacache/rgw1/:/mnt/nvme0n1/rgw_datacache/rgw1/"
 "-v"
 "/mnt/nvme0n1/rgw_datacache/rgw2/:/mnt/nvme0n1/rgw_datacache/rgw2/"
"
```

Example for rgw-spec.yml:

```
[ceph: root@host01 /]# cat rgw-spec.yml
 service_type: rgw
  service_id: rgw.test
  placement:
   hosts:
    host1
    host2
   count_per_host: 2
   extra_container_args:
    "-v"
    "/mnt/nvme0n1/rgw_datacache/rgw1/:/mnt/nvme0n1/rgw_datacache/rgw1/"
    "-v"
    "/mnt/nvme0n1/rgw_datacache/rgw2/:/mnt/nvme0n1/rgw_datacache/rgw2/"
```

5. Redeploy the RGW service:

Example

```
[ceph: root@host01 /]# ceph orch apply -i rgw-spec.yml
```

4.5.2. Configuring D3N on rados gateway

You can configure the D3N data cache on an existing RGW to improve the performance of big-data jobs running in Red Hat Ceph Storage clusters.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway installed.

- Root-level access to the admin node.
- A fast NVMe to serve as the cache storage.

Adding the required D3N-related configuration

To enable D3N on an existing RGW, the following configuration needs to be set for each Rados Gateways client :

Syntax

```
# ceph config set <client.rgw> <CONF-OPTION> <VALUE>
```

- **rgw_d3n_l1_local_datacache_enabled=true**
- **rgw_d3n_l1_datacache_persistent_path=*path to the cache directory***

  #### Example

  ```
  rgw_d3n_l1_datacache_persistent_path=/mnt/nvme/rgw_datacache/
  ```

- **rgw_d3n_l1_datacache_size=*max_size_of_cache_in_bytes***

  #### Example

  ```
  rgw_d3n_l1_datacache_size=10737418240
  ```

Example procedure

1. Create a test object:

   NOTE

   The test object needs to be larger than 4 MB to cache.

   #### Example

   ```
   [ceph: root@host01 /]# fallocate -l 1G ./1G.dat
   [ceph: root@host01 /]# s3cmd mb s3://bkt
   [ceph: root@host01 /]# s3cmd put ./1G.dat s3://bkt
   ```

2. Perform **GET** of an object:

   #### Example

   ```
   [ceph: root@host01 /]# s3cmd get s3://bkt/1G.dat /dev/shm/1G_get.dat
   download: 's3://bkt/1G.dat' -> './1G_get.dat'  [1 of 1]
   1073741824 of 1073741824   100% in    13s    73.94 MB/s  done
   ```

3. Verify cache creation. Cache will be created with the name consisting of object **key-name** within a configured **rgw_d3n_l1_datacache_persistent_path**.

   #### Example

```
[ceph: root@host01 /]# ls -lh /mnt/nvme/rgw_datacache

rw-rr. 1 ceph ceph 1.0M Jun  2 06:18 cc7f967c-0021-43b2-9fdf-
23858e868663.615391.1_shadow.ZCiCtMWeu_19wb100JIEZ-o4tv2IyA_1
```

4. Once the cache is created for an object, the next **GET** operation for that object will access from cache resulting in faster access.

   Example

   ```
   [ceph: root@host01 /]# s3cmd get s3://bkt/1G.dat /dev/shm/1G_get.dat
   download: 's3://bkt/1G.dat' -> './1G_get.dat'  [1 of 1]
   1073741824 of 1073741824   100% in    6s   155.07 MB/s  done
   ```

   In the above example, to demonstrate the cache acceleration, we are writing to RAM drive (**/dev/shm**).

Additional Resources

- See the *Ceph subsystems default logging level values* section in the *Red Hat Ceph Storage Troubleshooting Guide* for additional details on using high availability.
- See the *Understanding Ceph logs* section in the *Red Hat Ceph Storage Troubleshooting Guide* for additional details on using high availability.

4.6. ADJUSTING LOGGING AND DEBUGGING OUTPUT

Once you finish the setup procedure, check your logging output to ensure it meets your needs. By default, the Ceph daemons log to **journald**, and you can view the logs using the **journalctl** command. Alternatively, you can also have the Ceph daemons log to files, which are located under the **/var/log/ceph/*CEPH_CLUSTER_ID*/** directory.

IMPORTANT

Verbose logging can generate over 1 GB of data per hour. This type of logging can potentially fill up the operating system's disk, causing the operating system to stop functioning.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.

Procedure

1. Set the following parameter to increase the Ceph Object Gateway logging output:

   Syntax

   ```
   ceph config set client.rgw debug_rgw VALUE
   ```

   Example

```
[ceph: root@host01 /]# ceph config set client.rgw debug_rgw 20
```

a. You can also modify these settings at runtime:

Syntax

```
ceph --admin-daemon /var/run/ceph/ceph-client.rgw.NAME.asok config set debug_rgw
VALUE
```

Example

```
[ceph: root@host01 /]# ceph --admin-daemon /var/run/ceph/ceph-client.rgw.rgw.asok
config set debug_rgw 20
```

2. Optionally, you can configure the Ceph daemons to log their output to files. Set the **log_to_file**, and **mon_cluster_log_to_file** options to **true**:

Example

```
[ceph: root@host01 /]# ceph config set global log_to_file true
[ceph: root@host01 /]# ceph config set global mon_cluster_log_to_file true
```

Additional Resources

- See the *Ceph debugging and logging configuration* section of the *Red Hat Ceph Storage Configuration Guide* for more details.

4.7. STATIC WEB HOSTING

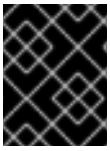
As a storage administrator, you can configure the Ceph Object Gateway to host static websites in S3 buckets. Traditional website hosting involves configuring a web server for each website, which can use resources inefficiently when content does not change dynamically. For example, sites that do not use server-side services like PHP, servlets, databases, nodejs, and the like. This approach is substantially more economical than setting up virtual machines with web servers for each site.

Prerequisites

- A healthy, running Red Hat Ceph Storage cluster.

4.7.1. Static web hosting assumptions

Static web hosting requires at least one running Red Hat Ceph Storage cluster, and at least two Ceph Object Gateway instances for the static web sites. Red Hat assumes that each zone will have multiple gateway instances using a load balancer, such as high-availability (HA) Proxy and **keepalived**.



IMPORTANT

Red Hat **DOES NOT** support using a Ceph Object Gateway instance to deploy both standard S3/Swift APIs and static web hosting simultaneously.

Additional Resources

- See the *High availability service* section in the *Red Hat Ceph Storage Object Gateway Guide* for additional details on using high availability.

4.7.2. Static web hosting requirements

Static web hosting functionality uses its own API, so configuring a gateway to use static web sites in S3 buckets requires the following:

1. S3 static web hosting uses Ceph Object Gateway instances that are separate and distinct from instances used for standard S3/Swift API use cases.
2. Gateway instances hosting S3 static web sites should have separate, non-overlapping domain names from the standard S3/Swift API gateway instances.
3. Gateway instances hosting S3 static web sites should use separate public-facing IP addresses from the standard S3/Swift API gateway instances.
4. Gateway instances hosting S3 static web sites load balance, and if necessary terminate SSL, using HAProxy/keepalived.

4.7.3. Static web hosting gateway setup

To enable a Ceph Object Gateway for static web hosting, set the following options:

Syntax

```
ceph config set client.rgw OPTION VALUE
```

Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_enable_static_website true
[ceph: root@host01 /]# ceph config set client.rgw rgw_enable_apis s3,s3website
[ceph: root@host01 /]# ceph config set client.rgw rgw_dns_name objects-zonegroup.example.com
[ceph: root@host01 /]# ceph config set client.rgw rgw_dns_s3website_name objects-website-zonegroup.example.com
[ceph: root@host01 /]# ceph config set client.rgw rgw_resolve_cname true
```

The **rgw_enable_static_website** setting MUST be **true**. The **rgw_enable_apis** setting MUST enable the **s3website** API. The **rgw_dns_name** and **rgw_dns_s3website_name** settings must provide their fully qualified domains. If the site uses canonical name extensions, then set the **rgw_resolve_cname** option to **true**.

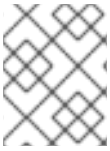
IMPORTANT

The FQDNs of **rgw_dns_name** and **rgw_dns_s3website_name** **MUST NOT** overlap.

4.7.4. Static web hosting DNS configuration

The following is an example of assumed DNS settings, where the first two lines specify the domains of the gateway instance using a standard S3 interface and point to the IPv4 and IPv6 addresses. The third line provides a wildcard CNAME setting for S3 buckets using canonical name extensions. The fourth and fifth lines specify the domains for the gateway instance using the S3 website interface and point to their IPv4 and IPv6 addresses.

```
objects-zonegroup.domain.com. IN    A 192.0.2.10
objects-zonegroup.domain.com. IN AAAA 2001:DB8::192:0:2:10
*.objects-zonegroup.domain.com. IN CNAME objects-zonegroup.domain.com.
objects-website-zonegroup.domain.com. IN    A 192.0.2.20
objects-website-zonegroup.domain.com. IN AAAA 2001:DB8::192:0:2:20
```



NOTE

The IP addresses in the first two lines differ from the IP addresses in the fourth and fifth lines.

If using Ceph Object Gateway in a multi-site configuration, consider using a routing solution to route traffic to the gateway closest to the client.

The Amazon Web Service (AWS) requires static web host buckets to match the host name. Ceph provides a few different ways to configure the DNS, and **HTTPS will work if the proxy has a matching certificate.**

Hostname to a Bucket on a Subdomain

To use AWS-style S3 subdomains, use a wildcard in the DNS entry which can redirect requests to any bucket. A DNS entry might look like the following:

```
*.objects-website-zonegroup.domain.com. IN CNAME objects-website-zonegroup.domain.com.
```

Access the bucket name, where the bucket name is **bucket1**, in the following manner:

```
http://bucket1.objects-website-zonegroup.domain.com
```

Hostname to Non-Matching Bucket

Ceph supports mapping domain names to buckets without including the bucket name in the request, which is unique to Ceph Object Gateway. To use a domain name to access a bucket, map the domain name to the bucket name. A DNS entry might look like the following:

```
www.example.com. IN CNAME bucket2.objects-website-zonegroup.domain.com.
```

Where the bucket name is **bucket2**.

Access the bucket in the following manner:

```
http://www.example.com
```

Hostname to Long Bucket with CNAME

AWS typically requires the bucket name to match the domain name. To configure the DNS for static web hosting using CNAME, the DNS entry might look like the following:

```
www.example.com. IN CNAME www.example.com.objects-website-zonegroup.domain.com.
```

Access the bucket in the following manner:

```
http://www.example.com
```

Hostname to Long Bucket without CNAME

If the DNS name contains other non-CNAME records, such as **SOA**, **NS**, **MX** or **TXT**, the DNS record must map the domain name directly to the IP address. For example:

```
www.example.com. IN A 192.0.2.20
www.example.com. IN AAAA 2001:DB8::192:0:2:20
```

Access the bucket in the following manner:

```
http://www.example.com
```

4.7.5. Creating a static web hosting site

To create a static website, perform the following steps:

1. Create an S3 bucket. The bucket name MIGHT be the same as the website's domain name. For example, **mysite.com** may have a bucket name of **mysite.com**. This is required for AWS, but it is NOT required for Ceph.
   - See the *Static web hosting DNS configuration* section in the *Red Hat Ceph Storage Object Gateway Guide* for details.
2. Upload the static website content to the bucket. Contents may include HTML, CSS, client-side JavaScript, images, audio/video content, and other downloadable files. A website MUST have an **index.html** file and might have an **error.html** file.
3. Verify the website's contents. At this point, only the creator of the bucket has access to the contents.
4. Set permissions on the files so that they are publicly readable.

4.8. HIGH AVAILABILITY FOR THE CEPH OBJECT GATEWAY

As a storage administrator, you can assign many instances of the Ceph Object Gateway to a single zone. This allows you to scale out as the load increases, that is, the same zone group and zone; however, you do not need a federated architecture to use a highly available proxy. Since each Ceph Object Gateway daemon has its own IP address, you can use the **ingress** service to balance the load across many Ceph Object Gateway daemons or nodes. The **ingress** service manages HAProxy and **keepalived** daemons for the Ceph Object Gateway environment. You can also terminate HTTPS traffic at the HAProxy server, and use HTTP between the HAProxy server and the Beast front-end web server instances for the Ceph Object Gateway.

Prerequisites

- At least two Ceph Object Gateway daemons running on different hosts.
- Capacity for at least two instances of the **ingress** service running on different hosts.

4.8.1. High availability service

The **ingress** service provides a highly available endpoint for the Ceph Object Gateway. The **ingress** service can be deployed to any number of hosts as needed. Red Hat recommends having at least two supported Red Hat Enterprise Linux servers, each server configured with the **ingress** service. You can

run a high availability (HA) service with a minimum set of configuration options. The Ceph orchestrator deploys the **ingress** service, which manages the **haproxy** and **keepalived** daemons, by providing load balancing with a floating virtual IP address. The active **haproxy** distributes all Ceph Object Gateway requests to all the available Ceph Object Gateway daemons.

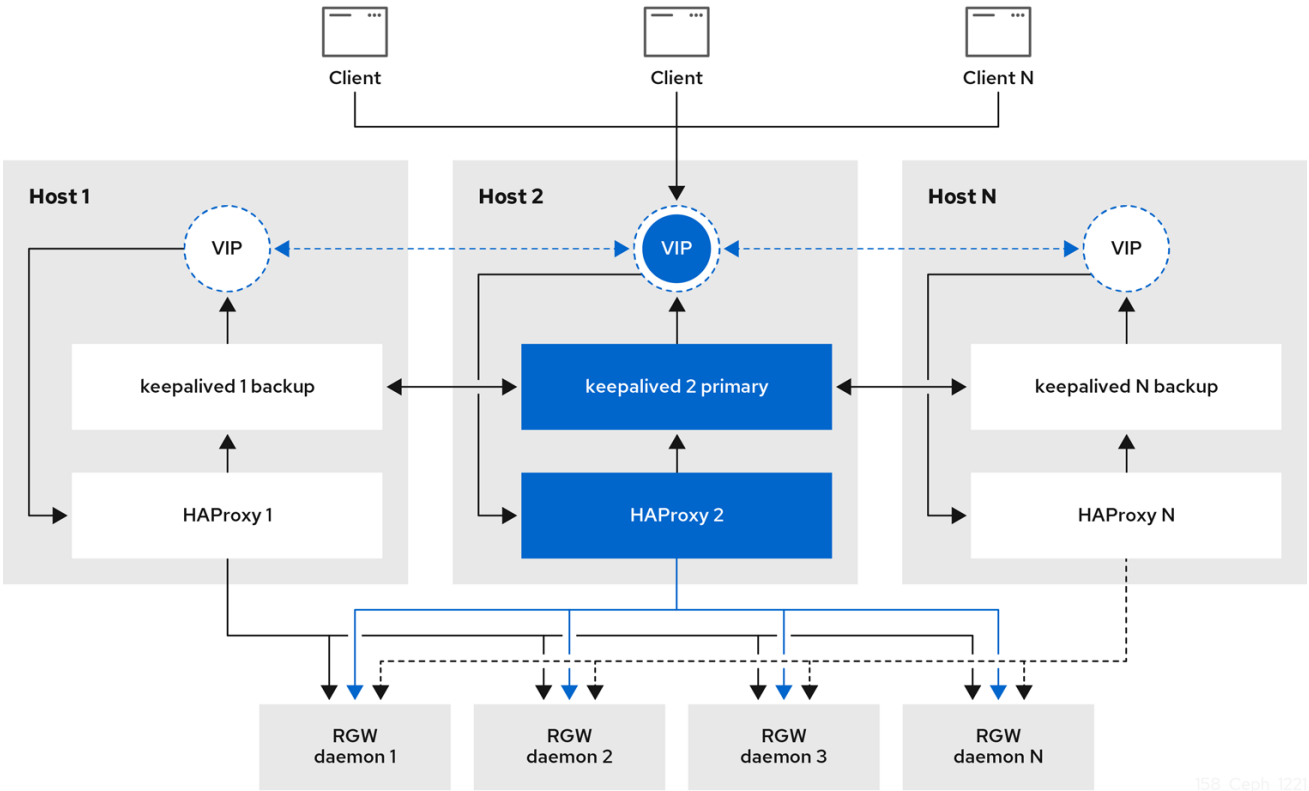
A virtual IP address is automatically configured on one of the **ingress** hosts at a time, known as the primary host. The Ceph orchestrator selects the first network interface based on existing IP addresses that are configured as part of the same subnet. In cases where the virtual IP address does not belong to the same subnet, you can define a list of subnets for the Ceph orchestrator to match with existing IP addresses. If the **keepalived** daemon and the active **haproxy** are not responding on the primary host, then the virtual IP address moves to a backup host. This backup host becomes the new primary host.

WARNING

Currently, you can not configure a virtual IP address on a network interface that does not have a configured IP address.

IMPORTANT

To use the secure socket layer (SSL), SSL must be terminated by the **ingress** service and not at the Ceph Object Gateway.



4.8.2. Configuring high availability for the Ceph Object Gateway

To configure high availability (HA) for the Ceph Object Gateway you write a YAML configuation file, and

the Ceph orchestrator does the installation, configuraton, and management of the **ingress** service. The **ingress** service uses the **haproxy** and **keepalived** daemons to provide high availability for the Ceph Object Gateway.

Prerequisites

- A minimum of two hosts running Red Hat Enterprise Linux 9, or higher, for installing the **ingress** service on.
- A healthy running Red Hat Ceph Storage cluster.
- A minimum of two Ceph Object Gateway daemons running on different hosts.
- Root-level access to the host running the **ingress** service.
- If using a firewall, then open port 80 for HTTP and port 443 for HTTPS traffic.

Procedure

1. Create a new **ingress.yaml** file:

   #### Example

   ```
   [root@host01 ~] touch ingress.yaml
   ```

2. Open the **ingress.yaml** file for editing. Added the following options, and add values applicable to the environment:

   #### Syntax

   ```
   service_type: ingress (1)
   service_id: SERVICE_ID (2)
   placement: (3)
     hosts:
       - HOST1
       - HOST2
       - HOST3
   spec:
     backend_service: SERVICE_ID
     virtual_ip: IP_ADDRESS/CIDR (4)
     frontend_port: INTEGER (5)
     monitor_port: INTEGER (6)
     virtual_interface_networks: (7)
       - IP_ADDRESS/CIDR
     ssl_cert: | (8)
   ```

   (1) Must be set to **ingress**.

   (2) Must match the existing Ceph Object Gateway service name.

   (3) Where to deploy the **haproxy** and **keepalived** containers.

   (4) The virtual IP address where the **ingress** service is available.

5. The port to access the **ingress** service.
6. The port to access the **haproxy** load balancer status.
7. Optional list of available subnets.
8. Optional SSL certificate and private key.

Example

```
service_type: ingress
service_id: rgw.foo
placement:
  hosts:
    - host01.example.com
    - host02.example.com
    - host03.example.com
spec:
  backend_service: rgw.foo
  virtual_ip: 192.168.1.2/24
  frontend_port: 8080
  monitor_port: 1967
  virtual_interface_networks:
    - 10.10.0.0/16
  ssl_cert: |
    -----BEGIN CERTIFICATE-----
    MIIEpAIBAAKCAQEA+Cf4l9OagD6x67HhdCy4Asqw89Zz9ZuGbH50/7ltIMQpJJU0
    gu9ObNtIoC0zabJ7n1jujueYgIpOqGnhRSvsGJiEkgN81NLQ9rqAVaGpadjrNLcM
    bpgqJCZj0vzzmtFBCtenpb5l/EccMFcAydGtGeLP33SaWiZ4Rne56GBInk6SATI/
    JSKweGD1y5GiAWipBR4C74HiAW9q6hCOuSdp/2WQxWT3T1j2sjlqxkHdtInUtwOm
    j5Ism276IndeQ9hR3reFR8PJnKIPx73oTBQ7p9CMR1J4ucq9Ny0J12wQYT00fmJp
    -----END CERTIFICATE-----
    -----BEGIN PRIVATE KEY-----
    MIIEBTCCAu2gAwIBAgIUGfYFsj8HyA9Zv2l600hxzT8+gG4wDQYJKoZIhvcNAQEL

BQAwgYkxCzAJBgNVBAYTAklOMQwwCgYDVQQIDANLQVIxDDAKBgNVBAcMA0JMUjEM

MAoGA1UECgwDUkhUMQswCQYDVQQLDAJCVTEkMCIGA1UEAwwbY2VwaC1zc2wtcmhj
    czUtOGRjeHY2LW5vZGU1MR0wGwYJKoZIhvcNAQkBFg5hYmNAcmVkaGF0LmNvbTAe
    -----END PRIVATE KEY-----
```

3. Launch the Cephadm shell:

Example

```
[root@host01 ~]# cephadm shell --mount ingress.yaml:/var/lib/ceph/radosgw/ingress.yaml
```

4. Configure the latest **haproxy** and **keepalived** images:

Syntax

```
ceph config set mgr mgr/cephadm/container_image_haproxy HAPROXY_IMAGE_ID
ceph config set mgr mgr/cephadm/container_image_keepalived KEEPALIVED_IMAGE_ID
```

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```
[ceph: root@host01 /]# ceph config set mgr mgr/cephadm/container_image_haproxy
registry.redhat.io/rhceph/rhceph-haproxy-rhel9:latest
[ceph: root@host01 /]# ceph config set mgr mgr/cephadm/container_image_keepalived
registry.redhat.io/rhceph/keepalived-rhel9:latest
```

5. Install and configure the new **ingress** service using the Ceph orchestrator:

```
[ceph: root@host01 /]# ceph orch apply -i /var/lib/ceph/radosgw/ingress.yaml
```

6. After the Ceph orchestrator completes, verify the HA configuration.

   a. On the host running the **ingress** service, check that the virtual IP address appears:

   Example

   ```
   [root@host01 ~]# ip addr show
   ```

   b. Try reaching the Ceph Object Gateway from a Ceph client:

   Syntax

   ```
   wget HOST_NAME
   ```

   Example

   ```
   [root@client ~]# wget host01.example.com
   ```

   If this returns an **index.html** with similar content as in the example below, then the HA configuration for the Ceph Object Gateway is working properly.

   Example

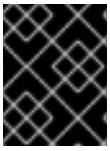
```
<?xml version="1.0" encoding="UTF-8"?>
 <ListAllMyBucketsResult xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
  <Owner>
   <ID>anonymous</ID>
   <DisplayName></DisplayName>
  </Owner>
  <Buckets>
  </Buckets>
 </ListAllMyBucketsResult>
```

Additional resources

- See the *Performing a Standard RHEL Installation Guide* for more details.
- See the *High availability service* section in the *Red Hat Ceph Storage Object Gateway Guide* for more details.

4.8.3. Exporting the namespace to NFS-Ganesha

To configure new NFS Ganesha exports for use with the Ceph Object Gateway, you have to use the Red Hat Ceph Storage Dashboard. See the *Managing NFS Ganesha exports on the Ceph dashboard* section in the *Red Hat Ceph Storage Dashboard Guide* for more details.



IMPORTANT

For existing NFS environments using the Ceph Object Gateway, upgrading from Red Hat Ceph Storage 4 to Red Hat Ceph Storage 5 is not supported at this time.

IMPORTANT

Red Hat does not support NFS version 3 exports using the Ceph Object Gateway.

CHAPTER 5. MULTI-SITE CONFIGURATION AND ADMINISTRATION

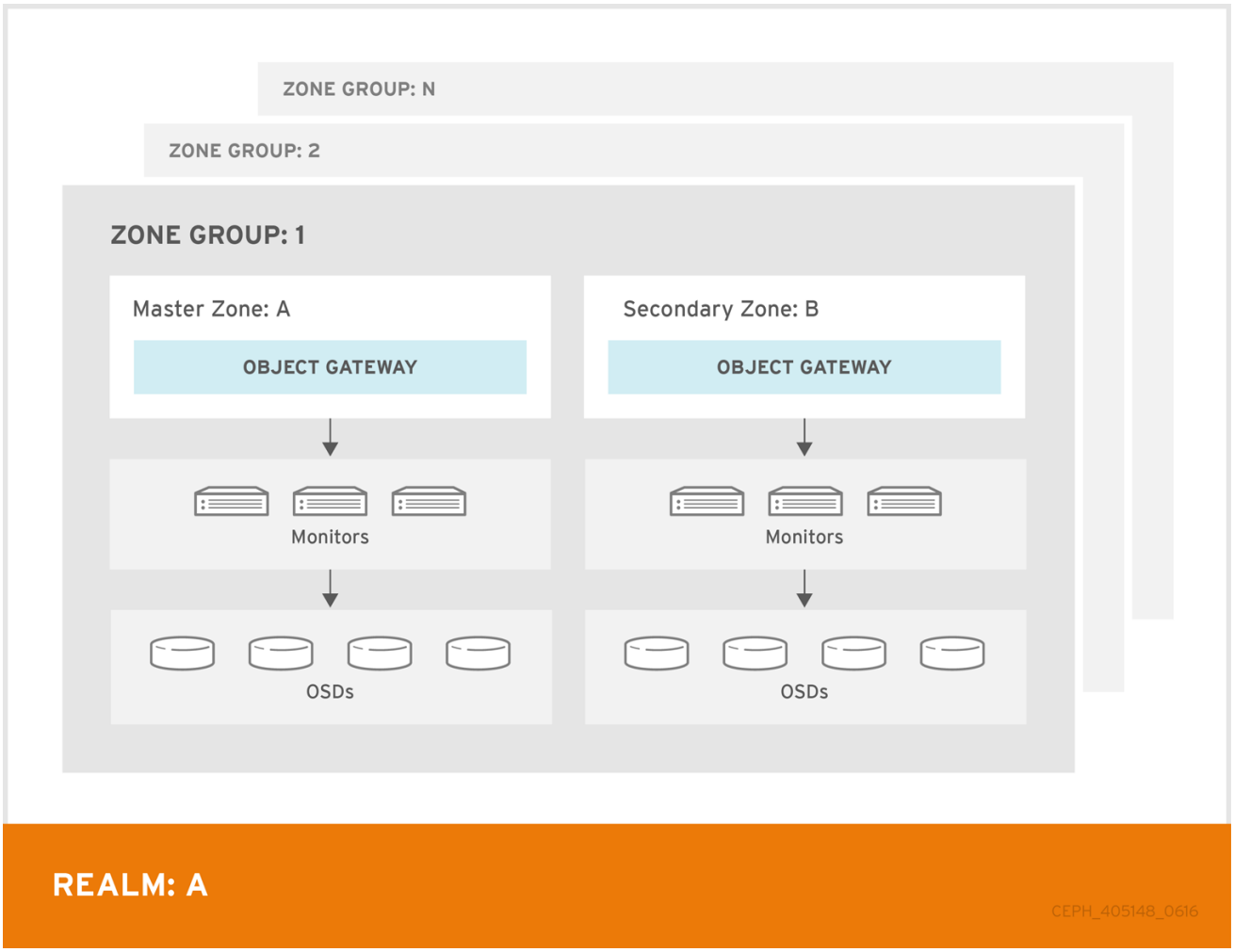
As a storage administrator, you can configure and administer multiple Ceph Object Gateways for a variety of use cases. You can learn what to do during a disaster recovery and failover events. Also, you can learn more about realms, zones, and syncing policies in multi-site Ceph Object Gateway environments.

A single zone configuration typically consists of one zone group containing one zone and one or more **ceph-radosgw** instances where you may load-balance gateway client requests between the instances. In a single zone configuration, typically multiple gateway instances point to a single Ceph storage cluster. However, Red Hat supports several multi-site configuration options for the Ceph Object Gateway:

- **Multi-zone:** A more advanced configuration consists of one zone group and multiple zones, each zone with one or more **ceph-radosgw** instances. Each zone is backed by its own Ceph Storage Cluster. Multiple zones in a zone group provides disaster recovery for the zone group should one of the zones experience a significant failure. Each zone is active and may receive write operations. In addition to disaster recovery, multiple active zones may also serve as a foundation for content delivery networks. To configure multiple zones without replication, see the *Configuring multiple zones without replication* .

- **Multi-zone-group:** Formerly called 'regions', the Ceph Object Gateway can also support multiple zone groups, each zone group with one or more zones. Objects stored to zone groups within the same realm share a global namespace, ensuring unique object IDs across zone groups and zones.

- **Multiple Realms:** The Ceph Object Gateway supports the notion of realms, which can be a single zone group or multiple zone groups and a globally unique namespace for the realm. Multiple realms provides the ability to support numerous configurations and namespaces.



Prerequisites

- A healthy running Red Hat Ceph Storage cluster.
- Deployment of the Ceph Object Gateway software.

5.1. REQUIREMENTS AND ASSUMPTIONS

A multi-site configuration requires at least two Ceph storage clusters, and At least two Ceph object gateway instances, one for each Ceph storage cluster.

This guide assumes at least two Ceph storage clusters in geographically separate locations; however, the configuration can work on the same physical site. This guide also assumes four Ceph object gateway servers named **rgw1**, **rgw2**, **rgw3** and **rgw4** respectively.

A multi-site configuration requires a master zone group and a master zone Additionally, **each zone group requires a master zone.** Zone groups might have one or more secondary or non-master zones.

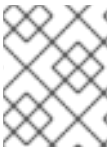
IMPORTANT

When planning network considerations for multi-site, it is important to understand the relation bandwidth and latency observed on the multi-site synchronization network and the clients ingest rate in direct correlation with the current sync state of the objects owed to the secondary site. The network link between Red Hat Ceph Storage multi-site clusters must be able to handle the ingest into the primary cluster to maintain an effective recovery time on the secondary site. Multi-site synchronization is asynchronous and one of the limitations is the rate at which the sync gateways can process data across the link. An example to look at in terms of network inter-connectivity speed could be 1 GbE or inter-datacenter connectivity, for every 8 TB or cumulative receive data, per client gateway. Thus, if you replicate to two other sites, and ingest 16 TB a day, you need 6 GbE of dedicated bandwidth for multi-site replication.

Red Hat also recommends private Ethernet or Dense wavelength-division multiplexing (DWDM) as a VPN over the internet is not ideal due to the additional overhead incurred.

IMPORTANT

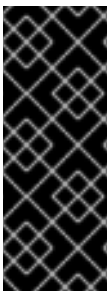
The master zone within the master zone group of a realm is responsible for storing the master copy of the realm's metadata, including users, quotas and buckets (created by the **radosgw-admin** CLI). This metadata gets synchronized to secondary zones and secondary zone groups automatically. Metadata operations executed with the **radosgw-admin** CLI **MUST be executed** on a host within the master zone of the master zone group in order to ensure that they get synchronized to the secondary zone groups and zones. Currently, it is *possible* to execute metadata operations on secondary zones and zone groups, but it is **NOT recommended** because they **WILL NOT** be synchronized, leading to fragmented metadata.



NOTE

For new Ceph Object Gateway deployment in multi-site, it takes around 20 minutes to sync metadata operations to the secondary site.

In the following examples, the **rgw1** host will serve as the master zone of the master zone group; the **rgw2** host will serve as the secondary zone of the master zone group; the **rgw3** host will serve as the master zone of the secondary zone group; and the **rgw4** host will serve as the secondary zone of the secondary zone group.



IMPORTANT

Red Hat recommends to use load balancer and three Ceph Object Gateway daemons to have sync end points with multi-site. For the non-syncing Ceph Object Gateway nodes in a multi-site configuration, which are dedicated for client I/O operations through load balancers, run the **ceph config set client.rgw.CLIENT_NODE rgw_run_sync_thread false** command to prevent them from performing sync operations, and then restart the Ceph Object Gateway.

Following is a typical configuration file for HAProxy for syncing gateways:

Example

```
[root@host01 ~]# cat ./haproxy.cfg
```

```
global

 log      127.0.0.1 local2

 chroot   /var/lib/haproxy
 pidfile  /var/run/haproxy.pid
 maxconn  7000
 user     haproxy
 group    haproxy
 daemon

 stats socket /var/lib/haproxy/stats

defaults

 mode                    http
 log                     global
 option                  httplog
 option                  dontlognull
 option http-server-close
 option forwardfor    except 127.0.0.0/8
 option                  redispatch
 retries                 3
 timeout http-request 10s
 timeout queue           1m
 timeout connect         10s
 timeout client          30s
 timeout server          30s
 timeout http-keep-alive 10s
 timeout check           10s
        timeout client-fin 1s
        timeout server-fin 1s
 maxconn                 6000


listen  stats
 bind 0.0.0.0:1936
    mode         http
    log          global

    maxconn 256


    clitimeout   10m
    srvtimeout   10m
    contimeout   10m
    timeout queue   10m

# JTH start
    stats enable
    stats hide-version
    stats refresh 30s
    stats show-node
##     stats auth admin:password
    stats uri  /haproxy?stats
      stats admin if TRUE
```

```
frontend  main
 bind  *:5000
 acl url_static    path_beg    -i /static /images /javascript /stylesheets
 acl url_static    path_end    -i .jpg .gif .png .css .js

 use_backend static       if url_static
 default_backend          app
       maxconn 6000

backend static
 balance  roundrobin
   fullconn 6000
   server  app8 host01:8080 check maxconn 2000
   server  app9 host02:8080 check maxconn 2000
   server  app10 host03:8080 check maxconn 2000


backend app
 balance  roundrobin
   fullconn 6000
   server  app8 host01:8080 check maxconn 2000
   server  app9 host02:8080 check maxconn 2000
   server  app10 host03:8080 check maxconn 2000
```

5.2. POOLS

Red Hat recommends using the *Ceph Placement Group's per Pool Calculator* to calculate a suitable number of placement groups for the pools the **radosgw** daemon will create. Set the calculated values as defaults in the Ceph configuration database.

Example

```
[ceph: root@host01 /]# ceph config set osd osd_pool_default_pg_num 50
[ceph: root@host01 /]# ceph config set osd osd_pool_default_pgp_num 50
```

NOTE

Making this change to the Ceph configuration will use those defaults when the Ceph Object Gateway instance creates the pools. Alternatively, you can create the pools manually.

Pool names particular to a zone follow the naming convention ***ZONE_NAME.POOL_NAME***. For example, a zone named **us-east** will have the following pools:

- **.rgw.root**
- **us-east.rgw.control**
- **us-east.rgw.meta**
- **us-east.rgw.log**

- **us-east.rgw.buckets.index**
- **us-east.rgw.buckets.data**
- **us-east.rgw.buckets.non-ec**
- **us-east.rgw.meta:users.keys**
- **us-east.rgw.meta:users.email**
- **us-east.rgw.meta:users.swift**
- **us-east.rgw.meta:users.uid**

Additional Resources

- See the *Pools* chapter in the *Red Hat Ceph Storage Storage Strategies Guide* for details on creating pools.

5.3. MIGRATING A SINGLE SITE SYSTEM TO MULTI-SITE

To migrate from a single site system with a **default** zone group and zone to a multi-site system, use the following steps:

1. Create a realm. Replace ***NAME*** with the realm name.

   Syntax

   ```
   radosgw-admin realm create --rgw-realm=NAME --default
   ```

2. Rename the default zone and zonegroup. Replace **<name>** with the zonegroup or zone name.

   Syntax

   ```
   radosgw-admin zonegroup rename --rgw-zonegroup default --zonegroup-new-name=NEW_ZONE_GROUP_NAME
   radosgw-admin zone rename --rgw-zone default --zone-new-name us-east-1 --rgw-zonegroup=ZONE_GROUP_NAME
   ```

3. Configure the primary zonegroup. Replace ***NAME*** with the realm or zonegroup name. Replace ***FQDN*** with the fully qualified domain name(s) in the zonegroup.

   Syntax

   ```
   radosgw-admin zonegroup modify --rgw-realm=REALM_NAME --rgw-zonegroup=ZONE_GROUP_NAME --endpoints http://FQDN:80 --master --default
   ```

4. Create a system user. Replace ***USER_ID*** with the username. Replace ***DISPLAY_NAME*** with a display name. It can contain spaces.

   Syntax

```
radosgw-admin user create --uid=USER_ID \
                    --display-name="DISPLAY_NAME" \
                    --access-key=ACCESS_KEY --secret=SECRET_KEY \ --system
```

5. Configure the primary zone. Replace ***NAME*** with the realm, zonegroup, or zone name. Replace ***FQDN*** with the fully qualified domain name(s) in the zonegroup.

   Syntax

```
radosgw-admin zone modify --rgw-realm=REALM_NAME --rgw-
zonegroup=ZONE_GROUP_NAME \
                    --rgw-zone=ZONE_NAME --endpoints http://FQDN:80 \
                    --access-key=ACCESS_KEY --secret=SECRET_KEY \
                    --master --default
```

6. Update the Ceph configuration database:

   Syntax

```
ceph config set client.rgw.SERVICE_NAME rgw_realm REALM_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zonegroup ZONE_GROUP_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zone PRIMARY_ZONE_NAME
```

   Example

```
[ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_realm
test_realm
[ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zonegroup
us
[ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zone us-
east-1
```

7. Commit the updated configuration:

   Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

8. Restart the Ceph Object Gateway:

NOTE

Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

   a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

      Syntax

```
systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
```

      Example

```
[root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
529020a7702d@rgw.realm.zone.host01.gwasto.service
```

b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host01 /]# ceph orch restart rgw
```

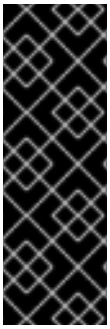
9. Establish the secondary zone. See the *Establishing a secondary zone* section.

5.4. ESTABLISHING A SECONDARY ZONE

Zones within a zone group replicate all data to ensure that each zone has the same data. When creating the secondary zone, issue **ALL** of the **radosgw-admin zone** operations on a host identified to serve the secondary zone.

NOTE

To add a additional zones, follow the same procedures as for adding the secondary zone. Use a different zone name.



IMPORTANT

You must run metadata operations, such as user creation and quotas, on a host within the master zone of the master zonegroup. The master zone and the secondary zone can receive bucket operations from the RESTful APIs, but the secondary zone redirects bucket operations to the master zone. If the master zone is down, bucket operations will fail. If you create a bucket using the **radosgw-admin** CLI, you must run it on a host within the master zone of the master zone group so that the buckets will synchronize with other zone groups and zones.

Prerequisites

- At least two running Red Hat Ceph Storage clusters.
- At least two Ceph Object Gateway instances, one for each Red Hat Ceph Storage cluster.
- Root-level access to all the nodes.
- Nodes or containers are added to the storage cluster.
- All Ceph Manager, Monitor, and OSD daemons are deployed.

Procedure

1. Log into the **cephadm** shell:

   Example

```
[root@host04 ~]# cephadm shell
```

2. Pull the primary realm configuration from the host:

Syntax

```
radosgw-admin realm pull --url=URL_TO_PRIMARY_ZONE_GATEWAY --access-key=ACCESS_KEY --secret-key=SECRET_KEY
```

Example

```
[ceph: root@host04 /]# radosgw-admin realm pull --url=http://10.74.249.26:80 --access-key=LIPEYZJLTWXRKXS9LPJC --secret-key=IsAje0AVDNXNw48LjMAimpCpI7VaxJYSnfD0FFKQ
```

3. Pull the primary period configuration from the host:

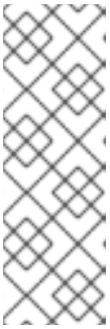
Syntax

```
radosgw-admin period pull --url=URL_TO_PRIMARY_ZONE_GATEWAY --access-key=ACCESS_KEY --secret-key=SECRET_KEY
```

Example

```
[ceph: root@host04 /]# radosgw-admin period pull --url=http://10.74.249.26:80 --access-key=LIPEYZJLTWXRKXS9LPJC --secret-key=IsAje0AVDNXNw48LjMAimpCpI7VaxJYSnfD0FFKQ
```

4. Configure a secondary zone:



NOTE

All zones run in an active-active configuration by default; that is, a gateway client might write data to any zone and the zone will replicate the data to all other zones within the zone group. If the secondary zone should not accept write operations, specify the `**--read-only** flag to create an active-passive configuration between the master zone and the secondary zone. Additionally, provide the **access_key** and **secret_key** of the generated system user stored in the master zone of the master zone group.

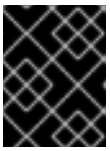
Syntax

```
radosgw-admin zone create --rgw-zonegroup=_ZONE_GROUP_NAME_ \
        --rgw-zone=_SECONDARY_ZONE_NAME_ --endpoints=http://_RGW_SECONDARY_HOSTNAME_:_RGW_PRIMARY_PORT_NUMBER_1_ \
        --access-key=_SYSTEM_ACCESS_KEY_ --secret=_SYSTEM_SECRET_KEY_ \
        [--read-only]
```

Example

```
[ceph: root@host04 /]# radosgw-admin zone create --rgw-zonegroup=us --rgw-zone=us-east-2 --endpoints=http://rgw2:80 --access-key=LIPEYZJLTWXRKXS9LPJC --secret-key=IsAje0AVDNXNw48LjMAimpCpI7VaxJYSnfD0FFKQ
```

5. Optional: Delete the default zone:



IMPORTANT

Do not delete the default zone and its pools if you are using the default zone and zone group to store data.

Example

```
[ceph: root@host04 /]# radosgw-admin zone rm --rgw-zone=default
[ceph: root@host04 /]# ceph osd pool rm default.rgw.log default.rgw.log --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.meta default.rgw.meta --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.control default.rgw.control --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.data.root default.rgw.data.root --yes-i-really-really-mean-it
[ceph: root@host04 /]# ceph osd pool rm default.rgw.gc default.rgw.gc --yes-i-really-really-mean-it
```

6. Update the Ceph configuration database:

Syntax

```
ceph config set client.rgw.SERVICE_NAME rgw_realm REALM_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zonegroup ZONE_GROUP_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zone SECONDARY_ZONE_NAME
```

Example

```
[ceph: root@host04 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_realm test_realm
[ceph: root@host04 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zonegroup us
[ceph: root@host04 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zone us-east-2
```

7. Commit the changes:

Syntax

```
radosgw-admin period update --commit
```

Example

```
[ceph: root@host04 /]# radosgw-admin period update --commit
```

8. Outside the **cephadm** shell, fetch the FSID of the storage cluster and the processes:

   Example

   ```
   [root@host04 ~]#  systemctl list-units | grep ceph
   ```

9. Start the Ceph Object Gateway daemon:

   Syntax

   ```
   systemctl start ceph-FSID@DAEMON_NAME
   systemctl enable ceph-FSID@DAEMON_NAME
   ```

   Example

   ```
   [root@host04 ~]# systemctl start ceph-62a081a6-88aa-11eb-a367-
   001a4a000672@rgw.test_realm.us-east-2.host04.ahdtsw.service
   [root@host04 ~]# systemctl enable ceph-62a081a6-88aa-11eb-a367-
   001a4a000672@rgw.test_realm.us-east-2.host04.ahdtsw.service
   ```

5.5. CONFIGURING THE ARCHIVE ZONE (TECHNOLOGY PREVIEW)

IMPORTANT

Archive zone is a Technology Preview feature only for Red Hat Ceph Storage 7.0. Technology Preview features are not supported with Red Hat production service level agreements (SLAs), might not be functionally complete, and Red Hat does not recommend using them for production. These features provide early access to upcoming product features, enabling customers to test functionality and provide feedback during the development process. See the support scope for Red Hat Technology Preview features for more details.

Archive Object data residing on Red Hat Ceph Storage using the Object Storage Archive Zone Feature.

The archive zone uses multi-site replication and S3 object versioning feature in Ceph Object Gateway. The archive zone retains all version of all the objects available, even when deleted in the production file.

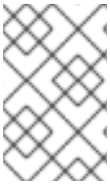
The archive zone has a history of versions of S3 objects that can only be eliminated through the gateways that are associated with the archive zone. It captures all the data updates and metadata to consolidate them as versions of S3 objects.

Bucket granular replication to the archive zone can be used after creating an archive zone.

You can control the storage space usage of an archive zone through the bucket Lifecycle policies, where you can define the number of versions you would like to keep for an object.

An archive zone helps protect your data against logical or physical errors. It can save users from logical failures, such as accidentally deleting a bucket in the production zone. It can also save your data from massive hardware failures, like a complete production site failure. Additionally, it provides an immutable copy, which can help build a ransomware protection strategy.

To implement the bucket granular replication, use the sync policies commands for enabling and disabling policies. See *Creating a sync policy group* and *Modifying a sync policy group* for more information.



NOTE

Using the sync policy group procedures is optional and only necessary to use enabling and disabling with bucket granular replication. For using the archive zone without bucket granular replication, it is not necessary to use the sync policy procedures.

If you want to migrate the storage cluster from single site, see *Migrating a single site system to multi-site* .

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to a Ceph Monitor node.
- Installation of the Ceph Object Gateway software.

Procedure

- During new zone creation, use the **archive** tier to configure the archive zone.

  Syntax

  ```
  radosgw-admin zone create --rgw-zonegroup={ZONE_GROUP_NAME} --rgw-zone=
  {ZONE_NAME} --endpoints={http://FQDN:PORT},{http://FQDN:PORT} --tier-type=archive
  ```

  Example

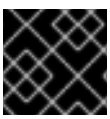
  ```
  [ceph: root@host01 /]# radosgw-admin zone create --rgw-zonegroup=us --rgw-zone=us-east
  --endpoints={http://example.com:8080} --tier-type=archive
  ```

Additional resources

- See the *Deploying a multi-site Ceph Object Gateway using the Ceph Orchestrator* section in the *Red Hat Ceph Storage Object Gateway Guide* for more details.

5.5.1. Deleting objects in archive zone

You can use an S3 lifecycle policy extension to delete objects within an **<ArchiveZone>** element.



IMPORTANT

Archive zone objects can only be deleted using the **expiration** lifecycle policy rule.

- If any **<Rule>** section contains an **<ArchiveZone>** element, that rule executes in archive zone and are the ONLY rules which run in an archive zone.
- Rules marked **<ArchiveZone>** do NOT execute in non-archive zones.

The rules within the lifecycle policy determine when and what objects to delete. For more information about lifecycle creation and management, see *Bucket lifecycle*.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to a Ceph Monitor node.
- Installation of the Ceph Object Gateway software.

Procedure

1. Set the **<ArchiveZone>** lifecycle policy rule. For more information about creating a lifecycle policy, see See the *Creating a lifecycle management policy* section in the *Red Hat Ceph Storage Object Gateway Guide* for more details.

   #### Example

   ```
   <?xml version="1.0" ?>
   <LifecycleConfiguration xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
       <Rule>
           <ID>delete-1-days-az</ID>
           <Filter>
      <Prefix></Prefix>
      <ArchiveZone /> 1
           </Filter>
           <Status>Enabled</Status>
           <Expiration>
               <Days>1</Days>
           </Expiration>
       </Rule>
   </LifecycleConfiguration>
   ```

2. Optional: See if a specific lifecycle policy contains an archive zone rule.

   #### Syntax

   ```
   radosgw-admin lc get --bucket BUCKET_NAME
   ```

   #### Example

   ```
   [ceph: root@host01 /]# radosgw-admin lc get --bucket test-bkt

   {
       "prefix_map": {
           "": {
               "status": true,
               "dm_expiration": true,
               "expiration": 0,
               "noncur_expiration": 2,
               "mp_expiration": 0,
               "transitions": {},
               "noncur_transitions": {}
   ```

```
        }
    },
    "rule_map": [
        {
            "id": "Rule 1",
            "rule": {
                "id": "Rule 1",
                "prefix": "",
                "status": "Enabled",
                "expiration": {
                    "days": "",
                    "date": ""
                },
                "noncur_expiration": {
                    "days": "2",
                    "date": ""
                },
                "mp_expiration": {
                    "days": "",
                    "date": ""
                },
                "filter": {
                    "prefix": "",
                    "obj_tags": {
                        "tagset": {}
                    },
                    "archivezone": ""  (1)
                },
                "transitions": {},
                "noncur_transitions": {},
                "dm_expiration": true
            }
        }
    ]
}
```

(1) The archive zone rule. This is an example of a lifecycle policy with an archive zone rule.

3. If the Ceph Object Gateway user is deleted, the buckets at the archive site owned by that user is inaccessible. Link those buckets to another Ceph Object Gateway user to access the data.

Syntax

```
radosgw-admin bucket link --uid NEW_USER_ID --bucket BUCKET_NAME --yes-i-really-mean-it
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket link --uid arcuser1 --bucket arc1-deleted-da473fbbaded232dc5d1e434675c1068 --yes-i-really-mean-it
```

Additional resources

- See the *Bucket lifecycle* section in the *Red Hat Ceph Storage Object Gateway Guide* for more details.
- See the *S3 bucket lifecycle* section in the *Red Hat Ceph Storage Developer Guide* for more details.

5.6. FAILOVER AND DISASTER RECOVERY

If the primary zone fails, failover to the secondary zone for disaster recovery.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to a Ceph Monitor node.
- Installation of the Ceph Object Gateway software.

Procedure

1. Make the secondary zone the primary and default zone. For example:

   Syntax

   ```
   radosgw-admin zone modify --rgw-zone=ZONE_NAME --master --default
   ```

   By default, Ceph Object Gateway runs in an active-active configuration. If the cluster was configured to run in an active-passive configuration, the secondary zone is a read-only zone. Remove the **--read-only** status to allow the zone to receive write operations. For example:

   Syntax

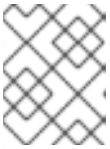
   ```
   radosgw-admin zone modify --rgw-zone=ZONE_NAME --master --default --read-only=false
   ```

2. Update the period to make the changes take effect:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin period update --commit
   ```

3. Restart the Ceph Object Gateway.

   NOTE

   Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

   a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

      Syntax

      ```
      systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
      ```

Example

```
[root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
529020a7702d@rgw.realm.zone.host01.gwasto.service
```

b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host01 /]# ceph orch restart rgw
```

If the former primary zone recovers, revert the operation.

1. From the recovered zone, pull the realm from the current primary zone:

Syntax

```
radosgw-admin realm pull --url=URL_TO_PRIMARY_ZONE_GATEWAY \
                         --access-key=ACCESS_KEY --secret=SECRET_KEY
```

2. Make the recovered zone the primary and default zone:

Syntax

```
radosgw-admin zone modify --rgw-zone=ZONE_NAME --master --default
```

3. Update the period to make the changes take effect:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

4. Restart the Ceph Object Gateway in the recovered zone:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host01 /]# ceph orch restart rgw
```

5. If the secondary zone needs to be a read-only configuration, update the secondary zone:

Syntax

```
radosgw-admin zone modify --rgw-zone=ZONE_NAME --read-only
radosgw-admin zone modify --rgw-zone=ZONE_NAME --read-only
```

6. Update the period to make the changes take effect:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

7. Restart the Ceph Object Gateway in the secondary zone:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host01 /]# ceph orch restart rgw
```

5.7. CONFIGURING MULTIPLE ZONES WITHOUT REPLICATION

You can configure multiple zones that will not replicate each other. For example, you can create a dedicated zone for each team in a company.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- Root-level access to the Ceph Object Gateway node.

Procedure

1. Create a new realm:

Syntax

```
radosgw-admin realm create --rgw-realm=REALM_NAME [--default]
```

Example

```
[ceph: root@host01 /]# radosgw-admin realm create --rgw-realm=test_realm --default
{
    "id": "0956b174-fe14-4f97-8b50-bb7ec5e1cf62",
    "name": "test_realm",
    "current_period": "1950b710-3e63-4c41-a19e-46a715000980",
    "epoch": 1
}
```

2. Create a new zone group:

Syntax

```
radosgw-admin zonegroup create --rgw-zonegroup=ZONE_GROUP_NAME --
endpoints=FQDN:PORT --rgw-realm=REALM_NAME|--realm-id=REALM_ID --master --
default
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup create --rgw-zonegroup=us --
endpoints=http://rgw1:80 --rgw-realm=test_realm --master --default
{
    "id": "f1a233f5-c354-4107-b36c-df66126475a6",
    "name": "us",
    "api_name": "us",
    "is_master": "true",
    "endpoints": [
        "http:\/\/rgw1:80"
    ],
    "hostnames": [],
    "hostnames_s3webzone": [],
    "master_zone": "",
    "zones": [],
    "placement_targets": [],
    "default_placement": "",
    "realm_id": "0956b174-fe14-4f97-8b50-bb7ec5e1cf62"
}
```

3. Create one or more zones depending on the use case:

Syntax

```
radosgw-admin zone create --rgw-zonegroup=ZONE_GROUP_NAME --rgw-
zone=ZONE_NAME --master --default --endpoints=FQDN:PORT,FQDN:PORT
```

Example

```
[ceph: root@host01 /]# radosgw-admin zone create --rgw-zonegroup=us --rgw-zone=us-east
--master --default --endpoints=http://rgw1:80
```

4. Get the JSON file with the configuration of the zone group:

Syntax

```
radosgw-admin zonegroup get --rgw-zonegroup=ZONE_GROUP_NAME >
JSON_FILE_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup get --rgw-zonegroup=us > zonegroup-
us.json
```

a. Open the file for editing, and set the **log_meta**, **log_data**, and **sync_from_all** fields to **false**:

Example

```
{
    "id": "72f3a886-4c70-420b-bc39-7687f072997d",
    "name": "default",
    "api_name": "",
    "is_master": "true",
    "endpoints": [],
    "hostnames": [],
    "hostnames_s3website": [],
    "master_zone": "a5e44ecd-7aae-4e39-b743-3a709acb60c5",
    "zones": [
        {
            "id": "975558e0-44d8-4866-a435-96d3e71041db",
            "name": "testzone",
            "endpoints": [],
            "log_meta": "false",
            "log_data": "false",
            "bucket_index_max_shards": 11,
            "read_only": "false",
            "tier_type": "",
            "sync_from_all": "false",
            "sync_from": []
        },
        {
            "id": "a5e44ecd-7aae-4e39-b743-3a709acb60c5",
            "name": "default",
            "endpoints": [],
            "log_meta": "false",
            "log_data": "false",
            "bucket_index_max_shards": 11,
            "read_only": "false",
            "tier_type": "",
            "sync_from_all": "false",
            "sync_from": []
        }
    ],
    "placement_targets": [
        {
            "name": "default-placement",
            "tags": []
        }
    ],
    "default_placement": "default-placement",
    "realm_id": "2d988e7d-917e-46e7-bb18-79350f6a5155"
}
```

5. Use the updated JSON file to set the zone group:

Syntax

```
radosgw-admin zonegroup set --rgw-zonegroup=ZONE_GROUP_NAME --
infile=JSON_FILE_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup set --rgw-zonegroup=us --
infile=zonegroup-us.json
```

6. Update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

Additional Resources

- *Realms*
- *Zone Groups*
- *Zones*
- *Installation Guide*

5.8. CONFIGURING MULTIPLE REALMS IN THE SAME STORAGE CLUSTER

You can configure multiple realms in the same storage cluster. This is a more advanced use case for multi-site. Configuring multiple realms in the same storage cluster enables you to use a local realm to handle local Ceph Object Gateway client traffic, as well as a replicated realm for data that will be replicated to a secondary site.

NOTE

Red Hat recommends that each realm has its own Ceph Object Gateway.

Prerequisites

- Two running Red Hat Ceph Storage data centers in a storage cluster.
- The access key and secret key for each data center in the storage cluster.
- Root-level access to all the Ceph Object Gateway nodes.
- Each data center has its own local realm. They share a realm that replicates on both sites.

Procedure

1. Create one local realm on the first data center in the storage cluster:

Syntax

```
radosgw-admin realm create --rgw-realm=REALM_NAME --default
```

Example

```
[ceph: root@host01 /]# radosgw-admin realm create --rgw-realm=ldc1 --default
```

2. Create one local master zonegroup on the first data center:

Syntax

```
radosgw-admin zonegroup create --rgw-zonegroup=ZONE_GROUP_NAME --
endpoints=http://RGW_NODE_NAME:80 --rgw-realm=REALM_NAME --master --default
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup create --rgw-zonegroup=ldc1zg --
endpoints=http://rgw1:80 --rgw-realm=ldc1 --master --default
```

3. Create one local zone on the first data center:

Syntax

```
radosgw-admin zone create --rgw-zonegroup=ZONE_GROUP_NAME --rgw-
zone=ZONE_NAME --master --default --endpoints=HTTP_FQDN[,HTTP_FQDN]
```

Example

```
[ceph: root@host01 /]# radosgw-admin zone create --rgw-zonegroup=ldc1zg --rgw-
zone=ldc1z --master --default --endpoints=http://rgw.example.com
```

4. Commit the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5. You can either deploy the Ceph Object Gateway daemons with the appropriate realm and zone or update the configuration database:

- Deploy the Ceph Object Gateway using placement specification:

Syntax

```
ceph orch apply rgw SERVICE_NAME --realm=REALM_NAME --zone=ZONE_NAME --
placement="NUMBER_OF_DAEMONS HOST_NAME_1 HOST_NAME_2"
```

Example

```
[ceph: root@host01 /]# ceph orch apply rgw rgw --realm=ldc1 --zone=ldc1z --
placement="1 host01"
```

- Update the Ceph configuration database:

  Syntax

  ```
  ceph config set client.rgw.SERVICE_NAME rgw_realm REALM_NAME
  ceph config set client.rgw.SERVICE_NAME rgw_zonegroup ZONE_GROUP_NAME
  ceph config set client.rgw.SERVICE_NAME rgw_zone ZONE_NAME
  ```

  Example

  ```
  [ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_realm
  ldc1
  [ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp
  rgw_zonegroup ldc1zg
  [ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zone
  ldc1z
  ```

6. Restart the Ceph Object Gateway.

   NOTE

   Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

   a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

      Syntax

      ```
      systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
      ```

      Example

      ```
      [root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
      529020a7702d@rgw.realm.zone.host01.gwasto.service
      ```

   b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

      Syntax

      ```
      ceph orch restart SERVICE_TYPE
      ```

      Example

      ```
      [ceph: root@host01 /]# ceph orch restart rgw
      ```

7. Create one local realm on the second data center in the storage cluster:

   Syntax

   ```
   radosgw-admin realm create --rgw-realm=REALM_NAME --default
   ```

Example

```
[ceph: root@host04 /]# radosgw-admin realm create --rgw-realm=ldc2 --default
```

8. Create one local master zonegroup on the second data center:

Syntax

```
radosgw-admin zonegroup create --rgw-zonegroup=ZONE_GROUP_NAME --
endpoints=http://RGW_NODE_NAME:80 --rgw-realm=REALM_NAME --master --default
```

Example

```
[ceph: root@host04 /]# radosgw-admin zonegroup create --rgw-zonegroup=ldc2zg --
endpoints=http://rgw2:80 --rgw-realm=ldc2 --master --default
```

9. Create one local zone on the second data center:

Syntax

```
radosgw-admin zone create --rgw-zonegroup=ZONE_GROUP_NAME --rgw-
zone=ZONE_NAME --master --default --endpoints=HTTP_FQDN[, HTTP_FQDN]
```

Example

```
[ceph: root@host04 /]# radosgw-admin zone create --rgw-zonegroup=ldc2zg --rgw-
zone=ldc2z --master --default --endpoints=http://rgw.example.com
```

10. Commit the period:

Example

```
[ceph: root@host04 /]# radosgw-admin period update --commit
```

11. You can either deploy the Ceph Object Gateway daemons with the appropriate realm and zone or update the configuration database:

- Deploy the Ceph Object Gateway using placement specification:

  Syntax

  ```
  ceph orch apply rgw SERVICE_NAME --realm=REALM_NAME --zone=ZONE_NAME --
  placement="NUMBER_OF_DAEMONS HOST_NAME_1 HOST_NAME_2"
  ```

  Example

  ```
  [ceph: root@host01 /]# ceph orch apply rgw rgw --realm=ldc2 --zone=ldc2z --
  placement="1 host01"
  ```

- Update the Ceph configuration database:

Syntax

```
ceph config set client.rgw.SERVICE_NAME rgw_realm REALM_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zonegroup ZONE_GROUP_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zone ZONE_NAME
```

Example

```
[ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_realm
ldc2
[ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp
rgw_zonegroup ldc2zg
[ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zone
ldc2z
```

12. Restart the Ceph Object Gateway.

NOTE

Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

a. To restart the Ceph Object Gateway on individual node in the storage cluster:

Syntax

```
systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
```

Example

```
[root@host04 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
529020a7702d@rgw.realm.zone.host01.gwasto.service
```

b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host04 /]# ceph orch restart rgw
```

13. Create a replicated realm on the first data center in the storage cluster:

Syntax

```
radosgw-admin realm create --rgw-realm=REPLICATED_REALM_1 --default
```

Example

```
[ceph: root@host01 /]# radosgw-admin realm create --rgw-realm=rdc1 --default
```

Use the **--default** flag to make the replicated realm default on the primary site.

14. Create a master zonegroup for the first data center:

    Syntax

    ```
    radosgw-admin zonegroup create --rgw-zonegroup=RGW_ZONE_GROUP --
    endpoints=http://_RGW_NODE_NAME:80 --rgw-realm=_RGW_REALM_NAME --master --
    default
    ```

    Example

    ```
    [ceph: root@host01 /]# radosgw-admin zonegroup create --rgw-zonegroup=rdc1zg --
    endpoints=http://rgw1:80 --rgw-realm=rdc1 --master --default
    ```

15. Create a master zone on the first data center:

    Syntax

    ```
    radosgw-admin zone create --rgw-zonegroup=RGW_ZONE_GROUP --rgw-
    zone=_MASTER_RGW_NODE_NAME --master --default --
    endpoints=HTTP_FQDN[,HTTP_FQDN]
    ```

    Example

    ```
    [ceph: root@host01 /]# radosgw-admin zone create --rgw-zonegroup=rdc1zg --rgw-
    zone=rdc1z --master --default --endpoints=http://rgw.example.com
    ```

16. Create a synchronization user and add the system user to the master zone for multi-site:

    Syntax

    ```
    radosgw-admin user create --uid="SYNCHRONIZATION_USER" --display-
    name="Synchronization User" --system
    radosgw-admin zone modify --rgw-zone=RGW_ZONE --access-key=ACCESS_KEY --
    secret=SECRET_KEY
    ```

    Example

    ```
    radosgw-admin user create --uid="synchronization-user" --display-name="Synchronization
    User" --system
    [ceph: root@host01 /]# radosgw-admin zone modify --rgw-zone=rdc1zg --access-
    key=3QV0D6ZMMCJZMSCXJ2QJ --
    secret=VpvQWcsfI9OPzUCpR4kynDLAbqa1OIKqRB6WEnH8
    ```

17. Commit the period:

    Example

    ```
    [ceph: root@host01 /]# radosgw-admin period update --commit
    ```

18. You can either deploy the Ceph Object Gateway daemons with the appropriate realm and zone or update the configuration database:

    - Deploy the Ceph Object Gateway using placement specification:

      Syntax

      ```
      ceph orch apply rgw SERVICE_NAME --realm=REALM_NAME --zone=ZONE_NAME --placement="NUMBER_OF_DAEMONS HOST_NAME_1 HOST_NAME_2"
      ```

      Example

      ```
      [ceph: root@host01 /]# ceph orch apply rgw rgw --realm=rdc1 --zone=rdc1z --placement="1 host01"
      ```

    - Update the Ceph configuration database:

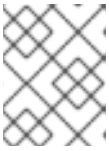
      Syntax

      ```
      ceph config set client.rgw.SERVICE_NAME rgw_realm REALM_NAME
      ceph config set client.rgw.SERVICE_NAME rgw_zonegroup ZONE_GROUP_NAME
      ceph config set client.rgw.SERVICE_NAME rgw_zone ZONE_NAME
      ```

      Example

      ```
      [ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_realm rdc1
      [ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zonegroup rdc1zg
      [ceph: root@host01 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zone rdc1z
      ```

19. Restart the Ceph Object Gateway.

    NOTE

    Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

    a. To restart the Ceph Object Gateway on individual node in the storage cluster:

       Syntax

       ```
       systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
       ```

       Example

       ```
       [root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-529020a7702d@rgw.realm.zone.host01.gwasto.service
       ```

    b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host01 /]# ceph orch restart rgw
```

20. Pull the replicated realm on the second data center:

Syntax

```
radosgw-admin realm pull --url=https://tower-osd1.cephtips.com --access-key=ACCESS_KEY --secret-key=SECRET_KEY
```

Example

```
[ceph: root@host01 /]# radosgw-admin realm pull --url=https://tower-osd1.cephtips.com --access-key=3QV0D6ZMMCJZMSCXJ2QJ --secret-key=VpvQWcsfI9OPzUCpR4kynDLAbqa1OIKqRB6WEnH8
```

21. Pull the period from the first data center:

Syntax

```
radosgw-admin period pull --url=https://tower-osd1.cephtips.com --access-key=ACCESS_KEY --secret-key=SECRET_KEY
```

Example

```
[ceph: root@host01 /]# radosgw-admin period pull --url=https://tower-osd1.cephtips.com --access-key=3QV0D6ZMMCJZMSCXJ2QJ --secret-key=VpvQWcsfI9OPzUCpR4kynDLAbqa1OIKqRB6WEnH8
```

22. Create the secondary zone on the second data center:

Syntax

```
radosgw-admin zone create --rgw-zone=RGW_ZONE --rgw-zonegroup=RGW_ZONE_GROUP --endpoints=https://tower-osd4.cephtips.com --access-key=_ACCESS_KEY --secret-key=SECRET_KEY
```

Example

```
[ceph: root@host04 /]# radosgw-admin zone create --rgw-zone=rdc2z --rgw-zonegroup=rdc1zg --endpoints=https://tower-osd4.cephtips.com --access-key=3QV0D6ZMMCJZMSCXJ2QJ --secret-key=VpvQWcsfI9OPzUCpR4kynDLAbqa1OIKqRB6WEnH8
```

23. Commit the period:

Example

```
[ceph: root@host04 /]# radosgw-admin period update --commit
```

24. You can either deploy the Ceph Object Gateway daemons with the appropriate realm and zone or update the configuration database:

- Deploy the Ceph Object Gateway using placement specification:

Syntax

```
ceph orch apply rgw SERVICE_NAME --realm=REALM_NAME --zone=ZONE_NAME --placement="NUMBER_OF_DAEMONS HOST_NAME_1 HOST_NAME_2"
```

Example

```
[ceph: root@host04 /]# ceph orch apply rgw rgw --realm=rdc1 --zone=rdc2z --placement="1 host04"
```

- Update the Ceph configuration database:

Syntax

```
ceph config set client.rgw.SERVICE_NAME rgw_realm REALM_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zonegroup ZONE_GROUP_NAME
ceph config set client.rgw.SERVICE_NAME rgw_zone ZONE_NAME
```

Example

```
[ceph: root@host04 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_realm rdc1
[ceph: root@host04 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zonegroup rdc1zg
[ceph: root@host04 /]# ceph config set client.rgw.rgwsvcid.mons-1.jwgwwp rgw_zone rdc2z
```

25. Restart the Ceph Object Gateway.

NOTE

Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

a. To restart the Ceph Object Gateway on individual node in the storage cluster:

Syntax

```
systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
```

Example

```
[root@host02 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
529020a7702d@rgw.realm.zone.host01.gwasto.service
```

b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host04 /]# ceph orch restart rgw
```

26. Log in as **root** on the endpoint for the second data center.

27. Verify the synchronization status on the master realm:

Syntax

```
radosgw-admin sync status
```

Example

```
[ceph: root@host04 /]# radosgw-admin sync status
          realm 59762f08-470c-46de-b2b1-d92c50986e67 (ldc2)
      zonegroup 7cf8daf8-d279-4d5c-b73e-c7fd2af65197 (ldc2zg)
           zone 034ae8d3-ae0c-4e35-8760-134782cb4196 (ldc2z)
  metadata sync no sync (zone is master)
```

28. Log in as **root** on the endpoint for the first data center.

29. Verify the synchronization status for the replication-synchronization realm:

Syntax

```
radosgw-admin sync status --rgw-realm RGW_REALM_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin sync status --rgw-realm rdc1
          realm 73c7b801-3736-4a89-aaf8-e23c96e6e29d (rdc1)
      zonegroup d67cc9c9-690a-4076-89b8-e8127d868398 (rdc1zg)
           zone 67584789-375b-4d61-8f12-d1cf71998b38 (rdc2z)
  metadata sync syncing
                full sync: 0/64 shards
                incremental sync: 64/64 shards
                metadata is caught up with master
      data sync source: 705ff9b0-68d5-4475-9017-452107cec9a0 (rdc1z)
                        syncing
                        full sync: 0/128 shards
                        incremental sync: 128/128 shards
                        data is caught up with source
```

```
          realm 73c7b801-3736-4a89-aaf8-e23c96e6e29d (rdc1)
      zonegroup d67cc9c9-690a-4076-89b8-e8127d868398 (rdc1zg)
           zone 67584789-375b-4d61-8f12-d1cf71998b38 (rdc2z)
  metadata sync syncing
                full sync: 0/64 shards
                incremental sync: 64/64 shards
                metadata is caught up with master
     data sync source: 705ff9b0-68d5-4475-9017-452107cec9a0 (rdc1z)
                      syncing
                      full sync: 0/128 shards
                      incremental sync: 128/128 shards
                      data is caught up with source
```

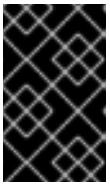
30. To store and access data in the local site, create the user for local realm:

Syntax

```
radosgw-admin user create --uid="LOCAL_USER" --display-name="Local user" --rgw-realm=_REALM_NAME --rgw-zonegroup=ZONE_GROUP_NAME --rgw-zone=ZONE_NAME
```

Example

```
[ceph: root@host04 /]# radosgw-admin user create --uid="local-user" --display-name="Local user" --rgw-realm=ldc1 --rgw-zonegroup=ldc1zg --rgw-zone=ldc1z
```



IMPORTANT

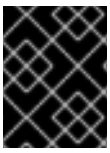
By default, users are created under the default realm. For the users to access data in the local realm, the **radosgw-admin** command requires the **--rgw-realm** argument.

5.9. USING MULTI-SITE SYNC POLICIES

As a storage administrator, you can use multi-site sync policies at the bucket level to control data movement between buckets in different zones. These policies are called bucket-granularity sync policies. Previously, all buckets within zones were treated symmetrically. This means that each zone contained a mirror copy of a given bucket, and the copies of buckets were identical in all of the zones. The sync process assumed that the bucket sync source and the bucket sync destination referred to the same bucket.

IMPORTANT

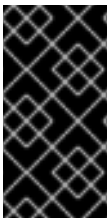
Bucket sync policies apply to data only, and metadata is synced across all the zones in the multi-site irrespective of the presence of the the bucket sync policies. Objects that were created, modified, or deleted when the bucket sync policy was in **allowed** or **forbidden** place, it does not automatically sync when policy takes effect. Run the **bucket sync run** command to sync these objects.



IMPORTANT

If there are multiple sync policies defined at zonegroup level, only one policy can be in enabled state at any time. We can toggle between policies if needed

The sync policy supersedes the old zone group coarse configuration (**sync_from***). The sync policy can be configured at the zone group level. If it is configured, it replaces the old-style configuration at the zone group level, but it can also be configured at the bucket level.



IMPORTANT

The bucket sync policies are applicable to the archive zones. The movement from an archive zone is not bidirectional wherein all the objects can be moved from active zone to archive zone. However, you cannot move objects from the archive zone to active zone since archive zone is read-only.

Example for bucket sync policy for zone groups

```
[ceph: root@host01 /]# radosgw-admin sync info --bucket=buck
{
    "sources": [
        {
            "id": "pipe1",
            "source": {
                "zone": "us-east",
                "bucket": "buck:115b12b3-....4409.1"
            },
            "dest": {
                "zone": "us-west",
                "bucket": "buck:115b12b3-....4409.1"
            },
           ...
        }
    ],
    "dests": [
        {
            "id": "pipe1",
            "source": {
                "zone": "us-west",
                "bucket": "buck:115b12b3-....4409.1"
            },
            "dest": {
                "zone": "us-east",
                "bucket": "buck:115b12b3-....4409.1"
            },
           ...
        },
        {
            "id": "pipe1",
            "source": {
                "zone": "us-west",
                "bucket": "buck:115b12b3-....4409.1"
            },
            "dest": {
                "zone": "us-west-2",
                "bucket": "buck:115b12b3-....4409.1"
            },
           ...
        }
```

```
    ],
    ...
}
```

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to a Ceph Monitor node.
- Installation of the Ceph Object Gateway software.

5.9.1. Multi-site sync policy group state

In the sync policy, multiple groups that can contain lists of data-flow configurations can be defined, as well as lists of pipe configurations. The data-flow defines the flow of data between the different zones. It can define symmetrical data flow, in which multiple zones sync data from each other, and it can define directional data flow, in which the data moves in one way from one zone to another.

A pipe defines the actual buckets that can use these data flows, and the properties that are associated with it, such as the source object prefix.

A sync policy group can be in 3 states:

- **enabled** – sync is allowed and enabled.
- **allowed** – sync is allowed.
- **forbidden** – sync, as defined by this group, is not allowed.

When the zones replicate, you can disable replication for specific buckets using the sync policy. The following are the semantics that need to be followed to resolve the policy conflicts:

Zonegroup	Bucket	Result
enabled	enabled	enabled
enabled	allowed	enabled
enabled	forbidden	disabled
allowed	enabled	enabled
allowed	allowed	disabled
allowed	forbidden	disabled
forbidden	enabled	disabled
forbidden	allowed	disabled

Zonegroup	Bucket	Result
forbidden	forbidden	disabled

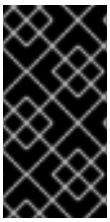
For multiple group polices that are set to reflect for any sync pair (*SOURCE_ZONE*, *SOURCE_BUCKET*), (*DESTINATION_ZONE*, *DESTINATION_BUCKET*), the following rules are applied in the following order:

- Even if one sync policy is **forbidden**, the sync is **disabled**.
- At least one policy should be **enabled** for the sync to be **allowed**.

Sync states in this group can override other groups.

A policy can be defined at the bucket level. A bucket level sync policy inherits the data flow of the zonegroup policy, and can only define a subset of what the zonegroup allows.

A wildcard zone, and a wildcard bucket parameter in the policy defines all relevant zones, or all relevant buckets. In the context of a bucket policy, it means the current bucket instance. A disaster recovery configuration where entire zones are mirrored does not require configuring anything on the buckets. However, for a fine grained bucket sync it would be better to configure the pipes to be synced by allowing (**status=allowed**) them at the zonegroup level (for example, by using wildcard). However, enable the specific sync at the bucket level (**status=enabled**) only. If needed, the policy at the bucket level can limit the data movement to specific relevant zones.



IMPORTANT

Any changes to the zonegroup policy need to be applied on the zonegroup master zone, and require period update and commit. Changes to the bucket policy need to be applied on the zonegroup master zone. Ceph Object Gateway handles these changes dynamically.

S3 bucket replication API

The S3 bucket replication API is implemented, and allows users to create replication rules between different buckets. Note though that while the AWS replication feature allows bucket replication within the same zone, Ceph Object Gateway does not allow it at the moment. However, the Ceph Object Gateway API also added a **Zone** array that allows users to select to what zones the specific bucket will be synced.

Additional Resources

- See *S3 bucket replication API* for more details.

5.9.2. Retrieving the current policy

You can use the **get** command to retrieve the current zonegroup sync policy, or a specific bucket policy.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.

- The Ceph Object Gateway is installed.

Procedure

- Retrieve the current zonegroup sync policy or bucket policy. To retrieve a specific bucket policy, use the **--bucket** option:

  Syntax

  ```
  radosgw-admin sync policy get --bucket=BUCKET_NAME
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin sync policy get --bucket=mybucket
  ```

5.9.3. Creating a sync policy group

You can create a sync policy group for the current zone group, or for a specific bucket.

When creating a sync policy for bucket granular replication for a sync policy group that has changed from **forbidden** to **enabled**, a manual update might be necessary to complete the sync process.

For example, if any data is written to **bucket1** when its policy is **forbidden**, the data might not sync properly across zones after the policy is changed to **enabled**. To properly sync the changes, run the **bucket sync run** command on the sync policy. This step is also necessary if the bucket is resharded when the policy is **forbidden**. In this case the **bucket sync run** command must also be used after enabling the policy.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.
- When creating for an archive zone, be sure that the archive zone is created before the sync policy group.

Procedure

1. Create a sync policy group or a bucket policy. To create a bucket policy, use the **--bucket** option:

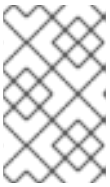
   Syntax

   ```
   radosgw-admin sync group create --bucket=BUCKET_NAME --group-id=GROUP_ID --
   status=enabled | allowed | forbidden
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group create --group-id=mygroup1 --
   status=enabled
   ```

2. Optional: Manually complete the sync process for bucket granular replication.



NOTE

This step is mandatory when using as part of an archive zone with bucket granular replication if the policy has data written or the bucket was resharded when the policy was **forbidden**.

Syntax

```
radosgw-admin bucket sync run
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket sync run
```

Additional Resources

For more information about configuring an archive zone and bucket granular replication, see Configuring the archive zone.

5.9.4. Modifying a sync policy group

You can modify an existing sync policy group for the current zone group, or for a specific bucket.

When modifying a sync policy for bucket granular replication for a sync policy group that has changed from **forbidden** to **enabled**, a manual update might be necessary in order to complete the sync process.

For example, if any data is written to **bucket1** when its policy is **forbidden**, the data might not sync properly across zones after the policy is changed to **enabled**. To properly sync the changes, run the **bucket sync run** command on the sync policy. This step is also necessary if the bucket is resharded when the policy is **forbidden**. In this case the **bucket sync run** command must also be used after enabling the policy.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.
- When modifying for an archive zone, be sure that the archive zone is created before the sync policy group.

Procedure

1. Modify the sync policy group or a bucket policy. To modify a bucket policy, use the **--bucket** option.

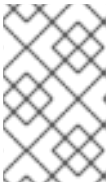
Syntax

```
radosgw-admin sync group modify --bucket=BUCKET_NAME --group-id=GROUP_ID --
status=enabled | allowed | forbidden
```

Example

```
[ceph: root@host01 /]# radosgw-admin sync group modify --group-id=mygroup1 --
status=forbidden
```

2. Optional: Manually complete the sync process for bucket granular replication.



NOTE

This step is mandatory when using as part of an archive zone with bucket granular replication if the policy has data written or the bucket was resharded when the policy was **forbidden**.

Syntax

```
radosgw-admin bucket sync run
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket sync run
```

Additional Resources

For more information about configuring an archive zone and bucket granular replication, see Configuring the archive zone.

5.9.5. Getting a sync policy group

You can use the **group get** command to show the current sync policy group by group ID, or to show a specific bucket policy.

If the **--bucket** option is not provided, the groups created at zonegroup level is retrieved and not the groups at the bucket-level.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.

Procedure

- Show the current sync policy group or bucket policy. To show a specific bucket policy, use the **--bucket** option:

  Syntax

```
radosgw-admin sync group get --bucket=BUCKET_NAME --group-id=GROUP_ID
```

Example

```
[ceph: root@host01 /]# radosgw-admin sync group get --group-id=mygroup
```

5.9.6. Removing a sync policy group

You can use the **group remove** command to remove the current sync policy group by group ID, or to remove a specific bucket policy.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.

Procedure

- Remove the current sync policy group or bucket policy. To remove a specific bucket policy, use the **--bucket** option:

  Syntax

  ```
  radosgw-admin sync group remove --bucket=BUCKET_NAME --group-id=GROUP_ID
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin sync group remove --group-id=mygroup
  ```

5.9.7. Creating a sync flow

You can create two different types of flows for a sync policy group or for a specific bucket:

- Directional sync flow
- Symmetrical sync flow

The **group flow create** command creates a sync flow. If you issue the **group flow create** command for a sync policy group or bucket that already has a sync flow, the command overwrites the existing settings for the sync flow and applies the settings you specify.

Option	Description	Required/Optional
--bucket	Name of the bucket to which the sync policy needs to be configured. Used only in bucket-level sync policy.	Optional

Option	Description	Required/Optional
--group-id	ID of the sync group.	Required
--flow-id	ID of the flow.	Required
--flow-type	Types of flows for a sync policy group or for a specific bucket - directional or symmetrical.	Required
--source-zone	To specify the source zone from which sync should happen. Zone that send data to the sync group. Required if flow type of sync group is directional.	Optional
--dest-zone	To specify the destination zone to which sync should happen. Zone that receive data from the sync group. Required if flow type of sync group is directional.	Optional
--zones	Zones that part of the sync group. Zones mention will be both sender and receiver zone. Specify zones separated by ",". Required if flow type of sync group is symmetrical.	Optional

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.

Procedure

1. Create or update a directional sync flow. To create or update directional sync flow for a specific bucket, use the **--bucket** option.

   #### Syntax

   ```
   radosgw-admin sync group flow create --bucket=BUCKET_NAME --group-id=GROUP_ID --flow-id=FLOW_ID --flow-type=directional --source-zone=SOURCE_ZONE --dest-zone=DESTINATION_ZONE
   ```

2. Create or update a symmetrical sync flow. To specify multiple zones for a symmetrical flow type, use a comma-separated list for the **--zones** option.

   #### Syntax

   ■

```
radosgw-admin sync group flow create --bucket=BUCKET_NAME --group-id=GROUP_ID --
flow-id=FLOW_ID --flow-type=symmetrical --zones=ZONE_NAME1,ZONE_NAME2
```

zones are comma-separated lists of all zones that need to be added to the flow.

5.9.8. Removing sync flows and zones

The **group flow remove** command removes sync flows or zones from a sync policy group or bucket.

For sync policy groups or buckets using directional flows, **group flow remove** command removes the flow. For sync policy groups or buckets using symmetrical flows, you can use the **group flow remove** command to remove specified zones from the flow, or to remove the flow.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.

Procedure

1. Remove a directional sync flow. To remove the directional sync flow for a specific bucket, use the **--bucket** option.

   Syntax

   ```
   radosgw-admin sync group flow remove --bucket=BUCKET_NAME --group-id=GROUP_ID --
   flow-id=FLOW_ID --flow-type=directional --source-zone=SOURCE_ZONE --dest-
   zone=DESTINATION_ZONE
   ```

2. Remove specific zones from a symmetrical sync flow. To remove multiple zones from a symmetrical flow, use a comma-separated list for the **--zones** option.

   Syntax

   ```
   radosgw-admin sync group flow remove --bucket=BUCKET_NAME --group-id=GROUP_ID --
   flow-id=FLOW_ID --flow-type=symmetrical --zones=ZONE_NAME1,ZONE_NAME2
   ```

3. Remove a symmetrical sync flow. To remove the sync flow at the zonegroup level, remove the **--bucket** option.

   Syntax

   ```
   radosgw-admin sync group flow remove --group-id=GROUP_ID --flow-id=FLOW_ID --flow-
   type=symmetrical --zones=ZONE_NAME1,ZONE_NAME2
   ```

5.9.9. Creating or modifying a sync group pipe

As a storage administrator, you can define pipes to specify which buckets can use your configured data flows and the properties associated with those data flows.

The **sync group pipe create** command enables you to create pipes, which are custom sync group data flows between specific buckets or groups of buckets, or between specific zones or groups of zones.

This command uses the following options:

Option	Description	Required/Optional
--bucket	Name of the bucket to which sync policy need to be configured. Used only in bucket-level sync policy.	Optional
--group-id	ID of the sync group	Required
--pipe-id	ID of the pipe	Required
--source-zones	Zones that send data to the sync group. Use single quotes (') for value. Use commas to separate multiple zones. Use the wildcard * for all zones that match the data flow rules.	Required
--source-bucket	Bucket or buckets that send data to the sync group. If bucket name is not mentioned, then * (wildcard) is taken as the default value. At bucket-level, source bucket will be the bucket for which the sync group created and at zonegroup-level, source bucket will be all buckets.	Optional
--source-bucket-id	ID of the source bucket.	Optional
--dest-zones	Zone or zones that receive the sync data. Use single quotes (') for value. Use commas to separate multiple zones. Use the wildcard * for all zones that match the data flow rules.	Required
--dest-bucket	Bucket or buckets that receive the sync data. If bucket name is not mentioned, then * (wildcard) is taken as the default value. At bucket-level, destination bucket will be the bucket for which the sync group is created and at zonegroup-level, destination bucket will be all buckets	Optional

Option	Description	Required/Optional
--dest-bucket-id	ID of the destination bucket.	Optional
--prefix	Bucket prefix. Use the wildcard * to filter for source objects.	Optional
--prefix-rm	Do not use bucket prefix for filtering.	Optional
--tags-add	Comma-separated list of key=value pairs.	Optional
--tags-rm	Removes one or more key=value pairs of tags.	Optional
--dest-owner	Destination owner of the objects from source.	Optional
--storage-class	Destination storage class for the objects from source.	Optional
--mode	Use **system** for system mode or **user** for user mode.	Optional
--uid	Used for permissions validation in user mode. Specifies the user ID under which the sync operation will be issued.	Optional

NOTE

If you want to enable/disable sync for a specific bucket at a zonegroup level, set the zonegroup level sync policy to enable/disable and create a pipe for each bucket with **--source-bucket** and **--dest-bucket** with the same bucket name or with **bucket-id**, i.e, **--source-bucket-id** and **--dest-bucket-id**.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.

Procedure

- Create the sync group pipe. The **create** command is also used to update a command by creating the sync group pipe with only the relevant options.

  Syntax

Syntax

```
radosgw-admin sync group pipe create --bucket=BUCKET_NAME --group-id=GROUP_ID --pipe-id=PIPE_ID --source-zones='ZONE_NAME','ZONE_NAME2'... --source-bucket=SOURCE_BUCKET --source-bucket-id=SOURCE_BUCKET_ID --dest-zones='ZONE_NAME','ZONE_NAME2'... --dest-bucket=DESTINATION_BUCKET --dest-bucket-id=DESTINATION_BUCKET_ID --prefix=SOURCE_PREFIX --prefix-rm --tags-add=KEY1=VALUE1,KEY2=VALUE2,.. --tags-rm=KEY1=VALUE1,KEY2=VALUE2, ... --dest-owner=OWNER_ID --storage-class=STORAGE_CLASS --mode=USER --uid=USER_ID
```

5.9.10. Modifying or deleting a sync group pipe

As a storage administrator, you can use the **sync group pipe modify** command or **sync group pipe remove** command to modify the sync group pipe by removing certain options. You can also use **sync group pipe remove** command to remove zones, buckets, or the sync group pipe completely.

Prerequisites

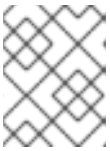
- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.

Procedure

- Modify the sync group pipe options with the **modify** argument.

  #### Syntax

  ```
  radosgw-admin sync group pipe modify --bucket=BUCKET_NAME --group-id=GROUP_ID --pipe-id=PIPE_ID --source-zones='ZONE_NAME','ZONE_NAME2'... --source-bucket=SOURCE_BUCKET1 --source-bucket-id=SOURCE_BUCKET_ID --dest-zones='ZONE_NAME','ZONE_NAME2'... --dest-bucket=DESTINATION_BUCKET1 --dest-bucket-id=_DESTINATION_BUCKET-ID
  ```

  #### NOTE

  Ensure to put the zones in single quotes ('). The source bucket does not need the quotes.

  #### Example

  ```
  [root@host01 ~]# radosgw-admin sync group pipe modify --group-id=zonegroup --pipe-id=pipe --dest-zones='primary','secondary','tertiary' --source-zones='primary','secondary','tertiary' --source-bucket=pri-bkt-1 --dest-bucket=pri-bkt-1
  ```

- Modify the sync group pipe options with the **remove** argument.

  #### Syntax

  ```
  radosgw-admin sync group pipe remove --bucket=BUCKET_NAME --group-id=GROUP_ID --pipe-id=PIPE_ID --source-zones='ZONE_NAME','ZONE_NAME2'... --source-
  ```

```
bucket=SOURCE_BUCKET, --source-bucket-id=SOURCE_BUCKET_ID --dest-
zones='ZONE_NAME','ZONE_NAME2'... --dest-bucket=DESTINATION_BUCKET --dest-
bucket-id=DESTINATION_BUCKET-ID
```

Example

```
[root@host01 ~]# radosgw-admin sync group pipe remove --group-id=zonegroup --pipe-
id=pipe --dest-zones='primary','secondary','tertiary' --source-
zones='primary','secondary','tertiary' --source-bucket=pri-bkt-1 --dest-bucket=pri-bkt-1
```

- Delete a sync group pipe.

  Syntax

```
radosgw-admin sync group pipe remove --bucket=BUCKET_NAME --group-id=GROUP_ID -
-pipe-id=PIPE_ID
```

  Example

```
[root@host01 ~]# radosgw-admin sync group pipe remove -bucket-name=mybuck --group-
id=zonegroup --pipe-id=pipe
```

5.9.11. Obtaining information about sync operations

The **sync info** command enables you to get information about the expected sync sources and targets, as defined by the sync policy.

When you create a sync policy for a bucket, that policy defines how data moves from that bucket toward a different bucket in a different zone. Creating the policy also creates a list of bucket dependencies that are used as hints whenever that bucket syncs with another bucket. Note that a bucket can refer to another bucket without actually syncing to it, since syncing depends on whether the data flow allows the sync to take place.

Both the **--bucket** and **effective-zone-name** parameters are optional. If you invoke the **sync info** command without specifying any options, the Object Gateway returns all of the sync operations defined by the sync policy in all zones.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root or **sudo** access.
- The Ceph Object Gateway is installed.
- A group sync policy is defined.

Procedure

- Get information about sync operations for buckets:

  Syntax

```
radosgw-admin sync info --bucket=BUCKET_NAME --effective-zone-name=ZONE_NAME
```

- Get information about sync operations at the zonegroup level:

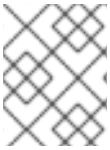
  Syntax

  ```
  radosgw-admin sync info
  ```

5.10. BUCKET GRANULAR SYNC POLICIES

The following features are now supported:

- **Greenfield deployment**: This release supports new multi-site deployments. To set up bucket granular sync replication, a new zonegroup/zone must be configured at a minimum.
- **Brownfield deployment**: Migrate or upgrade Ceph Object Gateway multi-site replication configurations to the newly featured Ceph Object Gateway bucket granular sync policy replication.



NOTE

Ensure that all the nodes in the storage cluster are in the same schema during the upgrade.

- **Data flow - directional, symmetrical**: Both unidirectional and bi-directional/symmetrical replication can be configured.

IMPORTANT

In this release, the following features are not supported:

- **Source filters**
- **Storage class**
- **Destination owner translation**
- **User mode**

When the sync policy of bucket or zonegroup, moves from **disabled** to **enabled** state, the below behavioral changes are observed:

Normal scenario:

- Zonegroup level: Data written when the sync policy is *disabled* catches up as soon as it's *enabled*, with no additional steps.
- Bucket level: Data written when the sync policy is *disabled* does not catch up when the policy is *enabled*. In this case, either one of the below two workarounds can be applied:
  - Writing new data to the bucket re-synchronizes the old data.
  - Executing **bucket sync run** command syncs all the old data.

NOTE

When you want to toggle from the sync policy to the legacy policy, you need to first run the **sync init** command followed by the **radosgw-admin bucket sync run** command to sync all the objects.

Reshard scenario:

- Zonegroup level: Any reshard that happens when the policy is **disabled**, sync gets stuck after the policy is **enabled** again. New objects also do not sync at this point. Run the **bucket sync run** command as a workaround.
- Bucket level: If any bucket is resharded when the policy is **disabled**, sync gets stuck after the policy is *enabled* again. New objects also do not sync at this point. Run the **bucket sync run** command as a workaround.

NOTE

When the policy is set to **enabled** for the zonegroup and the policy is set to **enabled** or **allowed** for the bucket, the pipe configuration takes effect from zonegroup level and not at the bucket level. This is a known issue BZ#2240719.

5.10.1. Setting bi-directional policy for zonegroups

Zonegroup sync policies are created with the new sync policy engine. Any change to the zonegroup sync policy requires a period update and a commit.

In the below example, create a group policy and define a data flow for the movement of data from one zone to another. Configure a pipe for the zonegroups to define the buckets that can use this data flow. The system in the below examples include 3 zones: *us-east* (the master zone), *us-west*, and *us-west-2*.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.

Procedure

1. Create a new sync group with the status set to *allowed*.

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group create --group-id=group1 --
   status=allowed
   ```

   NOTE

   Until a fully configured zonegroup replication policy is created, it is recommended to set the *--status* to **allowed**, to prevent the replication from starting.

2. Create a flow policy for the newly created group with the *--flow-type* set as **symmetrical** to enable bi-directional replication.

Example

```
[ceph: root@host01 /]# radosgw-admin sync group flow create --group-id=group1 \
                    --flow-id=flow-mirror --flow-type=symmetrical \
                    --zones=us-east,us-west
```

3. Create a new pipe called **pipe**.

Example

```
[ceph: root@host01 /]# radosgw-admin sync group pipe create --group-id=group1 \
                     --pipe-id=pipe1 --source-zones='*' \
                     --source-bucket='*' --dest-zones='*' \
                     --dest-bucket='*'
```

NOTE

Use the * wildcard for zones to include all zones set in the previous flow policy, and * for buckets to replicate all existing buckets in the zones.

4. After configuring the bucket sync policy, set the *--status* to *enabled*.

Example

```
[ceph: root@host01 /]# radosgw-admin sync group modify --group-id=group1 --
status=enabled
```

5. Update and commit the new period.

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

NOTE

Updating and committing the period is mandatory for a zonegroup policy.

6. Optional: Check the sync source, and destination for a specific bucket. All buckets in zones *us-east* and *us-west* replicates bi-directionally.

Example

```
[ceph: root@host01 /]# radosgw-admin sync info -bucket buck
{
    "sources": [
        {
            "id": "pipe1",
            "source": {
                "zone": "us-east",
                "bucket": "buck:115b12b3-....4409.1"
            },
            "dest": {
```

```
                "zone": "us-west",
                "bucket": "buck:115b12b3-....4409.1"
            },
            ...
        }
    ],
    "dests": [
        {
            "id": "pipe1",
            "source": {
                "zone": "us-west",
                "bucket": "buck:115b12b3-....4409.1"
            },
            "dest": {
                "zone": "us-east",
                "bucket": "buck:115b12b3-....4409.1"
            },
            ...
        }
    ],
    ...
}
```

The *id* field in the above output reflects the pipe rule that generated that entry. A single rule can generate multiple sync entries as seen in the below example.

5.10.2. Setting directional policy for zonegroups

Set the policy for zone groups uni directionally with the sync policy engine.

In the following example, create a group policy and configure the data flow for the movement of data from one zone to another. Also, configure a pipe for the zonegroups to define the buckets that can use this data flow. The system in the following examples includes 3 zones: **us-east** (the primary zone), **us-west** (secondary zone), and **us-west-2** (backup zone). Here, **us-west-2** is a replica of **us-west**, but data is not replicated back from it.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.

Procedure

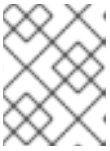
1. On the primary zone, create a new sync group with the status set to *allowed*.

   Syntax

   ```
   radosgw-admin sync group create --group-id=GROUP_ID --status=allowed
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group create --group-id=group1 --
   status=allowed
   ```



NOTE

Until a fully configured zonegroup replication policy is created, it is recommended to set the **--status** to **allowed**, to prevent the replication from starting.

2. Create the flow.

Syntax

```
radosgw-admin sync group flow create --group-id=GROUP_ID --flow-id=FLOW_ID --flow-type=directional --source-zone=SOURCE_ZONE_NAME --dest-zone=DESTINATION_ZONE_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin sync group flow create --group-id=group1 --flow-id=us-west-backup --flow-type=directional --source-zone=us-west --dest-zone=us-west-2
```

3. Create the pipe.

Syntax

```
radosgw-admin sync group pipe create --group-id=GROUP_ID --pipe-id=PIPE_ID --source-zones='SOURCE_ZONE_NAME' --dest-zones='DESTINATION_ZONE_NAME'
```

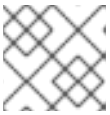
Example

```
[ceph: root@host01 /]# radosgw-admin sync group pipe create --group-id=group1 --pipe-id=pipe1 --source-zones='us-west' --dest-zones='us-west-2'
```

4. Update and commit the new period.

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```



NOTE

Updating and committing the period is mandatory for a zonegroup policy.

5. Verify source and destination of zonegroup using sync info in both the sites.

Syntax

```
radosgw-admin sync info
```

5.10.3. Setting directional policy for buckets

Set the policy for buckets uni directionally with the sync policy engine.

In the following example, create a group policy and configure the data flow for the movement of data

from one zone to another. Also, configure a pipe for the zonegroups to define the buckets that can use this data flow. The system in the following examples includes 3 zones: **us-east** (the primary zone), **us-west** (secondary zone), and **us-west-2** (backup zone). Here, **us-west-2** is a replica of **us-west**, but data is not replicated back from it.

The difference between setting the directional policy for zonegroups and buckets is that you need to specify the **--bucket** option.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.

Procedure

1. On the primary zone, create a new sync group with the status set to *allowed*.

   #### Syntax

   ```
   radosgw-admin sync group create --group-id=GROUP_ID --status=allowed --
   bucket=BUCKET_NAME
   ```

   #### Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group create --group-id=group1 --
   status=allowed --bucket=buck
   ```

   #### NOTE

   Until a fully configured zonegroup replication policy is created, it is recommended to set the **--status** to **allowed**, to prevent the replication from starting.

2. Create the flow.

   #### Syntax

   ```
   radosgw-admin sync group flow create --bucket-name=BUCKET_NAME --group-
   id=GROUP_ID --flow-id=FLOW_ID --flow-type=directional --source-
   zone=SOURCE_ZONE_NAME --dest-zone=DESTINATION_ZONE_NAME
   ```

   #### Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group flow create --bucket-name=buck --group-
   id=group1 --flow-id=us-west-backup --flow-type=directional --source-zone=us-west --dest-
   zone=us-west-2
   ```

3. Create the pipe.

   #### Syntax

```
radosgw-admin sync group pipe create --group-id=GROUP_ID --bucket-
name=BUCKET_NAME --pipe-id=PIPE_ID  --source-zones='SOURCE_ZONE_NAME' --
dest-zones='DESTINATION_ZONE_NAME'
```

Example

```
[ceph: root@host01 /]# radosgw-admin sync group pipe create --group-id=group1 --bucket-
name=buck --pipe-id=pipe1 --source-zones='us-west' --dest-zones='us-west-2'
```

4. Verify source and destination of zonegroup using sync info in both the sites.

Syntax

```
radosgw-admin sync info --bucket-name=BUCKET_NAME
```

5.10.4. Setting bi-directional policy for buckets

The data flow for the bucket-level policy is inherited from the zonegroup policy. The data flow and pipes need not be changed for the bucket-level policy, as the bucket-level policy flow and pipes are only be a subset of the flow defined in the zonegroup policy.

NOTE

- A bucket-level policy can *enable* pipes that are not enabled, except *forbidden*, at the zonegroup policy.
- Bucket-level policies do not require period updates.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.
- A sync flow is created.

Procedure

1. Set the zonegroup policy **--status** to **allowed** to permit per-bucket replication.

Example

```
[ceph: root@host01 /]# radosgw-admin sync group modify --group-id=group1 --
status=allowed
```

2. Update the period after modifying the zonegroup policy.

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

3. Create a sync group for the bucket we want to synchronize to and set **--status** to **enabled**.

Example

```
[ceph: root@host01 /]# radosgw-admin sync group create --bucket=buck \
                      --group-id=buck-default --status=enabled
```

4. Create a pipe for the group that was created in the previous step. The flow is inherited from the zonegroup level policy where data flow is symmetrical.

Example

```
[ceph: root@host01 /]# radosgw-admin sync group pipe create --bucket=buck \
                      --group-id=buck-default --pipe-id=pipe1 \
                      --source-zones='*' --dest-zones='*'
```

NOTE

Use wildcards * to specify the source and destination zones for the bucket replication.

5. Optional: To retrieve information about the expected bucket sync sources and targets, as defined by the sync policy, run the **radosgw-admin bucket sync info** command with the **--bucket** flag.

Example

```
[ceph: root@host01 /]# radosgw-admin bucket sync info --bucket buck
realm 33157555-f387-44fc-b4b4-3f9c0b32cd66 (india)
zonegroup 594f1f63-de6f-4e1e-90b6-105114d7ad55 (shared)
zone ffaa5ba4-c1bd-4c17-b176-2fe34004b4c5 (primary)
bucket :buck[ffaa5ba4-c1bd-4c17-b176-2fe34004b4c5.16191.1]

source zone e0e75beb-4e28-45ff-8d48-9710de06dcd0
bucket :buck[ffaa5ba4-c1bd-4c17-b176-2fe34004b4c5.16191.1]
```

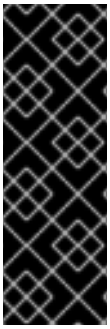
6. Optional: To retrieve information about the expected sync sources and targets, as defined by the sync policy, run the **radosgw-admin sync info** command with the *--bucket* flag.

Example

```
[ceph: root@host01 /]# radosgw-admin sync info --bucket buck
{
    "id": "pipe1",
    "source": {
        "zone": "secondary",
        "bucket": "buck:ffaa5ba4-c1bd-4c17-b176-2fe34004b4c5.16191.1"
    },
    "dest": {
        "zone": "primary",
        "bucket": "buck:ffaa5ba4-c1bd-4c17-b176-2fe34004b4c5.16191.1"
    },
    "params": {
        "source": {
            "filter": {
```

```
                "tags": []
            }
        },
        "dest": {},
        "priority": 0,
        "mode": "system",
        "user": ""
    }
},
    {
    "id": "pipe1",
    "source": {
        "zone": "primary",
        "bucket": "buck:ffaa5ba4-c1bd-4c17-b176-2fe34004b4c5.16191.1"
    },
    "dest": {
        "zone": "secondary",
        "bucket": "buck:ffaa5ba4-c1bd-4c17-b176-2fe34004b4c5.16191.1"
    },
    "params": {
        "source": {
            "filter": {
                "tags": []
            }
        },
        "dest": {},
        "priority": 0,
        "mode": "system",
        "user": ""
    }
}
```


5.10.5. Syncing between buckets (Technology Preview)



IMPORTANT

Syncing between buckets is a Technology Preview feature only for Red Hat Ceph Storage 7.0. Technology Preview features are not supported with Red Hat production service level agreements (SLAs), might not be functionally complete, and Red Hat does not recommend using them for production. These features provide early access to upcoming product features, enabling customers to test functionality and provide feedback during the development process. See the support scope for Red Hat Technology Preview features for more details.

You can sync data between the source and destination buckets across zones, but not within the same zone. Note that internally, data is still pulled from the source at the destination zone.

A wildcard bucket name means that the current bucket is in the context of the bucket sync policy.

There are two types of syncing between buckets:

1. Syncing from a bucket - You need to specify the source bucket.
2. Syncing to a bucket - You need to specify the destination bucket.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.

Syncing from a different bucket

1. Create a sync group to pull data from a bucket of another zone.

   Syntax

   ```
   radosgw-admin sync group create  --bucket=BUCKET_NAME --group-id=GROUP_ID --
   status=enabled
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group create --bucket=buck4 --group-id=buck4-
   default --status=enabled
   ```

2. Pull data.

   Syntax

   ```
   radosgw-admin sync group pipe create --bucket-name=BUCKET_NAME --group-
   id=GROUP_ID --pipe-id=PIPE_ID --source-zones=SOURCE_ZONE_NAME --source-
   bucket=SOURCE_BUCKET_NAME --dest-zones=DESTINATION_ZONE_NAME
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group pipe create --bucket=buck4 \
                         --group-id=buck4-default --pipe-id=pipe1 \
                         --source-zones='*' --source-bucket=buck5 \
                         --dest-zones='*'
   ```

   In this example, you can see that the source bucket is **buck5**.

3. Optional: Sync from buckets in specific zones.

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group pipe modify --bucket=buck4 \
                         --group-id=buck4-default --pipe-id=pipe1 \
                         --source-zones=us-west --source-bucket=buck5 \
                         --dest-zones='*'
   ```

4. Check sync status.

   Syntax

   ```
   radosgw-admin sync info --bucket-name=BUCKET_NAME
   ```

   Example

```
[ceph: root@host01 /]# radosgw-admin sync info --bucket=buck4
{
    "sources": [],
    "dests": [],
    "hints": {
        "sources": [],
        "dests": [
            "buck4:115b12b3-....14433.2"
        ]
    },
    "resolved-hints-1": {
        "sources": [],
        "dests": [
            {
                "id": "pipe1",
                "source": {
                    "zone": "us-west",
                    "bucket": "buck5"
                },
                "dest": {
                    "zone": "us-east",
                    "bucket": "buck4:115b12b3-....14433.2"
                },
                ...
            },
            {
                "id": "pipe1",
                "source": {
                    "zone": "us-west",
                    "bucket": "buck5"
                },
                "dest": {
                    "zone": "us-west-2",
                    "bucket": "buck4:115b12b3-....14433.2"
                },
                ...
            }
        ]
    },
    "resolved-hints": {
        "sources": [],
        "dests": []
    }
```

Note that there are **resolved-hints**, which means that the bucket **buck5** found about **buck4** syncing from it indirectly, and not from its own policy. The policy for **buck5** itself is empty.

Syncing to a different bucket

1. Create a sync group.

Syntax

```
radosgw-admin sync group create  --bucket=BUCKET_NAME --group-id=GROUP_ID --
status=enabled
```

Example

```
[ceph: root@host01 /]# radosgw-admin sync group create --bucket=buck6 \
                        --group-id=buck6-default --status=enabled
```

2. Push data.

Syntax

```
radosgw-admin sync group pipe create --bucket-name=BUCKET_NAME --group-
id=GROUP_ID --pipe-id=PIPE_ID --source-zones=SOURCE_ZONE_NAME --dest-
zones=DESTINATION_ZONE_NAME --dest-bucket=DESTINATION_BUCKET_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin sync group pipe create --bucket=buck6 \
                        --group-id=buck6-default --pipe-id=pipe1 \
                        --source-zones='*' --dest-zones='*' --dest-bucket=buck5
```

In this example, you can see that the destination bucket is **buck5**.

3. Optional: Sync to buckets in specific zones.

Example

```
[ceph: root@host01 /]# radosgw-admin sync group pipe modify  --bucket=buck6 \
                        --group-id=buck6-default --pipe-id=pipe1 \
                        --source-zones='*' --dest-zones='us-west' --dest-bucket=buck5
```

4. Check sync status.

Syntax

```
radosgw-admin sync info --bucket-name=BUCKET_NAME
```

Example

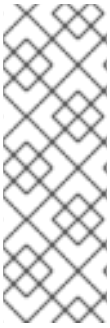
```
[ceph: root@host01 /]#  radosgw-admin sync info --bucket buck5
{
  "sources": [],
  "dests": [
    {
      "id": "pipe1",
      "source": {
        "zone": "us-west",
        "bucket": "buck6:c7887c5b-f6ff-4d5f-9736-aa5cdb4a15e8.20493.4"
      },
      "dest": {
        "zone": "us-east",
        "bucket": "buck5"
      },
      "params": {
        "source": {
```

```
            "filter": {
              "tags": []
            }
          },
          "dest": {},
          "priority": 0,
          "mode": "system",
          "user": "s3cmd"
        }
      },
    ],
    "hints": {
      "sources": [],
      "dests": [
        "buck5"
      ]
    },
    "resolved-hints-1": {
      "sources": [],
      "dests": []
    },
    "resolved-hints": {
      "sources": [],
      "dests": []
    }
  }
```

5.10.6. Filtering objects

Filter objects within the bucket with prefixes and tags. You can set object filter at zonegroup level policy as well. If the **--bucket** option is used, then it is set at bucket level for a bucket.

In the following example, sync from **buck1** bucket from one zone is synced to **buck1** bucket in another zone with the objects that start with the prefix **foo**/. Similarly, you can filter objects that have tags such as **color=blue**. Prefixes and tags can be combined, in which objects need to have both in the order to be synced. The priority parameter can also be passed, and it is used to determine when multiple different rules are there that are matches. This configuration determines that rules to be used.



NOTE

1. If the tag in sync policy has more than one tags, while syncing objects, it sync objects that match at least one tag, the key value pair. Objects might not match all the tag sets.

2. If the prefix and tag is set, then to sync the object to another zone, the objects must have prefix and any one tag should match. Only then, it syncs with each other.

Prerequisites

- At least two running Red Hat Ceph Storage clusters.
- The Ceph Object Gateway is installed.
- Buckets are created.

Procedure

1. Create a new sync group. If you want to create at the bucket level, use the **--bucket** option.

   Syntax

   ```
   radosgw-admin sync group create --bucket=BUCKET_NAME --group-id=GROUP_ID --
   status=enabled
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group create --bucket=buck1 --group-id=buck8-
   default --status=enabled
   ```

2. Sync between buckets where the object matches the tags. The flow is inherited from the zonegroup level policy where data flow is symmetrical.

   Syntax

   ```
   radosgw-admin sync group pipe create --bucket=BUCKET_NAME --group-id=GROUP_ID --
   pipe-id=PIPE_ID --tags-add=KEY1=VALUE1,KEY2=VALUE2 --source-
   zones='ZONE_NAME1','ZONE_NAME2' --dest-zones='ZONE_NAME1','ZONE_NAME2'
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group pipe create --bucket=buck1 \
                        --group-id=buck1-default --pipe-id=pipe-tags \
                        --tags-add=color=blue,color=red --source-zones='*' \
                        --dest-zones='*'
   ```

3. Sync between buckets where the object matches the prefix. The flow is inherited from the zonegroup level policy where data flow is symmetrical.

   Syntax

   ```
   radosgw-admin sync group pipe create --bucket=BUCKET_NAME --group-id=GROUP_ID --
   pipe-id=PIPE_ID --prefix=PREFIX --source-zones='ZONE_NAME1','ZONE_NAME2' --dest-
   zones='ZONE_NAME1','ZONE_NAME2'
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync group pipe create --bucket=buck1 \
                        --group-id=buck1-default --pipe-id=pipe-prefix \
                        --prefix=foo/ --source-zones='*' --dest-zones='*' \
   ```

4. Check the updated sync.

   Syntax

   ```
   radosgw-admin sync info --bucket=BUCKET_NAME
   ```

   Example

```
[ceph: root@host01 /]# radosgw-admin sync info --bucket=buck1
```

NOTE

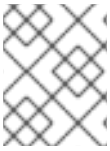
In the example, only two different destinations and no sources reflect, one each for configuration. When the sync process happens, it selects the relevant rule for each object it syncs.

5.10.7. Disabling policy between buckets

You can disable the policy between buckets along with sync information with the **forbidden** or **allowed** state.

See the *Multi-site sync policy group state* for the different combinations that can used for zonegroup and bucket level sync policies.

In certain cases, to interrupt the replication between two buckets, you can set the group policy for the bucket to be **forbidden**. You can also disable policy at zonegroup level, if the sync that is set does not happen for any of the buckets.



NOTE

You can also create a sync policy in disabled state with **allowed** or **forbidden** state using the **radosgw-admin sync group create** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.

Procedure

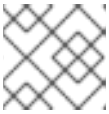
1. Run the **sync group modify** command to change the status from *allowed* to *forbidden*.

   Example

```
[ceph: root@host01 /]# radosgw-admin sync group modify --group-id  buck-default --status
forbidden --bucket buck
{
    "groups": [
        {
            "id": "buck-default",
            "data_flow": {},
            "pipes": [
                {
                    "id": "pipe1",
                    "source": {
                        "bucket": "*",
                        "zones": [
                            "*"
                        ]
                    },
                    "dest": {
```

```
                "bucket": "*",
                "zones": [
                    "*"
                ]
            },
            "params": {
                "source": {
                    "filter": {
                        "tags": []
                    }
                },
                "dest": {},
                "priority": 0,
                "mode": "system",
            }
        }
    ],
    "status": "forbidden"
  }
 ]
}
```

In this example, the replication of the bucket **buck** is interrupted between zones **us-east** and **us-west**.



NOTE

No update and commit for the period is required as this is a bucket sync policy.

2. Optional: Run **sync info command** command to check the status of the sync for bucket **buck**.

Example

```
[ceph: root@host01 /]# radosgw-admin sync info --bucket buck
{
  "sources": [],
  "dests": [],
  "hints": {
    "sources": [],
    "dests": []
  },
  "resolved-hints-1": {
    "sources": [],
    "dests": []
  },
  "resolved-hints": {
    "sources": [],
    "dests": []
  }
}
```

NOTE

There are no source and destination targets as the replication is interrupted.

5.11. MULTI-SITE CEPH OBJECT GATEWAY COMMAND LINE USAGE

As a storage administrator, you can have a good understanding of how to use the Ceph Object Gateway in a multi-site environment. You can learn how to better manage the realms, zone groups, and zones in a multi-site environment.

Prerequisites

- A running Red Hat Ceph Storage.
- Deployment of the Ceph Object Gateway software.
- Access to a Ceph Object Gateway node or container.

5.11.1. Realms

A realm represents a globally unique namespace consisting of one or more zonegroups containing one or more zones, and zones containing buckets, which in turn contain objects. A realm enables the Ceph Object Gateway to support multiple namespaces and their configuration on the same hardware.

A realm contains the notion of periods. Each period represents the state of the zone group and zone configuration in time. Each time you make a change to a zonegroup or zone, update the period and commit it.

Red Hat recommends creating realms for new clusters.

5.11.1.1. Creating a realm

To create a realm, issue the **realm create** command and specify the realm name. If the realm is the default, specify **--default**.

Syntax

```
radosgw-admin realm create --rgw-realm=REALM_NAME [--default]
```

Example

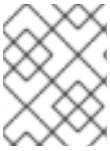
```
[ceph: root@host01 /]# radosgw-admin realm create --rgw-realm=test_realm --default
```

By specifying **--default**, the realm will be called implicitly with each **radosgw-admin** call unless **--rgw-realm** and the realm name are explicitly provided.

5.11.1.2. Making a Realm the Default

One realm in the list of realms should be the default realm. There may be only one default realm. If there is only one realm and it wasn't specified as the default realm when it was created, make it the default realm. Alternatively, to change which realm is the default, run the following command:

```
[ceph: root@host01 /]# radosgw-admin realm default --rgw-realm=test_realm
```



NOTE

When the realm is default, the command line assumes **--rgw-realm=*REALM_NAME*** as an argument.

5.11.1.3. Deleting a Realm

To delete a realm, run the **realm delete** command and specify the realm name.

Syntax

```
radosgw-admin realm delete --rgw-realm=REALM_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin realm delete --rgw-realm=test_realm
```

5.11.1.4. Getting a realm

To get a realm, run the **realm get** command and specify the realm name.

Syntax

```
radosgw-admin realm get --rgw-realm=REALM_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin realm get --rgw-realm=test_realm >filename.json
```

The CLI will echo a JSON object with the realm properties.

```
{
    "id": "0a68d52e-a19c-4e8e-b012-a8f831cb3ebc",
    "name": "test_realm",
    "current_period": "b0c5bbef-4337-4edd-8184-5aeab2ec413b",
    "epoch": 1
}
```

Use **>** and an output file name to output the JSON object to a file.

5.11.1.5. Setting a realm

To set a realm, run the **realm set** command, specify the realm name, and **--infile=** with an input file name.

Syntax

```
radosgw-admin realm set --rgw-realm=REALM_NAME --infile=IN_FILENAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin realm set --rgw-realm=test_realm --infile=filename.json
```

5.11.1.6. Listing realms

To list realms, run the **realm list** command:

Example

```
[ceph: root@host01 /]# radosgw-admin realm list
```

5.11.1.7. Listing Realm Periods

To list realm periods, run the **realm list-periods** command.

Example

```
[ceph: root@host01 /]# radosgw-admin realm list-periods
```

5.11.1.8. Pulling a Realm

To pull a realm from the node containing the master zone group and master zone to a node containing a secondary zone group or zone, run the **realm pull** command on the node that will receive the realm configuration.

Syntax

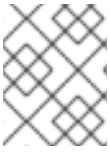
```
radosgw-admin realm pull --url=URL_TO_MASTER_ZONE_GATEWAY--access-key=ACCESS_KEY
--secret=SECRET_KEY
```

5.11.1.9. Renaming a Realm

A realm is not part of the period. Consequently, renaming the realm is only applied locally, and will not get pulled with **realm pull**. When renaming a realm with multiple zones, **run the command on each zone.** To rename a realm, run the following command:

Syntax

```
radosgw-admin realm rename --rgw-realm=REALM_NAME --realm-new-
name=NEW_REALM_NAME
```



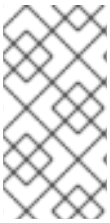
NOTE

Do NOT use **realm set** to change the **name** parameter. That changes the internal name only. Specifying **--rgw-realm** would still use the old realm name.

5.11.2. Zone Groups

The Ceph Object Gateway supports multi-site deployments and a global namespace by using the notion of zone groups. Formerly called a region, a zone group defines the geographic location of one or more Ceph Object Gateway instances within one or more zones.

Configuring zone groups differs from typical configuration procedures, because not all of the settings end up in a Ceph configuration file. You can list zone groups, get a zone group configuration, and set a zone group configuration.



NOTE

The **radosgw-admin zonegroup** operations can be performed on any node within the realm, because the step of updating the period propagates the changes throughout the cluster. However, **radosgw-admin zone** operations **MUST** be performed on a host within the zone.

5.11.2.1. Creating a Zone Group

Creating a zone group consists of specifying the zone group name. Creating a zone assumes it will live in the default realm unless **--rgw-realm=*REALM_NAME*** is specified. If the zonegroup is the default zonegroup, specify the **--default** flag. If the zonegroup is the master zonegroup, specify the **--master** flag.

Syntax

```
radosgw-admin zonegroup create --rgw-zonegroup=ZONE_GROUP_NAME [--rgw-realm=REALM_NAME] [--master] [--default]
```

NOTE

Use **zonegroup modify --rgw-zonegroup=*ZONE_GROUP_NAME*** to modify an existing zone group's settings.

5.11.2.2. Making a Zone Group the Default

One zonegroup in the list of zonegroups should be the default zonegroup. There may be only one default zonegroup. If there is only one zonegroup and it wasn't specified as the default zonegroup when it was created, make it the default zonegroup. Alternatively, to change which zonegroup is the default, run the following command:

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup default --rgw-zonegroup=us
```

NOTE

When the zonegroup is the default, the command line assumes **--rgw-zonegroup=*ZONE_GROUP_NAME*** as an argument.

Then, update the period:

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.2.3. Adding a Zone to a Zone Group

To add a zone to a zonegroup, you **MUST** run this command on a host that will be in the zone. To add a zone to a zonegroup, run the following command:

Syntax

```
radosgw-admin zonegroup add --rgw-zonegroup=ZONE_GROUP_NAME --rgw-zone=ZONE_NAME
```

Then, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.2.4. Removing a Zone from a Zone Group

To remove a zone from a zonegroup, run the following command:

Syntax

```
radosgw-admin zonegroup remove --rgw-zonegroup=ZONE_GROUP_NAME --rgw-zone=ZONE_NAME
```

Then, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.2.5. Renaming a Zone Group

To rename a zonegroup, run the following command:

Syntax

```
radosgw-admin zonegroup rename --rgw-zonegroup=ZONE_GROUP_NAME --zonegroup-new-name=NEW_ZONE_GROUP_NAME
```

Then, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.2.6. Deleting a Zone group

To delete a zonegroup, run the following command:

Syntax

```
radosgw-admin zonegroup delete --rgw-zonegroup=ZONE_GROUP_NAME
```

Then, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.2.7. Listing Zone Groups

A Ceph cluster contains a list of zone groups. To list the zone groups, run the following command:

```
[ceph: root@host01 /]# radosgw-admin zonegroup list
```

The **radosgw-admin** returns a JSON formatted list of zone groups.

```
{
    "default_info": "90b28698-e7c3-462c-a42d-4aa780d24eda",
    "zonegroups": [
        "us"
    ]
}
```

5.11.2.8. Getting a Zone Group

To view the configuration of a zone group, run the following command:

Syntax

```
radosgw-admin zonegroup get [--rgw-zonegroup=ZONE_GROUP_NAME]
```

The zone group configuration looks like this:

```
{
    "id": "90b28698-e7c3-462c-a42d-4aa780d24eda",
    "name": "us",
    "api_name": "us",
    "is_master": "true",
    "endpoints": [
        "http:\/\/rgw1:80"
    ],
    "hostnames": [],
    "hostnames_s3website": [],
    "master_zone": "9248cab2-afe7-43d8-a661-a40bf316665e",
    "zones": [
        {
            "id": "9248cab2-afe7-43d8-a661-a40bf316665e",
            "name": "us-east",
            "endpoints": [
                "http:\/\/rgw1"
            ],
            "log_meta": "true",
            "log_data": "true",
            "bucket_index_max_shards": 11,
            "read_only": "false"
        },
        {
            "id": "d1024e59-7d28-49d1-8222-af101965a939",
            "name": "us-west",
```

```
            "endpoints": [
                "http:\/\/rgw2:80"
            ],
            "log_meta": "false",
            "log_data": "true",
            "bucket_index_max_shards": 11,
            "read_only": "false"
        }
    ],
    "placement_targets": [
        {
            "name": "default-placement",
            "tags": []
        }
    ],
    "default_placement": "default-placement",
    "realm_id": "ae031368-8715-4e27-9a99-0c9468852cfe"
}
```

5.11.2.9. Setting a Zone Group

Defining a zone group consists of creating a JSON object, specifying at least the required settings:

1. **name**: The name of the zone group. Required.
2. **api_name**: The API name for the zone group. Optional.
3. **is_master**: Determines if the zone group is the master zone group. Required.
   Note: You can only have one master zone group.
4. **endpoints**: A list of all the endpoints in the zone group. For example, you may use multiple domain names to refer to the same zone group. Remember to escape the forward slashes (\/). You may also specify a port (**fqdn:port**) for each endpoint. Optional.
5. **hostnames**: A list of all the hostnames in the zone group. For example, you may use multiple domain names to refer to the same zone group. Optional. The **rgw dns name** setting will automatically be included in this list. You should restart the gateway daemon(s) after changing this setting.
6. **master_zone**: The master zone for the zone group. Optional. Uses the default zone if not specified.

   NOTE

   You can only have one master zone per zone group.

7. **zones**: A list of all zones within the zone group. Each zone has a name (required), a list of endpoints (optional), and whether or not the gateway will log metadata and data operations (false by default).
8. **placement_targets**: A list of placement targets (optional). Each placement target contains a name (required) for the placement target and a list of tags (optional) so that only users with the tag can use the placement target (i.e., the user's **placement_tags** field in the user info).

9. **default_placement**: The default placement target for the object index and object data. Set to **default-placement** by default. You may also set a per-user default placement in the user info for each user.

To set a zone group, create a JSON object consisting of the required fields, save the object to a file, for example, **zonegroup.json**; then, run the following command:

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup set --infile zonegroup.json
```

Where **zonegroup.json** is the JSON file you created.

IMPORTANT

The **default** zone group **is_master** setting is **true** by default. If you create a new zone group and want to make it the master zone group, you must either set the **default** zone group **is_master** setting to **false**, or delete the **default** zone group.

Finally, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.2.10. Setting a Zone Group Map

Setting a zone group map consists of creating a JSON object consisting of one or more zone groups, and setting the **master_zonegroup** for the cluster. Each zone group in the zone group map consists of a key/value pair, where the **key** setting is equivalent to the **name** setting for an individual zone group configuration, and the **val** is a JSON object consisting of an individual zone group configuration.

You may only have one zone group with **is_master** equal to **true**, and it must be specified as the **master_zonegroup** at the end of the zone group map. The following JSON object is an example of a default zone group map.

```
{
    "zonegroups": [
        {
            "key": "90b28698-e7c3-462c-a42d-4aa780d24eda",
            "val": {
                "id": "90b28698-e7c3-462c-a42d-4aa780d24eda",
                "name": "us",
                "api_name": "us",
                "is_master": "true",
                "endpoints": [
                    "http:\/\/rgw1:80"
                ],
                "hostnames": [],
                "hostnames_s3website": [],
                "master_zone": "9248cab2-afe7-43d8-a661-a40bf316665e",
                "zones": [
                    {
                        "id": "9248cab2-afe7-43d8-a661-a40bf316665e",
```

```
                    "name": "us-east",
                    "endpoints": [
                        "http:\/\/rgw1"
                    ],
                    "log_meta": "true",
                    "log_data": "true",
                    "bucket_index_max_shards": 11,
                    "read_only": "false"
                },
                {
                    "id": "d1024e59-7d28-49d1-8222-af101965a939",
                    "name": "us-west",
                    "endpoints": [
                        "http:\/\/rgw2:80"
                    ],
                    "log_meta": "false",
                    "log_data": "true",
                    "bucket_index_max_shards": 11,
                    "read_only": "false"
                }
            ],
            "placement_targets": [
                {
                    "name": "default-placement",
                    "tags": []
                }
            ],
            "default_placement": "default-placement",
            "realm_id": "ae031368-8715-4e27-9a99-0c9468852cfe"
        }
    }
  ],
  "master_zonegroup": "90b28698-e7c3-462c-a42d-4aa780d24eda",
  "bucket_quota": {
      "enabled": false,
      "max_size_kb": -1,
      "max_objects": -1
  },
  "user_quota": {
      "enabled": false,
      "max_size_kb": -1,
      "max_objects": -1
  }
}
```

To set a zone group map, run the following command:

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup-map set --infile zonegroupmap.json
```

Where **zonegroupmap.json** is the JSON file you created. Ensure that you have zones created for the ones specified in the zone group map. Finally, update the period.

Example

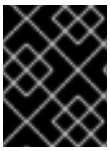
```
-
```

```
[ceph: root@host01 /]#  radosgw-admin period update --commit
```

5.11.3. Zones

Ceph Object Gateway supports the notion of zones. A zone defines a logical group consisting of one or more Ceph Object Gateway instances.

Configuring zones differs from typical configuration procedures, because not all of the settings end up in a Ceph configuration file. You can list zones, get a zone configuration, and set a zone configuration.



IMPORTANT

All **radosgw-admin zone** operations **MUST** be issued on a host that operates or will operate within the zone.

5.11.3.1. Creating a Zone

To create a zone, specify a zone name. If it is a master zone, specify the **--master** option. Only one zone in a zone group may be a master zone. To add the zone to a zonegroup, specify the **--rgw-zonegroup** option with the zonegroup name.

IMPORTANT

Zones must be created on a Ceph Object Gateway node that will be within the zone.

Syntax

```
radosgw-admin zone create --rgw-zone=ZONE_NAME \
             [--zonegroup=ZONE_GROUP_NAME]\
             [--endpoints=ENDPOINT_PORT [,<endpoint:port>] \
             [--master] [--default] \
             --access-key ACCESS_KEY --secret SECRET_KEY
```

Then, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.3.2. Deleting a zone

To delete a zone, first remove it from the zonegroup.

Procedure

1. Remove the zone from the zonegroup:

   Syntax

   ```
   radosgw-admin zonegroup remove --rgw-zonegroup=ZONE_GROUP_NAME\
                                  --rgw-zone=ZONE_NAME
   ```

2. Update the period:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin period update --commit
   ```

3. Delete the zone:

   IMPORTANT

   This procedure **MUST** be used on a host within the zone.

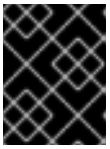
   Syntax

   ```
   radosgw-admin zone delete --rgw-zone=ZONE_NAME
   ```

4. Update the period:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin period update --commit
   ```

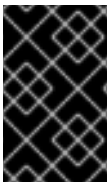
   IMPORTANT

   Do not delete a zone without removing it from a zone group first. Otherwise, updating the period will fail.

If the pools for the deleted zone will not be used anywhere else, consider deleting the pools. Replace ***DELETED_ZONE_NAME*** in the example below with the deleted zone's name.

IMPORTANT

Once Ceph deletes the zone pools, it deletes all of the data within them in an unrecoverable manner. Only delete the zone pools if Ceph clients no longer need the pool contents.



IMPORTANT

In a multi-realm cluster, deleting the **.rgw.root** pool along with the zone pools will remove ALL the realm information for the cluster. Ensure that **.rgw.root** does not contain other active realms before deleting the **.rgw.root** pool.

Syntax

```
ceph osd pool delete DELETED_ZONE_NAME.rgw.control DELETED_ZONE_NAME.rgw.control --
yes-i-really-really-mean-it
ceph osd pool delete DELETED_ZONE_NAME.rgw.data.root DELETED_ZONE_NAME.rgw.data.root
--yes-i-really-really-mean-it
ceph osd pool delete DELETED_ZONE_NAME.rgw.log DELETED_ZONE_NAME.rgw.log --yes-i-
```

```
really-really-mean-it
ceph osd pool delete DELETED_ZONE_NAME.rgw.users.uid
DELETED_ZONE_NAME.rgw.users.uid --yes-i-really-really-mean-it
```

IMPORTANT

After deleting the pools, restart the RGW process.

5.11.3.3. Modifying a Zone

To modify a zone, specify the zone name and the parameters you wish to modify.

IMPORTANT

Zones should be modified on a Ceph Object Gateway node that will be within the zone.

Syntax

```
radosgw-admin zone modify [options]

--access-key=<key>
--secret/--secret-key=<key>
--master
--default
--endpoints=<list>
```

Then, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.3.4. Listing Zones

As **root**, to list the zones in a cluster, run the following command:

Example

```
[ceph: root@host01 /]# radosgw-admin zone list
```

5.11.3.5. Getting a Zone

As **root**, to get the configuration of a zone, run the following command:

Syntax

```
radosgw-admin zone get [--rgw-zone=ZONE_NAME]
```

The **default** zone looks like this:

```
{ "domain_root": ".rgw",
```

```
  "control_pool": ".rgw.control",
  "gc_pool": ".rgw.gc",
  "log_pool": ".log",
  "intent_log_pool": ".intent-log",
  "usage_log_pool": ".usage",
  "user_keys_pool": ".users",
  "user_email_pool": ".users.email",
  "user_swift_pool": ".users.swift",
  "user_uid_pool": ".users.uid",
  "system_key": { "access_key": "", "secret_key": ""},
  "placement_pools": [
     {  "key": "default-placement",
        "val": { "index_pool": ".rgw.buckets.index",
                 "data_pool": ".rgw.buckets"}
     }
   ]
}
```

5.11.3.6. Setting a Zone

Configuring a zone involves specifying a series of Ceph Object Gateway pools. For consistency, we recommend using a pool prefix that is the same as the zone name. See the *Pools* chapter in the *Red Hat Ceph Storage Storage Strategies Guide* for details on configuring pools.

IMPORTANT

Zones should be set on a Ceph Object Gateway node that will be within the zone.

To set a zone, create a JSON object consisting of the pools, save the object to a file, for example, **zone.json**; then, run the following command, replacing ***ZONE_NAME*** with the name of the zone:

Example

```
[ceph: root@host01 /]# radosgw-admin zone set --rgw-zone=test-zone --infile zone.json
```

Where **zone.json** is the JSON file you created.

Then, as **root**, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

5.11.3.7. Renaming a Zone

To rename a zone, specify the zone name and the new zone name. Issue the following command on a host within the zone:

Syntax

```
radosgw-admin zone rename --rgw-zone=ZONE_NAME --zone-new-name=NEW_ZONE_NAME
```

Then, update the period:

Example

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

CHAPTER 6. ADVANCED CONFIGURATION

As a storage administrator, you can configure some of the more advanced features of the Ceph Object Gateway. You can configure a multi-site Ceph Object Gateway and integrate it with directory services, such as Microsoft Active Directory and OpenStack Keystone service.

Prerequisites

- A healthy running Red Hat Ceph Storage cluster.

6.1. CONFIGURE LDAP AND CEPH OBJECT GATEWAY

Perform the following steps to configure the Red Hat Directory Server to authenticate Ceph Object Gateway users.

6.1.1. Installing a Red Hat Directory Server

Red Hat Directory Server should be installed on a Red Hat Enterprise Linux 9 with a graphical user interface (GUI) in order to use the Java Swing GUI Directory and Administration consoles. However, Red Hat Directory Server can still be serviced exclusively from the command line interface (CLI).

Prerequisites

- Red Hat Enterprise Linux (RHEL) is installed on the server.
- The Directory Server node's FQDN is resolvable using DNS or the **/etc/hosts** file.
- Register the Directory Server node to the Red Hat subscription management service.
- A valid Red Hat Directory Server subscription is available in your Red Hat account.

Procedure

- Follow the instructions in *Chapter 1* and in *Chapter 2* of the *Red Hat Directory Server Installation Guide*.

Additional Resources

- See the *Red Hat Director Server Installation Guide* for more details.

6.1.2. Configure the Directory Server firewall

On the LDAP host, make sure that the firewall allows access to the Directory Server's secure (**636**) port, so that LDAP clients can access the Directory Server. Leave the default unsecure port (**389**) closed.

```
# firewall-cmd --zone=public --add-port=636/tcp
# firewall-cmd --zone=public --add-port=636/tcp --permanent
```

6.1.3. Label ports for SELinux

To ensure SELinux does not block requests, label the ports for SELinux. For details see the *Changing Directory Server Port Numbers* section in the *Administration Guide* for Red Hat Directory Server 10.

6.1.4. Configure LDAPS

The Ceph Object Gateway uses a simple ID and password to authenticate with the LDAP server, so the connection requires an SSL certificate for LDAP. To configure the Directory Server for LDAP, see the *Configuring Secure Connections* chapter in the *Administration Guide* for Red Hat Directory Server 11.

Once the LDAP is working, configure the Ceph Object Gateway servers to trust the Directory Server's certificate.

1. Extract/Download a PEM-formatted certificate for the Certificate Authority (CA) that signed the LDAP server's SSL certificate.
2. Confirm that **/etc/openldap/ldap.conf** does not have **TLS_REQCERT** set.
3. Confirm that **/etc/openldap/ldap.conf** contains a **TLS_CACERTDIR /etc/openldap/certs** setting.
4. Use the **certutil** command to add the AD CA to the store at **/etc/openldap/certs.** For example, if the CA is "msad-frog-MSAD-FROG-CA", and the PEM-formatted CA file is **ldap.pem**, use the following command:

   Example

   ```
   # certutil -d /etc/openldap/certs -A -t "TC,," -n "msad-frog-MSAD-FROG-CA" -i
   /path/to/ldap.pem
   ```

5. Update SELinux on all remote LDAP sites:

   Example

   ```
   # setsebool -P httpd_can_network_connect on
   ```

   NOTE

   This still has to be set even if SELinux is in permissive mode.

6. Make the **certs** database world-readable:

   Example

   ```
   # chmod 644 /etc/openldap/certs/*
   ```

7. Connect to the server using the "ldapwhoami" command as a non-root user.

   Example

   ```
   $ ldapwhoami -H ldaps://rh-directory-server.example.com -d 9
   ```

   The **-d 9** option will provide debugging information in case something went wrong with the SSL negotiation.

6.1.5. Check if the gateway user exists

Before creating the gateway user, ensure that the Ceph Object Gateway does not already have the user.

Example

```
[ceph: root@host01 /]# radosgw-admin metadata list user
```

The user name should NOT be in this list of users.

6.1.6. Add a gateway user

Create a Ceph Object Gateway user to user LDAP.

Procedure

1. Create an LDAP user for the Ceph Object Gateway, and make a note of the **binddn**. Since the Ceph object gateway uses the **ceph** user, consider using **ceph** as the username. The user needs to have permissions to search the directory. The Ceph Object Gateway binds to this user as specified in **rgw_ldap_binddn**.

2. Test to ensure that the user creation worked. Where **ceph** is the user ID under **People** and **example.com** is the domain, you can perform a search for the user.

   ```
   # ldapsearch -x -D "uid=ceph,ou=People,dc=example,dc=com" -W -H ldaps://example.com -
   b "ou=People,dc=example,dc=com" -s sub 'uid=ceph'
   ```

3. On each gateway node, create a file for the user's secret. For example, the secret might get stored in a file entitled **/etc/bindpass**. For security, change the owner of this file to the **ceph** user and group to ensure it is not globally readable.

4. Add the **rgw_ldap_secret** option:

   Syntax

   ```
   ceph config set client.rgw OPTION VALUE
   ```

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_secret /etc/bindpass
   ```

5. Patch the bind password file to the Ceph Object Gateway container and reapply the Ceph Object Gateway specification:

   Example

   ```
   service_type: rgw
   service_id: rgw.1
   service_name: rgw.rgw.1
   placement:
     label: rgw
     extra_container_args:
     - -v
     - /etc/bindpass:/etc/bindpass
   ```

NOTE

/etc/bindpass is not shipped automatically with Red Hat Ceph Storage and you need to ensure that the content is available on all the possible Ceph Object Gateway instance nodes.

6.1.7. Configure the gateway to use LDAP

1. Change the Ceph configuration with the following commands on all the Ceph nodes:

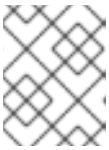
   Syntax

   ```
   ceph config set client.rgw OPTION VALUE
   ```

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_uri ldaps://:636
   [ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_binddn
   "ou=poc,dc=example,dc=local"
   [ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_searchdn
   "ou=poc,dc=example,dc=local"
   [ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_dnattr "uid"
   [ceph: root@host01 /]# ceph config set client.rgw rgw_s3_auth_use_ldap true
   ```

2. Restart the Ceph Object Gateway.

   NOTE

   Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

   a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

      Syntax

      ```
      systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
      ```

      Example

      ```
      [root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
      529020a7702d@rgw.realm.zone.host01.gwasto.service
      ```

   b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

      Syntax

      ```
      ceph orch restart SERVICE_TYPE
      ```

      Example

      ```
      [ceph: root@host01 /]# ceph orch restart rgw
      ```

6.1.8. Using a custom search filter

You can create a custom search filter to limit user access by using the **rgw_ldap_searchfilter** setting. There are two ways to use the **rgw_ldap_searchfilter** setting:

1. Specifying a partial filter:

   Example

   ```
   "objectclass=inetorgperson"
   ```

   The Ceph Object Gateway generates the search filter with the user name from the token and the value of **rgw_ldap_dnattr**. The constructed filter is then combined with the partial filter from the **rgw_ldap_searchfilter** value. For example, the user name and the settings generate the final search filter:

   Example

   ```
   "(&(uid=joe)(objectclass=inetorgperson))"
   ```

   User **joe** is only granted access if he is found in the LDAP directory, has an object class of **inetorgperson**, and specifies a valid password.

2. Specifying a complete filter:
   A complete filter must contain a **USERNAME** token which is substituted with the user name during the authentication attempt. The **rgw_ldap_dnattr** setting is not used in this case. For example, to limit valid users to a specific group, use the following filter:

   Example

   ```
   "(&(uid=@USERNAME@)(memberOf=cn=ceph-users,ou=groups,dc=mycompany,dc=com))"
   ```

6.1.9. Add an S3 user to the LDAP server

In the administrative console on the LDAP server, create at least one S3 user so that an S3 client can use the LDAP user credentials. Make a note of the user name and secret for use when passing the credentials to the S3 client.

6.1.10. Export an LDAP token

When running Ceph Object Gateway with LDAP, the access token is all that is required. However, the access token is created from the access key and secret key. Export the access key and secret key as an LDAP token.

1. Export the access key:

   Syntax

   ```
   export RGW_ACCESS_KEY_ID="USERNAME"
   ```

2. Export the secret key:

   Syntax

```
export RGW_SECRET_ACCESS_KEY="PASSWORD"
```

3. Export the token. For LDAP, use **ldap** as the token type (**ttype**).

   Example

   ```
   radosgw-token --encode --ttype=ldap
   ```

   For Active Directory, use **ad** as the token type.

   Example

   ```
   radosgw-token --encode --ttype=ad
   ```

   The result is a base-64 encoded string, which is the access token. Provide this access token to S3 clients in lieu of the access key. The secret key is no longer required.

4. Optional: For added convenience, export the base-64 encoded string to the **RGW_ACCESS_KEY_ID** environment variable if the S3 client uses the environment variable.

   Example

   ```
   export
   RGW_ACCESS_KEY_ID="ewogICAgIlJHV19UT0tFTiI6IHsKICAgICAgICAidmVyc2lvbiI6IDEsCi
   AgICAgICAgInR5cGUiOiAibGRhcCIsCiAgICAgICAgImlkIjogImNlcGgiLAogICAgICAgICJrZXkiO
   iAiODAwI0dvcmlsbGEiCiAgICB9Cn0K"
   ```

6.1.11. Test the configuration with an S3 client

Test the configuration with a Ceph Object Gateway client, using a script such as Python Boto.

Procedure.

1. Use the **RGW_ACCESS_KEY_ID** environment variable to configure the Ceph Object Gateway client. Alternatively, you can copy the base-64 encoded string and specify it as the access key. Following is an example of the configured S3 client:

   Example

   ```
   cat .aws/credentials

   [default]
   aws_access_key_id =
   ewogICaGbnjlwe9UT0tFTiI6IHsKICAgICAgICAidmVyc2lvbiI6IDEsCiAgICAgICAgInR5cGUiOiAi
   YWQiLAogICAgICAgICJpZCI6ICJjZXBoIiwKICAgICAgICAia2V5IjogInBhc3M0Q2VwaCIKICAgI
   H0KfQo=
   aws_secret_access_key =
   ```

NOTE

The secret key is no longer required.

2. Run the **aws s3 ls** command to verify the user:

   Example

```
[root@host01 ~]# aws s3 ls --endpoint http://host03

2023-12-11 17:08:50 mybucket
2023-12-24 14:55:44 mybucket2
```

3. Optional: You can also run the **radosgw-admin user** command to verify the user in the directory:

   Example

```
[root@host01 ~]# radosgw-admin user info --uid dir1
{
    "user_id": "dir1",
    "display_name": "dir1",
    "email": "",
    "suspended": 0,
    "max_buckets": 1000,
    "subusers": [],
    "keys": [],
    "swift_keys": [],
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "default_storage_class": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "ldap",
    "mfa_ids": []
}
```

6.2. CONFIGURE ACTIVE DIRECTORY AND CEPH OBJECT GATEWAY

Perform the following steps to configure an Active Directory server to authenticate Ceph Object Gateway users.

6.2.1. Using Microsoft Active Directory

Ceph Object Gateway LDAP authentication is compatible with any LDAP-compliant directory service that can be configured for simple bind, including Microsoft Active Directory. Using Active Directory is similar to using RH Directory server in that the Ceph Object Gateway binds as the user configured in the **rgw_ldap_binddn** setting, and uses LDAPs to ensure security.

The process for configuring Active Directory is essentially identical to configuring LDAP and Ceph Object Gateway, but may have some Windows-specific usage.

6.2.2. Configuring Active Directory for LDAPS

Active Directory LDAP servers are configured to use LDAPs by default. Windows Server 2012 and higher can use Active Directory Certificate Services. Instructions for generating and installing SSL certificates for use with Active Directory LDAP are available in the following MS TechNet article: LDAP over SSL (LDAPS) Certificate.

NOTE

Ensure that port **636** is open on the Active Directory host.

6.2.3. Check if the gateway user exists

Before creating the gateway user, ensure that the Ceph Object Gateway does not already have the user.

Example

```
[ceph: root@host01 /]# radosgw-admin metadata list user
```

The user name should NOT be in this list of users.

6.2.4. Add a gateway user

Create a Ceph Object Gateway user to user LDAP.

Procedure

1. Create an LDAP user for the Ceph Object Gateway, and make a note of the **binddn**. Since the Ceph object gateway uses the **ceph** user, consider using **ceph** as the username. The user needs to have permissions to search the directory. The Ceph Object Gateway binds to this user as specified in **rgw_ldap_binddn**.

2. Test to ensure that the user creation worked. Where **ceph** is the user ID under **People** and **example.com** is the domain, you can perform a search for the user.

   ```
   # ldapsearch -x -D "uid=ceph,ou=People,dc=example,dc=com" -W -H ldaps://example.com -
   b "ou=People,dc=example,dc=com" -s sub 'uid=ceph'
   ```

3. On each gateway node, create a file for the user's secret. For example, the secret might get stored in a file entitled **/etc/bindpass**. For security, change the owner of this file to the **ceph** user and group to ensure it is not globally readable.

4. Add the **rgw_ldap_secret** option:

   Syntax

   -

```
ceph config set client.rgw OPTION VALUE
```

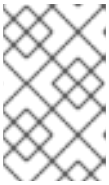
Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_secret /etc/bindpass
```

5. Patch the bind password file to the Ceph Object Gateway container and reapply the Ceph Object Gateway specification:

Example

```
service_type: rgw
service_id: rgw.1
service_name: rgw.rgw.1
placement:
  label: rgw
  extra_container_args:
  - -v
  - /etc/bindpass:/etc/bindpass
```



NOTE

/etc/bindpass is not shipped automatically with Red Hat Ceph Storage and you need to ensure that the content is available on all the possible Ceph Object Gateway instance nodes.

6.2.5. Configuring the gateway to use Active Directory

1. Add the following options after setting the **rgw_ldap_secret** setting:

Syntax

```
ceph config set client.rgw OPTION VALUE
```

Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_uri ldaps://_FQDN_:636
[ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_binddn "_BINDDN_"
[ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_searchdn "_SEARCHDN_"
[ceph: root@host01 /]# ceph config set client.rgw rgw_ldap_dnattr "cn"
[ceph: root@host01 /]# ceph config set client.rgw rgw_s3_auth_use_ldap true
```

For the **rgw_ldap_uri** setting, substitute *FQDN* with the fully qualified domain name of the LDAP server. If there is more than one LDAP server, specify each domain.

For the **rgw_ldap_binddn** setting, substitute *BINDDN* with the bind domain. With a domain of **example.com** and a **ceph** user under **users** and **accounts**, it should look something like this:

Example

```
rgw_ldap_binddn "uid=ceph,cn=users,cn=accounts,dc=example,dc=com"
```

For the **rgw_ldap_searchdn** setting, substitute *SEARCHDN* with the search domain. With a domain of **example.com** and users under **users** and **accounts**, it should look something like this:

```
rgw_ldap_searchdn "cn=users,cn=accounts,dc=example,dc=com"
```

2. Restart the Ceph Object Gateway:

NOTE

Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

Syntax

```
systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
```

Example

```
[root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
529020a7702d@rgw.realm.zone.host01.gwasto.service
```

b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host01 /]# ceph orch restart rgw
```

6.2.6. Add an S3 user to the LDAP server

In the administrative console on the LDAP server, create at least one S3 user so that an S3 client can use the LDAP user credentials. Make a note of the user name and secret for use when passing the credentials to the S3 client.

6.2.7. Export an LDAP token

When running Ceph Object Gateway with LDAP, the access token is all that is required. However, the access token is created from the access key and secret key. Export the access key and secret key as an LDAP token.

1. Export the access key:

Syntax

```
export RGW_ACCESS_KEY_ID="USERNAME"
```

2. Export the secret key:

   Syntax

   ```
   export RGW_SECRET_ACCESS_KEY="PASSWORD"
   ```

3. Export the token. For LDAP, use **ldap** as the token type (**ttype**).

   Example

   ```
   radosgw-token --encode --ttype=ldap
   ```

   For Active Directory, use **ad** as the token type.

   Example

   ```
   radosgw-token --encode --ttype=ad
   ```

   The result is a base-64 encoded string, which is the access token. Provide this access token to S3 clients in lieu of the access key. The secret key is no longer required.

4. Optional: For added convenience, export the base-64 encoded string to the **RGW_ACCESS_KEY_ID** environment variable if the S3 client uses the environment variable.

   Example

   ```
   export
   RGW_ACCESS_KEY_ID="ewogICAgIlJHV19UT0tFTiI6IHsKICAgICAgICAidmVyc2lvbiI6IDEsCi
   AgICAgICAgInR5cGUiOiAibGRhcCIsCiAgICAgICAgImlkIjogImNlcGgiLAogICAgICAgICJrZXkiO
   iAiODAwI0dvcmlsbGEiCiAgICB9Cn0K"
   ```

6.2.8. Test the configuration with an S3 client

Test the configuration with a Ceph Object Gateway client, using a script such as Python Boto.

Procedure.

1. Use the **RGW_ACCESS_KEY_ID** environment variable to configure the Ceph Object Gateway client. Alternatively, you can copy the base-64 encoded string and specify it as the access key. Following is an example of the configured S3 client:

   Example

   ```
   cat .aws/credentials

   [default]
   aws_access_key_id =
   ewogICaGbnjlwe9UT0tFTiI6IHsKICAgICAgICAidmVyc2lvbiI6IDEsCiAgICAgICAgInR5cGUiOiAi
   YWQiLAogICAgICAgICJpZCI6ICJjZXBoIiwKICAgICAgICAia2V5IjogInBhc3M0Q2VwaCIKICAgI
   H0KfQo=
   aws_secret_access_key =
   ```

NOTE

The secret key is no longer required.

2. Run the **aws s3 ls** command to verify the user:

Example

```
[root@host01 ~]# aws s3 ls --endpoint http://host03

2023-12-11 17:08:50 mybucket
2023-12-24 14:55:44 mybucket2
```

3. Optional: You can also run the **radosgw-admin user** command to verify the user in the directory:

Example

```
[root@host01 ~]# radosgw-admin user info --uid dir1
{
    "user_id": "dir1",
    "display_name": "dir1",
    "email": "",
    "suspended": 0,
    "max_buckets": 1000,
    "subusers": [],
    "keys": [],
    "swift_keys": [],
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "default_storage_class": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "ldap",
    "mfa_ids": []
}
```

6.3. THE CEPH OBJECT GATEWAY AND OPENSTACK KEYSTONE

As a storage administrator, you can use OpenStack's Keystone authentication service to authenticate users through the Ceph Object Gateway. Before you can configure the Ceph Object Gateway, you need to configure Keystone first. This enables the Swift service, and points the Keystone service to the Ceph Object Gateway. Next, you need to configure the Ceph Object Gateway to accept authentication requests from the Keystone service.

Prerequisites

- A running Red Hat OpenStack Platform environment.
- A running Red Hat Ceph Storage environment.
- A running Ceph Object Gateway environment.

6.3.1. Roles for Keystone authentication

The OpenStack Keystone service provides three roles: **admin**, **member**, and **reader**. These roles are hierarchical; users with the **admin** role inherit the capabilities of the **member** role and users with the **member** role inherit the capabilities of the **reader** role.

NOTE

The **member** role's read permissions only apply to objects of the project it belongs to.

admin

The admin role is reserved for the highest level of authorization within a particular scope. This usually includes all the create, read, update, or delete operations on a resource or API.

member

The **member** role is not used directly by default. It provides flexibility during deployments and helps reduce responsibility for administrators.

For example, you can override a policy for a deployment by using the default **member** role and a simple policy override, to allow system members to update services and endpoints. This provides a layer of authorization between **admin** and **reader** roles.

reader

The **reader** role is reserved for read-only operations regardless of the scope.

WARNING

If you use a **reader** to access sensitive information such as image license keys, administrative image data, administrative volume metadata, application credentials, and secrets, you might unintentionally expose sensitive information. Hence, APIs that expose these resources should carefully consider the impact of the **reader** role and appropriately defer access to the **member** and **admin** roles.

6.3.2. Keystone authentication and the Ceph Object Gateway

Organizations using OpenStack Keystone to authenticate users can integrate Keystone with the Ceph Object Gateway. The Ceph Object Gateway enables the gateway to accept a Keystone token, authenticate the user, and create a corresponding Ceph Object Gateway user. When Keystone validates a token, the gateway considers the user authenticated.

Benefits

- Assigning **admin**, **member**, and **reader** roles to users with Keystone.
- Automatic user creation in the Ceph Object Gateway.
- Managing users with Keystone.
- The Ceph Object Gateway will query Keystone periodically for a list of revoked tokens.

6.3.3. Creating the Swift service

Before configuring the Ceph Object Gateway, configure Keystone so that the Swift service is enabled and pointing to the Ceph Object Gateway.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Access to the Ceph software repository.
- Root-level access to OpenStack controller node.

Procedure

- Create the Swift service:

```
[root@swift~]# openstack service create --name=swift --description="Swift Service" object-store
```

Creating the service will echo the service settings.

Table 6.1. Example

Field	Value
description	Swift Service
enabled	True
id	37c4c0e79571404cb4644201a4a6e5ee
name	swift
type	object-store

6.3.4. Setting the Ceph Object Gateway endpoints

After creating the Swift service, point the service to a Ceph Object Gateway.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Access to the Ceph software repository.
- A running Swift service on a Red Hat OpenStack Platform 17.0 environment.

Procedure

- Create the OpenStack endpoints pointing to the Ceph Object Gateway:

Syntax

```
openstack endpoint create --region REGION_NAME swift admin "URL"
openstack endpoint create --region REGION_NAME swift public "URL"
openstack endpoint create --region REGION_NAME swift internal "URL"
```

Replace *REGION_NAME* with the name of the gateway's zone group name or region name. Replace *URL* with URLs appropriate for the Ceph Object Gateway.

Example

```
[root@osp ~]# openstack endpoint create --region us-west swift admin
"http://radosgw.example.com:8080/swift/v1"
[root@osp ~]# openstack endpoint create --region us-west swift public
"http://radosgw.example.com:8080/swift/v1"
[root@osp ~]# openstack endpoint create --region us-west swift internal
"http://radosgw.example.com:8080/swift/v1"
```

Field	Value
adminurl	**http://radosgw.example.com:8080/swift/v1**
id	**e4249d2b60e44743a67b5e5b38c18dd3**
internalurl	**http://radosgw.example.com:8080/swift/v1**
publicurl	**http://radosgw.example.com:8080/swift/v1**
region	**us-west**
service_id	**37c4c0e79571404cb4644201a4a6e5ee**
service_name	**swift**

Field	Value
service_type	**object-store**

Setting the endpoints will output the service endpoint settings.

6.3.5. Verifying Openstack is using the Ceph Object Gateway endpoints

After creating the Swift service and setting the endpoints, show the endpoints to ensure that all settings are correct.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Access to the Ceph software repository.

Procedure

1. List the endpoints under the Swift service:

```
[root@swift~]# openstack endpoint list --service=swift
```

2. Verify settings for the endpoints listed in the previous command:

Syntax

```
[root@swift~]# openstack endpoint show ENDPOINT_ID
```

Showing the endpoints will echo the endpoints settings, and the service settings.

Table 6.2. Example

Field	Value
adminurl	http://radosgw.example.com:8080/swift/v1
enabled	True
id	e4249d2b60e44743a67b5e5b38c18dd3
internalurl	http://radosgw.example.com:8080/swift/v1
publicurl	http://radosgw.example.com:8080/swift/v1
region	us-west
service_id	37c4c0e79571404cb4644201a4a6e5ee

Field	Value
service_name	swift
service_type	object-store

Additional Resources

- For more information on getting the details about endpoints, see Show endpoints in the Red Hat OpenStack guide.

6.3.6. Configuring the Ceph Object Gateway to use Keystone SSL

Converting the OpenSSL certificates that Keystone uses configures the Ceph Object Gateway to work with Keystone. When the Ceph Object Gateway interacts with OpenStack's Keystone authentication, Keystone will terminate with a self-signed SSL certificate.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Access to the Ceph software repository.

Procedure

1. Convert the OpenSSL certificate to the **nss db** format:

   Example

   ```
   [root@osp ~]# mkdir /var/ceph/nss

   [root@osp ~]# openssl x509 -in /etc/keystone/ssl/certs/ca.pem -pubkey | \
       certutil -d /var/ceph/nss -A -n ca -t "TCu,Cu,Tuw"

   [root@osp ~]# openssl x509 -in /etc/keystone/ssl/certs/signing_cert.pem -pubkey | \
       certutil -A -d /var/ceph/nss -n signing_cert -t "P,P,P"
   ```

2. Install Keystone's SSL certificate in the node running the Ceph Object Gateway. Alternatively set the value of the configurable **rgw_keystone_verify_ssl** setting to **false**.
   Setting **rgw_keystone_verify_ssl** to **false** means that the gateway will not attempt to verify the certificate.

6.3.7. Configuring the Ceph Object Gateway to use Keystone authentication

Configure the Red Hat Ceph Storage to use OpenStack's Keystone authentication.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Access to the Ceph software repository.

- Have **admin** privileges to the production environment.

Procedure

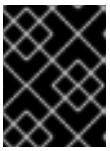
1. Do the following for each gateway instance.

   a. Set the **nss_db_path** setting to the path where the NSS database is stored:

   #### Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw nss_db_path
   "/var/lib/ceph/radosgw/ceph-rgw.rgw01/nss"
   ```

2. Provide authentication credentials:
   It is possible to configure a Keystone service tenant, user, and password for keystone for the OpenStack Identity API, similar to the way system administrators tend to configure OpenStack services. Providing a username and password avoids providing the shared secret to the **rgw_keystone_admin_token** setting.

   #### IMPORTANT

   Red Hat recommends disabling authentication by admin token in production environments. The service tenant credentials should have **admin** privileges.

   The necessary configuration options are:

   #### Syntax

   ```
   ceph config set client.rgw rgw_keystone_verify_ssl TRUE/FALSE
   ceph config set client.rgw rgw_s3_auth_use_keystone TRUE/FALSE
   ceph config set client.rgw rgw_keystone_api_version API_VERSION
   ceph config set client.rgw rgw_keystone_url KEYSTONE_URL:ADMIN_PORT
   ceph config set client.rgw rgw_keystone_accepted_roles ACCEPTED_ROLES_
   ceph config set client.rgw rgw_keystone_accepted_admin_roles
   ACCEPTED_ADMIN_ROLES
   ceph config set client.rgw rgw_keystone_admin_domain default
   ceph config set client.rgw rgw_keystone_admin_project SERVICE_NAME
   ceph config set client.rgw rgw_keystone_admin_user KEYSTONE_TENANT_USER_NAME
   ceph config set client.rgw rgw_keystone_admin_password
   KEYSTONE_TENANT_USER_PASSWORD
   ceph config set client.rgw rgw_keystone_implicit_tenants
   KEYSTONE_IMPLICIT_TENANT_NAME
   ceph config set client.rgw rgw_swift_versioning_enabled TRUE/FALSE
   ceph config set client.rgw rgw_swift_enforce_content_length TRUE/FALSE
   ceph config set client.rgw rgw_swift_account_in_url TRUE/FALSE
   ceph config set client.rgw rgw_trust_forwarded_https TRUE/FALSE
   ceph config set client.rgw rgw_max_attr_name_len
   MAXIMUM_LENGTH_OF_METADATA_NAMES
   ceph config set client.rgw rgw_max_attrs_num_in_req
   MAXIMUM_NUMBER_OF_METADATA_ITEMS
   ceph config set client.rgw rgw_max_attr_size
   MAXIMUM_LENGTH_OF_METADATA_VALUE
   ceph config set client.rgw rgw_keystone_accepted_reader_roles SwiftSystemReader
   ```

Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_verify_ssl false
[ceph: root@host01 /]# ceph config set client.rgw rgw_s3_auth_use_keystone true
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_api_version 3
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_url http://<public Keystone endpoint>:5000/
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_accepted_roles 'member, Member, admin'
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_accepted_admin_roles 'ResellerAdmin, swiftoperator'
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_admin_domain default
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_admin_project service
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_admin_user swift
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_admin_password password
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_implicit_tenants true
[ceph: root@host01 /]# ceph config set client.rgw rgw_swift_versioning_enabled  true
[ceph: root@host01 /]# ceph config set client.rgw rgw_swift_enforce_content_length true
[ceph: root@host01 /]# ceph config set client.rgw rgw_swift_account_in_url true
[ceph: root@host01 /]# ceph config set client.rgw rgw_trust_forwarded_https true
[ceph: root@host01 /]# ceph config set client.rgw rgw_max_attr_name_len 128
[ceph: root@host01 /]# ceph config set client.rgw rgw_max_attrs_num_in_req 90
[ceph: root@host01 /]# ceph config set client.rgw rgw_max_attr_size  1024
[ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_accepted_reader_roles SwiftSystemReader
```

A Ceph Object Gateway user is mapped into a Keystone **tenant**. A Keystone user has different roles assigned to it on possibly more than a single tenant. When the Ceph Object Gateway gets the ticket, it looks at the tenant, and the user roles that are assigned to that ticket, and accepts or rejects the request according to the **rgw_keystone_accepted_roles** configurable.

Additional Resources

- See the *Users and Identity Management Guide* for Red Hat OpenStack Platform.

6.3.8. Restarting the Ceph Object Gateway daemon

Restarting the Ceph Object Gateway must be done to active configuration changes.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Access to the Ceph software repository.
- **admin** privileges to the production environment.

Procedure

- Once you have saved the Ceph configuration file and distributed it to each Ceph node, restart the Ceph Object Gateway instances:

NOTE

Use the output from the **ceph orch ps** command, under the **NAME** column, to get the *SERVICE_TYPE.ID* information.

a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

Syntax

```
systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
```

Example

```
[root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
529020a7702d@rgw.realm.zone.host01.gwasto.service
```

b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host01 /]# ceph orch restart rgw
```

CHAPTER 7. SECURITY

As a storage administrator, securing the storage cluster environment is important. Red Hat Ceph Storage provides encryption and key management to secure the Ceph Object Gateway access point.

Prerequisites

- A healthy running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.

7.1. SERVER-SIDE ENCRYPTION (SSE)

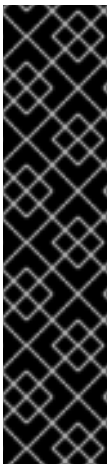
The Ceph Object Gateway supports server-side encryption of uploaded objects for the S3 application programming interface (API). Server-side encryption means that the S3 client sends data over HTTP in its unencrypted form, and the Ceph Object Gateway stores that data in the Red Hat Ceph Storage cluster in encrypted form.

NOTE

- Red Hat does NOT support S3 object encryption of Static Large Object (SLO) or Dynamic Large Object (DLO).
- Currently, none of the Server-Side Encryption (SSE) modes have implemented support for **CopyObject**. It is currently being developed [BZ#2149450].

IMPORTANT

Server-side encryption is not compatible with multi-site replication due to a known issue. This issue will be resolved in a future release. See *Known issues- Mult-site Object Gateway* for more details.



IMPORTANT

To use encryption, client requests **MUST** send requests over an SSL connection. Red Hat does not support S3 encryption from a client unless the Ceph Object Gateway uses SSL. However, for testing purposes, administrators can disable SSL during testing by setting the **rgw_crypt_require_ssl** configuration setting to **false** at runtime, using the **ceph config set client.rgw** command, and then restarting the Ceph Object Gateway instance.

In a production environment, it might not be possible to send encrypted requests over SSL. In such a case, send requests using HTTP with server-side encryption.

For information about how to configure HTTP with server-side encryption, see the *Additional Resources* section below.

There are three options for the management of encryption keys:

Customer-provided Keys

When using customer-provided keys, the S3 client passes an encryption key along with each request to read or write encrypted data. It is the customer's responsibility to manage those keys. Customers must remember which key the Ceph Object Gateway used to encrypt each object.

Ceph Object Gateway implements the customer-provided key behavior in the S3 API according to the Amazon SSE-C specification.

Since the customer handles the key management and the S3 client passes keys to the Ceph Object Gateway, the Ceph Object Gateway requires no special configuration to support this encryption mode.

Key Management Service

When using a key management service, the secure key management service stores the keys and the Ceph Object Gateway retrieves them on demand to serve requests to encrypt or decrypt data.

Ceph Object Gateway implements the key management service behavior in the S3 API according to the Amazon SSE-KMS specification.

IMPORTANT

Currently, the only tested key management implementations are HashiCorp Vault, and OpenStack Barbican. However, OpenStack Barbican is a Technology Preview and is not supported for use in production systems.

SSE-S3

When using SSE-S3, the keys are stored in vault, but they are automatically created and deleted by Ceph and retrieved as required to serve requests to encrypt or decrypt data.

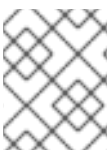
Ceph Object Gateway implements the SSE-S3 behavior in the S3 API according to the Amazon SSE-S3 specification.

Additional Resources

- Amazon SSE-C
- Amazon SSE-KMS
- *Configuring server-side encryption*
- *The HashiCorp Vault*

7.1.1. Setting the default encryption for an existing S3 bucket

As a storage administrator, you can set the default encryption for an existing Amazon S3 bucket so that all objects are encrypted when they are stored in a bucket. You can use Bucket Encryption APIs to support server-side encryption with Amazon S3-managed keys (SSE-S3) or Amazon KMS customer master keys (SSE-KMS).



NOTE

SSE-KMS is supported only from Red Hat Ceph Storage 5.x, not for Red Hat Ceph Storage 4.x.

You can manage default encryption for an existing Amazon S3 bucket using the **PutBucketEncryption** API. All files uploaded to this bucket will have this encryption by defining the default encryption at the bucket level.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- An S3 bucket created.
- An S3 user created with user access.
- Access to a Ceph Object Gateway client with the AWS CLI package installed.

Procedure

1. Create a JSON file for the encryption configuration:

   Example

   ```
   [user@client ~]$ vi bucket-encryption.json
   ```

2. Add the encryption configuration rules to the file:

   Example

   ```
   {
    "Rules": [
          {
       "ApplyServerSideEncryptionByDefault": {
                     "SSEAlgorithm": "AES256"
       }
         }
      ]
   }
   ```

3. Set the default encryption for the bucket:

   Syntax

   ```
   aws --endpoint-url=pass:q[_RADOSGW_ENDPOINT_URL_]:pass:q[_PORT_] s3api put-bucket-encryption --bucket pass:q[_BUCKET_NAME_] --server-side-encryption-configuration pass:q[_file://PATH_TO_BUCKET_ENCRYPTION_CONFIGURATION_FILE/BUCKET_ENCRYPTION_CONFIGURATION_FILE.json_]
   ```

   Example

   ```
   [user@client ~]$ aws --endpoint-url=http://host01:80 s3api put-bucket-encryption --bucket testbucket --server-side-encryption-configuration file://bucket-encryption.json
   ```

Verification

- Retrieve the bucket encryption configuration for the bucket:

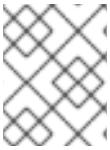
  Syntax

```
aws --endpoint-url=pass:q[_RADOSGW_ENDPOINT_URL_]:pass:q[_PORT_] s3api get-bucket-encryption --bucket BUCKET_NAME
```

Example

```
[user@client ~]$  aws --profile ceph --endpoint=http://host01:80 s3api get-bucket-encryption --bucket testbucket

{
    "ServerSideEncryptionConfiguration": {
        "Rules": [
            {
                "ApplyServerSideEncryptionByDefault": {
                    "SSEAlgorithm": "AES256"
                }
            }
        ]
    }
}
```



NOTE

If the bucket does not have a default encryption configuration, the **get-bucket-encryption** command returns **ServerSideEncryptionConfigurationNotFoundError**.

7.1.2. Deleting the default bucket encryption

You can delete the default bucket encryption for a specified bucket using the **s3api delete-bucket-encryption** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- An S3 bucket created.
- An S3 user created with user access.
- Access to a Ceph Object Gateway client with the AWS CLI package installed.

Procedure

- Delete a bucket encryption configuration:

  Syntax

  ```
  aws --endpoint-url=RADOSGW_ENDPOINT_URL:PORT s3api delete-bucket-encryption --bucket BUCKET_NAME
  ```

  Example

```
[user@client ~]$ aws --endpoint-url=http://host01:80 s3api delete-bucket-encryption --bucket
testbucket
```

Verification

- Retrieve the bucket encryption configuration for the bucket:

  Syntax

  ```
  aws --endpoint-url=RADOSGW_ENDPOINT_URL:PORT s3api get-bucket-encryption --
  bucket BUCKET_NAME
  ```

  Example

  ```
  [user@client ~]$  aws --endpoint=http://host01:80 s3api get-bucket-encryption --bucket
  testbucket

  An error occurred (ServerSideEncryptionConfigurationNotFoundError) when calling the
  GetBucketEncryption operation:
  The server side encryption configuration was not found
  ```

7.2. SERVER-SIDE ENCRYPTION REQUESTS

In a production environment, clients often contact the Ceph Object Gateway through a proxy. This proxy is referred to as a load balancer because it connects to multiple Ceph Object Gateways. When the client sends requests to the Ceph Object Gateway, the load balancer routes those requests to the multiple Ceph Object Gateways, thus distributing the workload.

In this type of configuration, it is possible that SSL terminations occur both at a load balancer and between the load balancer and the multiple Ceph Object Gateways. Communication occurs using HTTP only. To set up the Ceph Object Gateways to accept the server-side encryption requests, see *Configuring server-side encryption* .

7.3. CONFIGURING SERVER-SIDE ENCRYPTION

You can set up server-side encryption to send requests to the Ceph Object Gateway using HTTP, in cases where it might not be possible to send encrypted requests over SSL.

This procedure uses HAProxy as proxy and load balancer.

Prerequisites

- Root-level access to all nodes in the storage cluster.
- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- Installation of the HAProxy software.

Procedure

1. Edit the **haproxy.cfg** file:

Example

```
frontend http_web *:80
    mode http
    default_backend rgw

frontend rgw-https
  bind *:443 ssl crt /etc/ssl/private/example.com.pem
  default_backend rgw

backend rgw
    balance roundrobin
    mode http
    server  rgw1 10.0.0.71:8080 check
    server  rgw2 10.0.0.80:8080 check
```

2. Comment out the lines that allow access to the **http** front end and add instructions to direct HAProxy to use the **https** front end instead:

Example

```
#     frontend http_web *:80
#     mode http
#     default_backend rgw

frontend rgw-https
  bind *:443 ssl crt /etc/ssl/private/example.com.pem
  http-request set-header X-Forwarded-Proto https if { ssl_fc }
  http-request set-header X-Forwarded-Proto https
# here we set the incoming HTTPS port on the load balancer (eg : 443)
  http-request set-header X-Forwarded-Port 443
  default_backend rgw

backend rgw
    balance roundrobin
    mode http
    server  rgw1 10.0.0.71:8080 check
    server  rgw2 10.0.0.80:8080 check
```

3. Set the **rgw_trust_forwarded_https** option to **true**:

Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_trust_forwarded_https true
```

4. Enable and start HAProxy:

```
[root@host01 ~]# systemctl enable haproxy
[root@host01 ~]# systemctl start haproxy
```

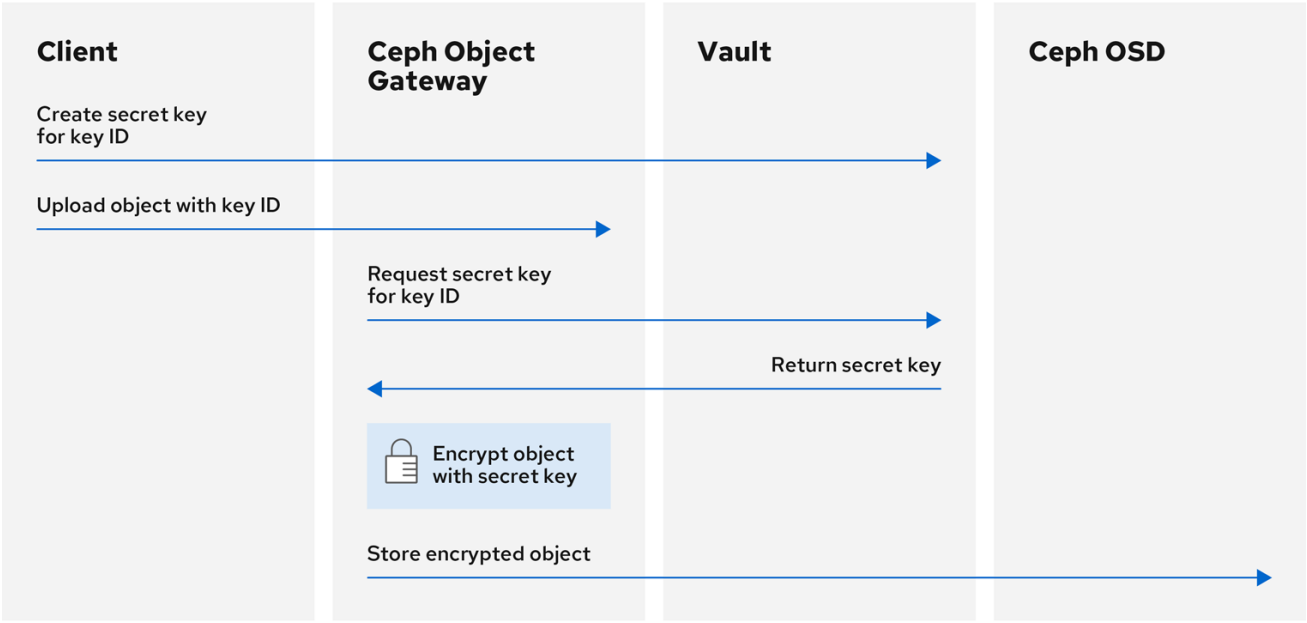
Additional Resources

- See the *High availability service* section in the *Red Hat Ceph Storage Object Gateway Guide* for additional details.

- See the *Red Hat Ceph Storage installation* chapter in the *Red Hat Ceph Storage Installation Guide* for additional details.

7.4. THE HASHICORP VAULT

As a storage administrator, you can securely store keys, passwords, and certificates in the HashiCorp Vault for use with the Ceph Object Gateway. The HashiCorp Vault provides a secure key management service for server-side encryption used by the Ceph Object Gateway.



The basic workflow:

1. The client requests the creation of a secret key from the Vault based on an object's key ID.
2. The client uploads an object with the object's key ID to the Ceph Object Gateway.
3. The Ceph Object Gateway then requests the newly created secret key from the Vault.
4. The Vault replies to the request by returning the secret key to the Ceph Object Gateway.
5. Now the Ceph Object Gateway can encrypt the object using the new secret key.
6. After encryption is done the object is then stored on the Ceph OSD.

IMPORTANT

Red Hat works with our technology partners to provide this documentation as a service to our customers. However, Red Hat does not provide support for this product. If you need technical assistance for this product, then contact Hashicorp for support.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.

- Installation of the HashiCorp Vault software.

7.4.1. Secret engines for Vault

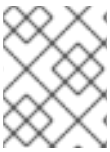
The HashiCorp Vault provides several secret engines to generate, store, or encrypt data. The application programming interface (API) sends data calls to the secret engine asking for action on that data, and the secret engine returns a result of that action request.

The Ceph Object Gateway supports two of the HashiCorp Vault secret engines:

- Key/Value version 2
- Transit

Key/Value version 2

The Key/Value secret engine stores random secrets within the Vault, on disk. With version 2 of the **kv** engine, a key can have a configurable number of versions. The default number of versions is 10. Deleting a version does not delete the underlying data, but marks the data as deleted, allowing deleted versions to be undeleted. You can use the API endpoint or the **destroy** command to permanently remove a version's data. To delete all versions and metadata for a key, you can use the **metadata** command or the API endpoint. The key names must be strings, and the engine will convert non-string values into strings when using the command line interface. To preserve non-string values, provide a JSON file or use the HTTP application programming interface (API).



NOTE

For access control list (ACL) policies, the Key/Value secret engine recognizes the distinctions between the **create** and **update** capabilities.

Transit

The Transit secret engine performs cryptographic functions on in-transit data. The Transit secret engine can generate hashes, can be a source of random bytes, and can also sign and verify data. The Vault does not store data when using the Transit secret engine. The Transit secret engine supports key derivation, by allowing the same key to be used for multiple purposes. Also, the transit secret engine supports key versioning. The Transit secret engine supports these key types:

aes128-gcm96

AES-GCM with a 128-bit AES key and a 96-bit nonce; supports encryption, decryption, key derivation, and convergent encryption

aes256-gcm96

AES-GCM with a 256-bit AES key and a 96-bit nonce; supports encryption, decryption, key derivation, and convergent encryption (default)

chacha20-poly1305

ChaCha20-Poly1305 with a 256-bit key; supports encryption, decryption, key derivation, and convergent encryption

ed25519

Ed25519; supports signing, signature verification, and key derivation

ecdsa-p256

ECDSA using curve P-256; supports signing and signature verification

ecdsa-p384

ECDSA using curve P-384; supports signing and signature verification

ecdsa-p521

ECDSA using curve P-521; supports signing and signature verification

rsa-2048

2048-bit RSA key; supports encryption, decryption, signing, and signature verification

rsa-3072

3072-bit RSA key; supports encryption, decryption, signing, and signature verification

rsa-4096

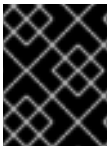
4096-bit RSA key; supports encryption, decryption, signing, and signature verification

Additional Resources

- See the *KV Secrets Engine* documentation on Vault's project site for more information.
- See the *Transit Secrets Engine* documentation on Vault's project site for more information.

7.4.2. Authentication for Vault

The HashiCorp Vault supports several types of authentication mechanisms. The Ceph Object Gateway currently supports the Vault agent method. The Ceph Object Gateway uses the **rgw_crypt_vault_auth**, and **rgw_crypt_vault_addr** options to configure the use of the HashiCorp Vault.



IMPORTANT

Red Hat supports the usage of Vault agent as the authentication method for containers and the usage of token authentication is not supported on containers.

Vault Agent

The Vault agent is a daemon that runs on a client node and provides client-side caching, along with token renewal. The Vault agent typically runs on the Ceph Object Gateway node. Run the Vault agent and refresh the token file. When the Vault agent is used in this mode, you can use file system permissions to restrict who has access to the usage of tokens. Also, the Vault agent can act as a proxy server, that is, Vault will add a token when required and add it to the requests passed to it before forwarding them to the actual server. The Vault agent can still handle token renewal just as it would when storing a token in the Filesystem. It is required to secure the network that Ceph Object Gateways uses to connect with the Vault agent, for example, the Vault agent listens to only the localhost.

Additional Resources

- See the *Vault Agent* documentation on Vault's project site for more information.

7.4.3. Namespaces for Vault

Using HashiCorp Vault as an enterprise service provides centralized management for isolated namespaces that teams within an organization can use. These isolated namespace environments are known as *tenants*, and teams within an organization can utilize these *tenants* to isolate their policies, secrets, and identities from other teams. The namespace features of Vault help support secure multi-tenancy from within a single infrastructure.

Additional Resources

- See the *Vault Enterprise Namespaces* documentation on Vault's project site for more information.

7.4.4. Transit engine compatibility support

There is compatibility support for the previous versions of Ceph which used the Transit engine as a simple key store. You can use the **compat** option in the Transit engine to configure the compatibility support. You can disable previous support with the following command:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_secret_engine transit compat=0
```

NOTE

This is the default for future versions and you can use the current version for new installations.

The normal default with the current version is:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_secret_engine transit compat=1
```

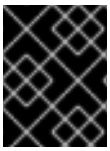
This enables the new engine for newly created objects and still allows the old engine to be used for the old objects. To access old and new objects, the Vault token must have both the old and new transit policies.

You can force use only the old engine with the following command:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_secret_engine transit compat=2
```

This mode is selected by default if the Vault ends in **export/encryption-key**.



IMPORTANT

After configuring the **client.rgw** options, you need to restart the Ceph Object Gateway daemons for the new values to take effect.

Additional Resources

- See the *Vault Agent* documentation on Vault's project site for more information.

7.4.5. Creating token policies for Vault

A token policy specifies the powers that all Vault tokens have. One token can have multiple policies. You should use the required policy for the configuration.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the HashiCorp Vault software.
- Root-level access to the HashiCorp Vault node.

Procedure

1. Create a token policy:
   a. For the Key/Value secret engine:

      Example

      ```
      [root@vault ~]# vault policy write rgw-kv-policy -<<EOF
       path "secret/data/*" {
         capabilities = ["read"]
       }
      EOF
      ```

   b. For the Transit engine:

      Example

      ```
      [root@vault ~]# vault policy write rgw-transit-policy -<<EOF
        path "transit/keys/*" {
          capabilities = [ "create", "update" ]
          denied_parameters = {"exportable" = [], "allow_plaintext_backup" = [] }
        }

        path "transit/keys/*" {
          capabilities = ["read", "delete"]
        }

        path "transit/keys/" {
          capabilities = ["list"]
        }

        path "transit/keys/+/rotate" {
          capabilities = [ "update" ]
        }

        path "transit/*" {
          capabilities = [ "update" ]
        }
      EOF
      ```

NOTE

If you have used the Transit secret engine on an older version of Ceph, the token policy is:

Example

```
[root@vault ~]# vault policy write old-rgw-transit-policy -<<EOF
  path "transit/export/encryption-key/*" {
    capabilities = ["read"]
  }
EOF
```

If you are using both SSE-KMS and SSE-S3, you should point each to separate containers. You could either use separate Vault instances or separately mount transit instances or different branches under a common transit point. If you are not using separate Vault instances, you can point SSE-KMS or SSE-S3 to serparate containers using **rgw_crypt_vault_prefix** and **rgw_crypt_sse_s3_vault_prefix**. When granting Vault permissions to SSE-KMS bucket owners, you should not give them permission to SSE-S3 keys; only Ceph should have access to the SSE-S3 keys.

7.4.6. Configuring the Ceph Object Gateway to use SSE-KMS with Vault

To configure the Ceph Object Gateway to use the HashiCorp Vault with SSE-KMS for key management, it must be set as the encryption key store. Currently, the Ceph Object Gateway supports two different secret engines, and two different authentication methods.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- Root-level access to a Ceph Object Gateway node.

Procedure

1. Use the **ceph config set client.rgw *OPTION VALUE*** command to enable Vault as the encryption key store:

   Syntax

   ```
   ceph config set client.rgw rgw_crypt_s3_kms_backend vault
   ```

2. Add the following options and values:

   Syntax

   ```
   ceph config set client.rgw rgw_crypt_vault_auth agent
   ceph config set client.rgw rgw_crypt_vault_addr http://VAULT_SERVER:8100
   ```

3. Customize the policy as per the use case.

4. Get the role-id:

Syntax

```
vault read auth/approle/role/rgw-ap/role-id -format=json | \ jq -r .data.role_id >
PATH_TO_FILE
```

5. Get the secret-id:

Syntax

```
vault read auth/approle/role/rgw-ap/role-id -format=json | \ jq -r .data.secret_id >
PATH_TO_FILE
```

6. Create the configuration for the Vault agent:

Example

```
pid_file = "/run/kv-vault-agent-pid"
auto_auth {
  method "AppRole" {
    mount_path = "auth/approle"
    config = {
      role_id_file_path ="/root/vault_configs/kv-agent-role-id"
      secret_id_file_path ="/root/vault_configs/kv-agent-secret-id"
      remove_secret_id_file_after_reading ="false"
    }
  }
}
cache {
  use_auto_auth_token = true
}
listener "tcp" {
  address = "127.0.0.1:8100"
  tls_disable = true
}
vault {
  address = "http://10.8.128.9:8200"
}
```

7. Use systemctl to run the persistent daemon:

Example

```
[root@host03 ~]# /usr/local/bin/vault agent -config=/usr/local/etc/vault/rgw-agent.hcl
```

8. A token file is populated with a valid token when the Vault agent runs.

9. Select a Vault secret engine, either Key/Value or Transit.

   a. If using **Key/Value**, then add the following line:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_secret_engine kv
```

b. If using **Transit**, then add the following line:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_secret_engine transit
```

10. Use the **ceph config set client.rgw *OPTION VALUE*** command to set the Vault namespace to retrieve the encryption keys:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_namespace
testnamespace1
```

11. Restrict where the Ceph Object Gateway retrieves the encryption keys from the Vault by setting a path prefix:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_prefix /v1/secret/data
```

a. For exportable Transit keys, set the prefix path as follows:

Example

```
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_vault_prefix
/v1/transit/export/encryption-key
```

Assuming the domain name of the Vault server is **vault-server**, the Ceph Object Gateway will fetch encrypted transit keys from the following URL:

Example

```
http://vault-server:8200/v1/transit/export/encryption-key
```

12. Restart the Ceph Object Gateway daemons.

a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

Syntax

```
systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
```

Example

```
[root@host03 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
529020a7702d@rgw.realm.zone.host01.gwasto.service
```

b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root@host03 /]# ceph orch restart rgw
```

Additional Resources

- See the *Secret engines for Vault* section of the *Red Hat Ceph Storage Object Gateway Guide* for more details.
- See the *Authentication for Vault* section of the *Red Hat Ceph Storage Object Gateway Guide* for more details.

7.4.7. Configuring the Ceph Object Gateway to use SSE-S3 with Vault

To configure the Ceph Object Gateway to use the HashiCorp Vault with SSE-S3 for key management, it must be set as the encryption key store. Currently, the Ceph Object Gateway only uses **agent** authentication method.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- Root-level access to a Ceph Object Gateway node.

Procedure

1. Log into the Cephadm shell

   Example

   ```
   [root@host01 ~]# cephadm shell
   ```

2. Enable Vault as the secrets engine to retrieve SSE-S3 encryption keys:

   Syntax

   ```
   ceph config set client.rgw rgw_crypt_sse_s3_backend vault
   ```

3. To set the authentication method to use with SSE-S3 and Vault, configure the following settings:

   Syntax

   ```
   ceph config set client.rgw rgw_crypt_sse_s3_vault_auth agent
   ceph config set client.rgw rgw_crypt_sse_s3_vault_addr
   http://VAULT_AGENT:VAULT_AGENT_PORT
   ```

   Example

```
[ceph: root@host01 ~]# ceph config set client.rgw rgw_crypt_sse_s3_vault_auth agent
[ceph: root@host01 ~]# ceph config set client.rgw rgw_crypt_sse_s3_vault_addr
http://vaultagent:8100
```

a. Customize the policy as per your use case to set up a Vault agent.

b. Get the role-id:

Syntax

```
vault read auth/approle/role/rgw-ap/role-id -format=json | \ jq -r .rgw-ap-role-id >
PATH_TO_FILE
```

c. Get the secret-id:

Syntax

```
vault read auth/approle/role/rgw-ap/role-id -format=json | \ jq -r .rgw-ap-secret-id >
PATH_TO_FILE
```

d. Create the configuration for the Vault agent:

Example

```
pid_file = "/run/rgw-vault-agent-pid"
auto_auth {
  method "AppRole" {
    mount_path = "auth/approle"
    config = {
      role_id_file_path ="/usr/local/etc/vault/.rgw-ap-role-id"
      secret_id_file_path ="/usr/local/etc/vault/.rgw-ap-secret-id"
      remove_secret_id_file_after_reading ="false"
    }
  }
}
cache {
  use_auto_auth_token = true
}
listener "tcp" {
  address = "127.0.0.1:8100"
  tls_disable = true
}
vault {
  address = "https://vaultserver:8200"
}
```

e. Use systemctl to run the persistent daemon:

Example

```
[root@host01 ~]# /usr/local/bin/vault agent -config=/usr/local/etc/vault/rgw-agent.hcl
```

f. A token file is populated with a valid token when the Vault agent runs.

4. Set the Vault secret engine to use to retrieve encryption keys, either Key/Value or Transit.

   a. If using **Key/Value**, set the following:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_secret_engine
   kv
   ```

   b. If using **Transit**, set the following:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_secret_engine
   transit
   ```

5. Optional: Configure the Ceph Object Gateway to access Vault within a particular namespace to retrieve the encryption keys:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_namespace
   company/testnamespace1
   ```

   NOTE

   Vault namespaces allow teams to operate within isolated environments known as tenants. The Vault namespaces feature is only available in the Vault Enterprise version.

6. Optional: Restrict access to a particular subset of the Vault secret space by setting a URL path prefix, where the Ceph Object Gateway retrieves the encryption keys from:

   a. If using **Key/Value**, set the following:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_prefix
   /v1/secret/data
   ```

   b. If using **Transit**, set the following:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_prefix
   /v1/transit
   ```

   Assuming the domain name of the Vault server is **vaultserver**, the Ceph Object Gateway will fetch encrypted transit keys from the following URL:

   Example

   ```
   http://vaultserver:8200/v1/transit
   ```

7. Optional: To use custom SSL certification to authenticate with Vault, configure the following settings:

Syntax

```
ceph config set client.rgw rgw_crypt_sse_s3_vault_verify_ssl true
ceph config set client.rgw rgw_crypt_sse_s3_vault_ssl_cacert PATH_TO_CA_CERTIFICATE
ceph config set client.rgw rgw_crypt_sse_s3_vault_ssl_clientcert
PATH_TO_CLIENT_CERTIFICATE
ceph config set client.rgw rgw_crypt_sse_s3_vault_ssl_clientkey PATH_TO_PRIVATE_KEY
```

Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_verify_ssl true
[ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_ssl_cacert
/etc/ceph/vault.ca
[ceph: root@host01 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_ssl_clientcert
/etc/ceph/vault.crt
[ceph: root@host03 /]# ceph config set client.rgw rgw_crypt_sse_s3_vault_ssl_clientkey
/etc/ceph/vault.key
```

8. Restart the Ceph Object Gateway daemons.

   a. To restart the Ceph Object Gateway on an individual node in the storage cluster:

   Syntax

   ```
   systemctl restart ceph-CLUSTER_ID@SERVICE_TYPE.ID.service
   ```

   Example

   ```
   [root@host01 ~]# systemctl restart ceph-c4b34c6f-8365-11ba-dc31-
   529020a7702d@rgw.realm.zone.host01.gwasto.service
   ```

   b. To restart the Ceph Object Gateways on all nodes in the storage cluster:

   Syntax

   ```
   ceph orch restart SERVICE_TYPE
   ```

   Example

   ```
   [ceph: root@host01 /]# ceph orch restart rgw
   ```

Additional Resources

- See the *Secret engines for Vault* section of the *Red Hat Ceph Storage Object Gateway Guide* for more details.
- See the *Authentication for Vault* section of the *Red Hat Ceph Storage Object Gateway Guide* for more details.

7.4.8. Creating a key using the kv engine

Configure the HashiCorp Vault Key/Value secret engine (**kv**) so you can create a key for use with the Ceph Object Gateway. Secrets are stored as key-value pairs in the **kv** secret engine.

IMPORTANT

Keys for server-side encryption must be 256-bits long and encoded using **base64**.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the HashiCorp Vault software.
- Root-level access to the HashiCorp Vault node.

Procedure

1. Enable the Key/Value version 2 secret engine:

   Example

   ```
   vault secrets enable -path secret kv-v2
   ```

2. Create a new key:

   Syntax

   ```
   vault kv put secret/PROJECT_NAME/BUCKET_NAME key=$(openssl rand -base64 32)
   ```

   Example

   ```
   [root@vault ~]# vault kv put secret/myproject/mybucketkey key=$(openssl rand -base64 32)

   ====== Metadata ======
   Key              Value
   ---              -----
   created_time     2020-02-21T17:01:09.095824999Z
   deletion_time    n/a
   destroyed        false
   version          1
   ```

7.4.9. Creating a key using the transit engine

Configure the HashiCorp Vault Transit secret engine (**transit**) so you can create a key for use with the Ceph Object Gateway. Creating keys with the Transit secret engine must be exportable in order to be used for server-side encryption with the Ceph Object Gateway.

Prerequisites

- A running Red Hat Ceph Storage cluster.

- Installation of the HashiCorp Vault software.
- Root-level access to the HashiCorp Vault node.

Procedure

1. Enable the Transit secret engine:

```
[root@vault ~]# vault secrets enable transit
```

2. Create a new exportable key:

Syntax

```
vault write -f transit/keys/BUCKET_NAME exportable=true
```

Example

```
[root@vault ~]# vault write -f transit/keys/mybucketkey exportable=true
```

NOTE

By default the above command creates a **aes256-gcm96** type key.

3. Verify the creation of the key:

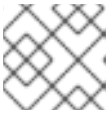
Syntax

```
vault read transit/export/encryption-key/BUCKET_NAME/VERSION_NUMBER
```

Example

```
[root@vault ~]# vault read transit/export/encryption-key/mybucketkey/1

Key     Value
---     -----
keys    map[1:-gbTI9lNpqv/V/2lDcmH2Nq1xKn6FPDWarCmFM2aNsQ=]
name    mybucketkey
type    aes256-gcm96
```



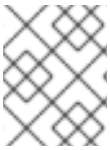
NOTE

Providing the full key path, including the key version, is required.

7.4.10. Uploading an object using AWS and the Vault

When uploading an object to the Ceph Object Gateway, the Ceph Object Gateway will fetch the key from the Vault, and then encrypt and store the object in a bucket. When a request is made to download the object, the Ceph Object Gateway will automatically retrieve the corresponding key from the Vault and decrypt the object. To upload an object, the Ceph object Gateway fetches the key from the Vault

and then encrypts the object and stores it in the bucket. The Ceph Object Gateway retrieves the corresponding key from the Vault and decrypts the object when there is a request to download the object.



NOTE

The URL is constructed using the base address, set by the **rgw_crypt_vault_addr** option, and the path prefix, set by the **rgw_crypt_vault_prefix** option.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- Installation of the HashiCorp Vault software.
- Access to a Ceph Object Gateway client node.
- Access to Amazon Web Services (AWS).

Procedure

1. Upload an object using the AWS command line client and provide the Secure Side Encryption (SSE) key ID in the request:

   a. For the Key/Value secret engine:

   Example (with SSE-KMS)

   ```
   [user@client ~]$ aws --endpoint=http://radosgw:8000 s3 cp plaintext.txt
   s3://mybucket/encrypted.txt --sse=aws:kms --sse-kms-key-id myproject/mybucketkey
   ```

   Example (with SSE-S3)

   ```
   [user@client ~]$ aws s3api --endpoint http://rgw_host:8080 put-object --bucket my-
   bucket --key obj1 --body test_file_to_upload --server-side-encryption AES256
   ```

   NOTE

   In the example, the Ceph Object Gateway would fetch the secret from **http://vault-server:8200/v1/secret/data/myproject/mybucketkey**

   b. For the Transit engine:

   Example (with SSE-KMS)

   ```
   [user@client ~]$ aws --endpoint=http://radosgw:8000 s3 cp plaintext.txt
   s3://mybucket/encrypted.txt --sse=aws:kms --sse-kms-key-id mybucketkey
   ```

   Example (with SSE-S3)

```
[user@client ~]$ aws s3api --endpoint http://rgw_host:8080 put-object --bucket my-bucket --key obj1 --body test_file_to_upload --server-side-encryption AES256
```

NOTE

In the example, the Ceph Object Gateway would fetch the secret from **http://vaultserver:8200/v1/transit/mybucketkey**

Additional Resources

- See the *Install Vault* documentation on Vault's project site for more information.

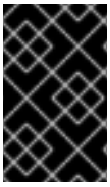
7.5. THE CEPH OBJECT GATEWAY AND MULTI-FACTOR AUTHENTICATION

As a storage administrator, you can manage time-based one time password (TOTP) tokens for Ceph Object Gateway users.

7.5.1. Multi-factor authentication

When a bucket is configured for object versioning, a developer can optionally configure the bucket to require multi-factor authentication (MFA) for delete requests. Using MFA, a time-based one time password (TOTP) token is passed as a key to the **x-amz-mfa** header. The tokens are generated with virtual MFA devices like Google Authenticator, or a hardware MFA device like those provided by Gemalto.

Use **radosgw-admin** to assign time-based one time password tokens to a user. You must set a secret seed and a serial ID. You can also use **radosgw-admin** to list, remove, and resynchronize tokens.



IMPORTANT

In a multi-site environment it is advisable to use different tokens for different zones, because, while MFA IDs are set on the user's metadata, the actual MFA one time password configuration resides on the local zone's OSDs.

Table 7.1. Terminology

Term	Description
TOTP	Time-based One Time Password.
Token serial	A string that represents the ID of a TOTP token.
Token seed	The secret seed that is used to calculate the TOTP. It can be hexadecimal or base32.
TOTP seconds	The time resolution used for TOTP generation.
TOTP window	The number of TOTP tokens that are checked before and after the current token when validating tokens.

Term	Description
TOTP pin	The valid value of a TOTP token at a certain time.

7.5.2. Creating a seed for multi-factor authentication

To set up multi-factor authentication (MFA), you must create a secret seed for use by the one-time password generator and the back-end MFA system.

Prerequisites

- A Linux system.
- Access to the command line shell.

Procedure

1. Generate a 30 character seed from the **urandom** Linux device file and store it in the shell variable **SEED**:

   #### Example

   ```
   [user@host01 ~]$ SEED=$(head -10 /dev/urandom | sha512sum | cut -b 1-30)
   ```

2. Print the seed by running echo on the **SEED** variable:

   #### Example

   ```
   [user@host01 ~]$ echo $SEED
   492dedb20cf51d1405ef6a1316017e
   ```

   Configure the one-time password generator and the back-end MFA system to use the same seed.

Additional Resources

- For more information, see the solution *Unable to create RGW MFA token for bucket* .
- For more information, see *The Ceph Object Gateway and multi-factor authentication* .

7.5.3. Creating a new multi-factor authentication TOTP token

Create a new multi-factor authentication (MFA) time-based one time password (TOTP) token.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway is installed.
- You have root access on a Ceph Monitor node.

- A secret seed for the one-time password generator and Ceph Object Gateway MFA was generated.

Procedure

- Create a new MFA TOTP token:

  Syntax

  ```
  radosgw-admin mfa create --uid=USERID --totp-serial=SERIAL --totp-seed=SEED --totp-seed-type=SEED_TYPE --totp-seconds=TOTP_SECONDS --totp-window=TOTP_WINDOW
  ```

  Set *USERID* to the user name to set up MFA on, set *SERIAL* to a string that represents the ID for the TOTP token, and set *SEED* to a hexadecimal or base32 value that is used to calculate the TOTP. The following settings are optional: Set the *SEED_TYPE* to **hex** or **base32**, set *TOTP_SECONDS* to the timeout in seconds, or set *TOTP_WINDOW* to the number of TOTP tokens to check before and after the current token when validating tokens.

  Example

  ```
  [root@host01 ~]# radosgw-admin mfa create --uid=johndoe --totp-serial=MFAtest --totp-seed=492dedb20cf51d1405ef6a1316017e
  ```

Additional Resources

- For more information, see *Creating a seed for multi-factor authentication* .
- For more information, See *Resynchronizing a multi-factor authentication token* .

7.5.4. Test a multi-factor authentication TOTP token

Test a multi-factor authentication (MFA) time-based one time password (TOTP) token.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway is installed.
- You have root access on a Ceph Monitor node.
- An MFA TOTP token was created using **radosgw-admin mfa create**.

Procedure

- Test the TOTP token PIN to verify that TOTP functions correctly:

  Syntax

  ```
  radosgw-admin mfa check --uid=USERID --totp-serial=SERIAL --totp-pin=PIN
  ```

  Set *USERID* to the user name MFA is set up on, set *SERIAL* to the string that represents the ID for the TOTP token, and set *PIN* to the latest PIN from the one-time password generator.

Example

```
[root@host01 ~]# radosgw-admin mfa check  --uid=johndoe --totp-serial=MFAtest --totp-pin=870305
ok
```

If this is the first time you have tested the PIN, it may fail. If it fails, resynchronize the token. See *Resynchronizing a multi-factor authentication token* in the *Red Hat Ceph Storage Object Gateway Configuration and Administration Guide*.

Additional Resources

- For more information, see *Creating a seed for multi-factor authentication* .
- For more information, see *Resynchronizing a multi-factor authentication token* .

7.5.5. Resynchronizing a multi-factor authentication TOTP token

Resynchronize a multi-factor authentication (MFA) time-based one time password token.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway is installed.
- You have root access on a Ceph Monitor node.
- An MFA TOTP token was created using **radosgw-admin mfa create**.

Procedure

1. Resynchronize a multi-factor authentication TOTP token in case of time skew or failed checks. This requires passing in two consecutive pins: the previous pin, and the current pin.

   #### Syntax

   ```
   radosgw-admin mfa resync --uid=USERID --totp-serial=SERIAL --totp-pin=PREVIOUS_PIN --totp=pin=CURRENT_PIN
   ```

   Set *USERID* to the user name MFA is set up on, set *SERIAL* to the string that represents the ID for the TOTP token, set *PREVIOUS_PIN* to the user's previous PIN, and set *CURRENT_PIN* to the user's current PIN.

   #### Example

   ```
   [root@host01 ~]# radosgw-admin mfa resync --uid=johndoe --totp-serial=MFAtest --totp-pin=802021 --totp-pin=439996
   ```

2. Verify the token was successfully resynchronized by testing a new PIN:

   #### Syntax

```
radosgw-admin mfa check --uid=USERID --totp-serial=SERIAL --totp-pin=PIN
```

Set *USERID* to the user name MFA is set up on, set *SERIAL* to the string that represents the ID for the TOTP token, and set *PIN* to the user's PIN.

Example

```
[root@host01 ~]# radosgw-admin mfa check  --uid=johndoe --totp-serial=MFAtest --totp-pin=870305
ok
```

Additional Resources

- For more information, see *Creating a new multi-factor authentication TOTP token* .

7.5.6. Listing multi-factor authentication TOTP tokens

List all multi-factor authentication (MFA) time-based one time password (TOTP) tokens that a particular user has.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway is installed.
- You have root access on a Ceph Monitor node.
- An MFA TOTP token was created using **radosgw-admin mfa create**.

Procedure

- List MFA TOTP tokens:

Syntax

```
radosgw-admin mfa list --uid=USERID
```

Set *USERID* to the user name MFA is set up on.

Example

```
[root@host01 ~]# radosgw-admin mfa list --uid=johndoe
{
    "entries": [
        {
            "type": 2,
            "id": "MFAtest",
            "seed": "492dedb20cf51d1405ef6a1316017e",
            "seed_type": "hex",
            "time_ofs": 0,
            "step_size": 30,
            "window": 2
```

```
        }
    ]
}
```

Additional Resources

- For more information, see *Creating a new multi-factor authentication TOTP token* .

7.5.7. Display a multi-factor authentication TOTP token

Display a specific multi-factor authentication (MFA) time-based one time password (TOTP) token by specifying its serial.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway is installed.
- You have root access on a Ceph Monitor node.
- An MFA TOTP token was created using **radosgw-admin mfa create**.

Procedure

- Show the MFA TOTP token:

  #### Syntax

  ```
  radosgw-admin mfa get --uid=USERID --totp-serial=SERIAL
  ```

  Set *USERID* to the user name MFA is set up on and set *SERIAL* to the string that represents the ID for the TOTP token.

Additional Resources

- For more information, see *Creating a new multi-factor authentication TOTP token* .

7.5.8. Deleting a multi-factor authentication TOTP token

Delete a multi-factor authentication (MFA) time-based one time password (TOTP) token.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway is installed.
- You have root access on a Ceph Monitor node.
- An MFA TOTP token was created using **radosgw-admin mfa create**.

Procedure

1. Delete an MFA TOTP token:

   Syntax

   ```
   radosgw-admin mfa remove --uid=USERID --totp-serial=SERIAL
   ```

   Set *USERID* to the user name MFA is set up on and set *SERIAL* to the string that represents the ID for the TOTP token.

   Example

   ```
   [root@host01 ~]# radosgw-admin mfa remove --uid=johndoe --totp-serial=MFAtest
   ```

2. Verify the MFA TOTP token was deleted:

   Syntax

   ```
   radosgw-admin mfa get --uid=USERID --totp-serial=SERIAL
   ```

   Set *USERID* to the user name MFA is set up on and set *SERIAL* to the string that represents the ID for the TOTP token.

   Example

   ```
   [root@host01 ~]# radosgw-admin mfa get --uid=johndoe --totp-serial=MFAtest
   MFA serial id not found
   ```

Additional Resources

- For more information, see *The Ceph Object Gateway and multi-factor authentication* .

CHAPTER 8. ADMINISTRATION

As a storage administrator, you can manage the Ceph Object Gateway using the **radosgw-admin** command line interface (CLI) or using the Red Hat Ceph Storage Dashboard.

NOTE

Not all of the Ceph Object Gateway features are available to the Red Hat Ceph Storage Dashboard.

- *Storage Policies*
- *Indexless Buckets*
- *Configure bucket index resharding*
- *Compression*
- *User Management*
- *Role Management*
- *Quota Management*
- *Bucket Management*
- *Usage*
- *Ceph Object Gateway data layout*

Prerequisites

- A healthy running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.

8.1. CREATING STORAGE POLICIES

The Ceph Object Gateway stores the client bucket and object data by identifying placement targets, and storing buckets and objects in the pools associated with a placement target. If you don't configure placement targets and map them to pools in the instance's zone configuration, the Ceph Object Gateway will use default targets and pools, for example, **default_placement**.

Storage policies give Ceph Object Gateway clients a way of accessing a storage strategy, that is, the ability to target a particular type of storage, such as SSDs, SAS drives, and SATA drives, as a way of ensuring, for example, durability, replication, and erasure coding. For details, see the *Storage Strategies* guide for Red Hat Ceph Storage 7.

To create a storage policy, use the following procedure:

1. Create a new pool **.rgw.buckets.special** with the desired storage strategy. For example, a pool customized with erasure-coding, a particular CRUSH ruleset, the number of replicas, and the **pg_num** and **pgp_num** count.
2. Get the zone group configuration and store it in a file:

Syntax

```
radosgw-admin zonegroup --rgw-zonegroup=ZONE_GROUP_NAME get > FILE_NAME.json
```

Example

```
[root@host01 ~]# radosgw-admin zonegroup --rgw-zonegroup=default get > zonegroup.json
```

3. Add a **special-placement** entry under **placement_target** in the **zonegroup.json** file:

Example

```
{
 "name": "default",
 "api_name": "",
 "is_master": "true",
 "endpoints": [],
 "hostnames": [],
 "master_zone": "",
 "zones": [{
  "name": "default",
  "endpoints": [],
  "log_meta": "false",
  "log_data": "false",
  "bucket_index_max_shards": 5
 }],
 "placement_targets": [{
  "name": "default-placement",
  "tags": []
 }, {
  "name": "special-placement",
  "tags": []
 }],
 "default_placement": "default-placement"
}
```

4. Set the zone group with the modified **zonegroup.json** file:

Example

```
[root@host01 ~]# radosgw-admin zonegroup set < zonegroup.json
```

5. Get the zone configuration and store it in a file, for example, **zone.json**:

Example

```
[root@host01 ~]# radosgw-admin zone get > zone.json
```

6. Edit the zone file and add the new placement policy key under **placement_pool**:

Example

```
{
```

```
 "domain_root": ".rgw",
 "control_pool": ".rgw.control",
 "gc_pool": ".rgw.gc",
 "log_pool": ".log",
 "intent_log_pool": ".intent-log",
 "usage_log_pool": ".usage",
 "user_keys_pool": ".users",
 "user_email_pool": ".users.email",
 "user_swift_pool": ".users.swift",
 "user_uid_pool": ".users.uid",
 "system_key": {
  "access_key": "",
  "secret_key": ""
 },
 "placement_pools": [{
  "key": "default-placement",
  "val": {
   "index_pool": ".rgw.buckets.index",
   "data_pool": ".rgw.buckets",
   "data_extra_pool": ".rgw.buckets.extra"
  }
 }, {
  "key": "special-placement",
  "val": {
   "index_pool": ".rgw.buckets.index",
   "data_pool": ".rgw.buckets.special",
   "data_extra_pool": ".rgw.buckets.extra"
  }
 }]
}
```

7. Set the new zone configuration:

   Example

   ```
   [root@host01 ~]# radosgw-admin zone set < zone.json
   ```

8. Update the zone group map:

   Example

   ```
   [root@host01 ~]# radosgw-admin period update --commit
   ```

   The **special-placement** entry is listed as a **placement_target**.

9. To specify the storage policy when making a request:

   Example

   ```
   $ curl -i http://10.0.0.1/swift/v1/TestContainer/file.txt -X PUT -H "X-Storage-Policy: special-placement" -H "X-Auth-Token: AUTH_rgwtxxxxxx"
   ```

8.2. CREATING INDEXLESS BUCKETS

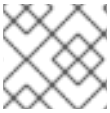
You can configure a placement target where created buckets do not use the bucket index to store objects index; that is, indexless buckets. Placement targets that do not use data replication or listing might implement indexless buckets. Indexless buckets provide a mechanism in which the placement target does not track objects in specific buckets. This removes a resource contention that happens whenever an object write happens and reduces the number of round trips that Ceph Object Gateway needs to make to the Ceph storage cluster. This can have a positive effect on concurrent operations and small object write performance.

IMPORTANT

The bucket index does not reflect the correct state of the bucket, and listing these buckets does not correctly return their list of objects. This affects multiple features. Specifically, these buckets are not synced in a multi-zone environment because the bucket index is not used to store change information. Red Hat recommends not to use S3 object versioning on indexless buckets, because the bucket index is necessary for this feature.

NOTE

Using indexless buckets removes the limit of the max number of objects in a single bucket.



NOTE

Objects in indexless buckets cannot be listed from NFS.

Prerequisites

- A running and healthy Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- Root-level access to a Ceph Object Gateway node.

Procedure

1. Add a new placement target to the zonegroup:

   Example

   ```
   [ceph: root@host03 /]# radosgw-admin zonegroup placement add --rgw-zonegroup="default"
   \
     --placement-id="indexless-placement"
   ```

2. Add a new placement target to the zone:

   Example

   ```
   [ceph: root@host03 /]# radosgw-admin zone placement add --rgw-zone="default" \
     --placement-id="indexless-placement" \
     --data-pool="default.rgw.buckets.data" \
     --index-pool="default.rgw.buckets.index" \
     --data_extra_pool="default.rgw.buckets.non-ec" \
     --placement-index-type="indexless"
   ```

3. Set the zonegroup's default placement to **indexless-placement**:

   Example

   ```
   [ceph: root@host03 /]# radosgw-admin zonegroup placement default --placement-id
   "indexless-placement"
   ```

   In this example, the buckets created in the **indexless-placement** target will be indexless buckets.

4. Update and commit the period if the cluster is in a multi-site configuration:

   Example

   ```
   [ceph: root@host03 /]# radosgw-admin period update --commit
   ```

5. Restart the Ceph Object Gateways on all nodes in the storage cluster for the change to take effect:

   Syntax

   ```
   ceph orch restart SERVICE_TYPE
   ```

   Example

   ```
   [ceph: root@host03 /]# ceph orch restart rgw
   ```

8.3. CONFIGURE BUCKET INDEX RESHARDING

As a storage administrator, you can configure bucket index resharding in single-site and multi-site deployments to improve performance.

You can reshard a bucket index either manually offline or dynamically online.

8.3.1. Bucket index resharding

The Ceph Object Gateway stores bucket index data in the index pool, which defaults to **.rgw.buckets.index** parameter. When the client puts many objects in a single bucket without setting quotas for the maximum number of objects per bucket, the index pool can result in significant performance degradation.

- Bucket index resharding prevents performance bottlenecks when you add a high number of objects per bucket.
- You can configure bucket index resharding for new buckets or change the bucket index on the existing ones.
- You need to have the shard count as the nearest prime number to the calculated shard count. The bucket index shards that are prime numbers tend to work better in an evenly distributed bucket index entries across shards.
- Bucket index can be resharded manually or dynamically.
  During the process of resharding bucket index dynamically, there is a periodic check of all the

Ceph Object Gateway buckets and it detects buckets that require resharding. If a bucket has grown larger than the value specified in the **rgw_max_objs_per_shard** parameter, the Ceph Object Gateway reshards the bucket dynamically in the background. The default value for **rgw_max_objs_per_shard** is 100k objects per shard. Resharding bucket index dynamically works as expected on the upgraded single-site configuration without any modification to the zone or the zone group. A single site-configuration can be any of the following:

- A default zone configuration with no realm.
- A non-default configuration with at least one realm.
- A multi-realm single-site configuration.

8.3.2. Recovering bucket index

Resharding a bucket that was created with **bucket_index_max_shards = 0**, removes the bucket's metadata. However, you can restore the bucket indexes by recovering the affected buckets.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed at a minimum of two sites.
- The **jq** package installed.

Procedure

- Perform either of the below two steps to perform recovery of bucket indexes:
  - Run **radosgw-admin object reindex --bucket *BUCKET_NAME* --object *OBJECT_NAME*** command.
  - Run the script - **/usr/bin/rgw-restore-bucket-index -b *BUCKET_NAME* -p *DATA_POOL_NAME***.

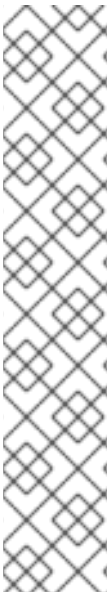
    Example

```
[root@host01 ceph]# /usr/bin/rgw-restore-bucket-index -b bucket-large-1 -p local-zone.rgw.buckets.data

marker is d8a347a4-99b6-4312-a5c1-75b83904b3d4.41610.2
bucket_id is d8a347a4-99b6-4312-a5c1-75b83904b3d4.41610.2
number of bucket index shards is 5
data pool is local-zone.rgw.buckets.data
NOTICE: This tool is currently considered EXPERIMENTAL.
The list of objects that we will attempt to restore can be found in "/tmp/rgwrbi-object-list.49946".
Please review the object names in that file (either below or in another window/terminal) before proceeding.
Type "proceed!" to proceed, "view" to view object list, or "q" to quit: view
Viewing...
Type "proceed!" to proceed, "view" to view object list, or "q" to quit: proceed!
Proceeding...
NOTICE: Bucket stats are currently incorrect. They can be restored with the following command after 2 minutes:
```

```
    radosgw-admin bucket list --bucket=bucket-large-1 --allow-unordered --max-
entries=1073741824
Would you like to take the time to recalculate bucket stats now? [yes/no] yes
Done

real    2m16.530s
user    0m1.082s
sys    0m0.870s
```



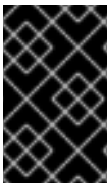
NOTE

- The tool does not work for versioned buckets.

```
[root@host01 ~]# time rgw-restore-bucket-index  --proceed serp-bu-ver-1
default.rgw.buckets.data
NOTICE: This tool is currently considered EXPERIMENTAL.
marker is e871fb65-b87f-4c16-a7c3-064b66feb1c4.25076.5
bucket_id is e871fb65-b87f-4c16-a7c3-064b66feb1c4.25076.5
Error: this bucket appears to be versioned, and this tool cannot work with
versioned buckets.
```

- The tool's scope is limited to a single site only and not multi-site, that is, if we run **rgw-restore-bucket-index** tool at site-1, it does not recover objects in site-2 and vice versa. On a multi-site, the recovery tool and the object re-index command should be executed at both sites for a bucket.

8.3.3. Limitations of bucket index resharding



IMPORTANT

Use the following limitations with caution. There are implications related to your hardware selections, so you should always discuss these requirements with your Red Hat account team.

- **Maximum number of objects in one bucket before it needs resharding:** Use a maximum of 102,400 objects per bucket index shard. To take full advantage of resharding and maximize parallelism, provide a sufficient number of OSDs in the Ceph Object Gateway bucket index pool. This parallelization scales with the number of Ceph Object Gateway instances, and replaces the in-order index shard enumeration with a number sequence. The default locking timeout is extended from 60 seconds to 90 seconds.

- **Maximum number of objects when using sharding:** Based on prior testing, the number of bucket index shards currently supported is 65521. Red Hat quality assurance has NOT performed full scalability testing on bucket sharding.

- **Maximum number of objects when using sharding:** Based on prior testing, the number of bucket index shards currently supported is 65,521.

- **You can reshard a bucket three times before the other zones catch-up:** Resharding is not recommended until the older generations synchronize. Around four generations of the buckets from previous reshards are supported. Once the limit is reached, dynamic resharding does not reshard the bucket again until at least one of the old log generations are fully trimmed. Using the command **radosgw-admin bucket reshard** throws the following error:

```
Bucket _BUCKET_NAME_ already has too many log generations (4) from previous reshards that peer zones haven't finished syncing.

Resharding is not recommended until the old generations sync, but you can force a reshard with `--yes-i-really-mean-it`.
```

8.3.4. Configuring bucket index resharding in simple deployments

To enable and configure bucket index resharding on all new buckets, use the **rgw_override_bucket_index_max_shards** parameter.

You can set the parameter to one of the following values:

- **0** to disable bucket index sharding, which is the default value.
- A value greater than **0** to enable bucket sharding and to set the maximum number of shards.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed at a minimum of two sites.

Procedure

1. Calculate the recommended number of shards:

   ```
   number of objects expected in a bucket / 100,000
   ```

   NOTE

   The maximum number of bucket index shards currently supported is 65,521.

2. Set the **rgw_override_bucket_index_max_shards** option accordingly:

   Syntax

   ```
   ceph config set client.rgw rgw_override_bucket_index_max_shards VALUE
   ```

   Replace *VALUE* with the recommended number of shards calculated:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_override_bucket_index_max_shards 12
   ```

   - To configure bucket index resharding for all instances of the Ceph Object Gateway, set the **rgw_override_bucket_index_max_shards** parameter with the **global** option.
   - To configure bucket index resharding only for a particular instance of the Ceph Object Gateway, add **rgw_override_bucket_index_max_shards** parameter under the instance.

3. Restart the Ceph Object Gateways on all nodes in the cluster to take effect:

Syntax

```
ceph orch restart SERVICE_TYPE
```

Example

```
[ceph: root#host01 /]# ceph orch restart rgw
```

Additional Resources

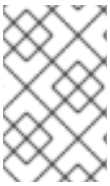
- See the *Resharding bucket index dynamically*
- See the *Resharding bucket index manually*

8.3.5. Configuring bucket index resharding in multi-site deployments

In multi-site deployments, each zone can have a different **index_pool** setting to manage failover. To configure a consistent shard count for zones in one zone group, set the **bucket_index_max_shards** parameter in the configuration for that zone group. The default value of **bucket_index_max_shards** parameter is 11.

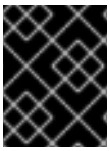
You can set the parameter to one of the following values:

- **0** to disable bucket index sharding.
- A value greater than **0** to enable bucket sharding and to set the maximum number of shards.



NOTE

Mapping the index pool, for each zone, if applicable, to a CRUSH ruleset of SSD-based OSDs might also help with bucket index performance. See the *Establishing performance domains* section for more information.



IMPORTANT

To prevent sync issues in multi-site deployments, a bucket should not have more than three generation gaps.

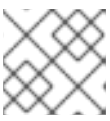
Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed at a minimum of two sites.

Procedure

1. Calculate the recommended number of shards:

```
number of objects expected in a bucket / 100,000
```



NOTE

The maximum number of bucket index shards currently supported is 65,521.

2. Extract the zone group configuration to the **zonegroup.json** file:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin zonegroup get > zonegroup.json
   ```

3. In the **zonegroup.json** file, set the **bucket_index_max_shards** parameter for each named zone:

   Syntax

   ```
   bucket_index_max_shards = VALUE
   ```

   Replace *VALUE* with the recommended number of shards calculated:

   Example

   ```
   bucket_index_max_shards = 12
   ```

4. Reset the zone group:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin zonegroup set < zonegroup.json
   ```

5. Update the period:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin period update --commit
   ```

6. Check if resharding is complete:

   Syntax

   ```
   radosgw-admin reshard status --bucket BUCKET_NAME
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin reshard status --bucket data
   ```

Verification

- Check the sync status of the storage cluster:

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin sync status
  ```

8.3.6. Resharding bucket index dynamically

You can reshard the bucket index dynamically by adding the bucket to the resharding queue. It gets scheduled to be resharded. The reshard threads run in the background and executes the scheduled resharding, one at a time.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed at a minimum of two sites.

Procedure

1. Set the **rgw_dynamic_resharding** parameter is set to **true**.

   #### Example

   ```
   [ceph: root@host01 /]# radosgw-admin period get
   ```

2. Optional: Customize Ceph configuration using the following command:

   #### Syntax

   ```
   ceph config set client.rgw OPTION VALUE
   ```

   Replace OPTION with the following options:

   - **rgw_reshard_num_logs**: The number of shards for the resharding log. The default value is **16**.
   - **rgw_reshard_bucket_lock_duration**: The duration of the lock on a bucket during resharding. The default value is **360** seconds.
   - **rgw_dynamic_resharding**: Enables or disables dynamic resharding. The default value is **true**.
   - **rgw_max_objs_per_shard**: The maximum number of objects per shard. The default value is **100000** objects per shard.
   - **rgw_reshard_thread_interval**: The maximum time between rounds of reshard thread processing. The default value is **600** seconds.

   #### Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_reshard_num_logs 23
   ```

3. Add a bucket to the resharding queue:

   #### Syntax

   ```
   radosgw-admin reshard add --bucket BUCKET --num-shards NUMBER
   ```

   #### Example

```
[ceph: root@host01 /]# radosgw-admin reshard add --bucket data --num-shards 10
```

4. List the resharding queue:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin reshard list
   ```

5. Check the bucket log generations and shards:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket layout --bucket data
   {
       "layout": {
           "resharding": "None",
           "current_index": {
               "gen": 1,
               "layout": {
                   "type": "Normal",
                   "normal": {
                       "num_shards": 23,
                       "hash_type": "Mod"
                   }
               }
           },
           "logs": [
               {
                   "gen": 0,
                   "layout": {
                       "type": "InIndex",
                       "in_index": {
                           "gen": 0,
                           "layout": {
                               "num_shards": 11,
                               "hash_type": "Mod"
                           }
                       }
                   }
               },
               {
                   "gen": 1,
                   "layout": {
                       "type": "InIndex",
                       "in_index": {
                           "gen": 1,
                           "layout": {
                               "num_shards": 23,
                               "hash_type": "Mod"
                           }
                       }
                   }
               }
   ```

```
        ]
    }
}
```

6. Check bucket resharding status:

   Syntax

   ```
   radosgw-admin reshard status --bucket BUCKET
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin reshard status --bucket data
   ```

7. Process entries on the resharding queue immediately:

   ```
   [ceph: root@host01 /]# radosgw-admin reshard process
   ```

8. Cancel pending bucket resharding:

   WARNING

   You can only cancel **pending** resharding operations. Do not cancel **ongoing** resharding operations.

   Syntax

   ```
   radosgw-admin reshard cancel --bucket BUCKET
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin reshard cancel --bucket data
   ```

Verification

- Check bucket resharding status:

  Syntax

  ```
  radosgw-admin reshard status --bucket BUCKET
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin reshard status --bucket data
  ```

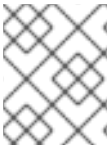
Additional resources

- See the *Cleaning stale instances of bucket entries after resharding* section to remove the stale bucket entries.
- See the *Resharding bucket index manually* .
- See the *Configuring bucket index resharding in simple deployments* .

8.3.7. Resharding bucket index dynamically in multi-site configuration

Red Hat Ceph Storage supports dynamic bucket index resharding in multi-site configuration. The feature allows buckets to be resharded in a multi-site configuration without interrupting the replication of their objects. When **rgw_dynamic_resharding** is enabled, it runs on each zone independently, and the zones might choose different shard counts for the same bucket.

These steps that need to be followed are for an existing Red Hat Ceph Storage cluster **only**. You need to enable the **resharding** feature manually on the existing zones and the zone groups after upgrading the storage cluster.

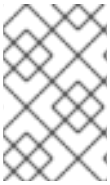


NOTE

For a new installation of Red Hat Ceph Storage 6.0, the **resharding** feature for the zones and the zone groups are supported and enabled by default.

NOTE

You can reshard a bucket three times before the other zones catch-up. See the *Limitations of bucket index resharding* for more details.



NOTE

If a bucket is created and uploaded with more than the threshold number of objects for resharding dynamically, you need to continue to write I/Os to old buckets to begin the resharding process.

Prerequisites

- The Red Hat Ceph Storage clusters at both sites are upgraded to the latest version.
- All the Ceph Object Gateway daemons enabled at both the sites are upgraded to the latest version.
- Root-level access to all the nodes.

Procedure

1. Check if **resharding** is enabled on the zonegroup:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin sync status
   ```

   If **zonegroup features enabled** is not enabled for resharding on the zonegroup, then continue with the procedure.

2. Enable the **resharding** feature on all the zonegroups in the multi-site configuration where Ceph Object Gateway is installed:

   Syntax

   ```
   radosgw-admin zonegroup modify --rgw-zonegroup=ZONEGROUP_NAME --enable-feature=resharding
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin zonegroup modify --rgw-zonegroup=us --enable-feature=resharding
   ```

3. Update the period and commit:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin period update --commit
   ```

4. Enable the **resharding** feature on all the zones in the multi-site configuration where Ceph Object Gateway is installed:

   Syntax

   ```
   radosgw-admin zone modify --rgw-zone=ZONE_NAME --enable-feature=resharding
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin zone modify --rgw-zone=us-east --enable-feature=resharding
   ```

5. Update the period and commit:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin period update --commit
   ```

6. Verify the **resharding** feature is enabled on the zones and zonegroups. You can see that each zone lists its **supported_features** and the zonegroups lists its **enabled_features**

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin period get

   "zones": [
                   {
                       "id": "505b48db-6de0-45d5-8208-8c98f7b1278d",
                       "name": "us_east",
                       "endpoints": [
                           "http://10.0.208.11:8080"
                       ],
                       "log_meta": "false",
   ```

```
                "log_data": "true",
                "bucket_index_max_shards": 11,
                "read_only": "false",
                "tier_type": "",
                "sync_from_all": "true",
                "sync_from": [],
                "redirect_zone": "",
                "supported_features": [
                    "resharding"
                ]
            "default_placement": "default-placement",
            "realm_id": "26cf6f23-c3a0-4d57-aae4-9b0010ee55cc",
            "sync_policy": {
                "groups": []
            },
            "enabled_features": [
                "resharding"
            ]
```

7. Check the sync status:

   Example

```
[ceph: root@host01 /]# radosgw-admin sync status
          realm 26cf6f23-c3a0-4d57-aae4-9b0010ee55cc (usa)
      zonegroup 33a17718-6c77-493e-99fe-048d3110a06e (us)
           zone 505b48db-6de0-45d5-8208-8c98f7b1278d (us_east)
zonegroup features enabled: resharding
```

   In this example, the **resharding** feature is enabled for the **us** zonegroup.

8. Optional: You can disable the **resharding** feature for the zonegroups:

   IMPORTANT

   To disable resharding on any singular zone, set the **rgw_dynamic_resharding** configuration option to **false** on that specific zone.

   a. Disable the feature on all the zonegroups in the multi-site where Ceph Object Gateway is installed:

      Syntax

```
radosgw-admin zonegroup modify --rgw-zonegroup=ZONEGROUP_NAME --disable-feature=resharding
```

      Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup modify --rgw-zonegroup=us --disable-feature=resharding
```

   b. Update the period and commit:

      Example

.

```
[ceph: root@host01 /]# radosgw-admin period update --commit
```

Additional Resources

- For more configurable parameters for dynamic bucket index resharding, see the *Resharding bucket index dynamically* section in the *Red Hat Ceph Storage Object Gateway Configuration and Administration Guide*.

8.3.8. Resharding bucket index manually

If a bucket has grown larger than the initial configuration for which it was optimzed, reshard the bucket index pool by using the **radosgw-admin bucket reshard** command. This command performs the following tasks:

- Creates a new set of bucket index objects for the specified bucket.
- Distributes object entries across these bucket index objects.
- Creates a new bucket instance.
- Links the new bucket instance with the bucket so that all new index operations go through the new bucket indexes.
- Prints the old and the new bucket ID to the command output.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed at a minimum of two sites.

Procedure

1. Back up the original bucket index:

   Syntax

   ```
   radosgw-admin bi list --bucket=BUCKET > BUCKET.list.backup
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bi list --bucket=data > data.list.backup
   ```

2. Reshard the bucket index:

   Syntax

   ```
   radosgw-admin bucket reshard --bucket=BUCKET --num-shards=NUMBER
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket reshard --bucket=data --num-shards=100
   ```

-

Verification

- Check bucket resharding status:

  Syntax

  ```
  radosgw-admin reshard status --bucket bucket
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin reshard status --bucket data
  ```

Additional Resources

- See the *Configuring bucket index resharding in multi-site deployments* in the *Red Hat Ceph Storage Object Gateway Guide* for more details.
- See the *Resharding bucket index dynamically*.
- See the *Configuring bucket index resharding in simple deployments* .

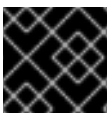
8.3.9. Cleaning stale instances of bucket entries after resharding

The resharding process might not clean stale instances of bucket entries automatically and these instances can impact performance of the storage cluster.

Clean them manually to prevent the stale instances from negatively impacting the performance of the storage cluster.

IMPORTANT

Contact *Red Hat Support* prior to cleaning the stale instances.



IMPORTANT

Use this procedure only in simple deployments, not in multi-site clusters.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway installed.

Procedure

1. List stale instances:

   ```
   [ceph: root@host01 /]# radosgw-admin reshard stale-instances list
   ```

2. Clean the stale instances of the bucket entries:

   ```
   [ceph: root@host01 /]# radosgw-admin reshard stale-instances rm
   ```

-

Verification

- Check bucket resharding status:

  Syntax

  ```
  radosgw-admin reshard status --bucket BUCKET
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin reshard status --bucket data
  ```

8.3.10. Enabling compression

The Ceph Object Gateway supports server-side compression of uploaded objects using any of Ceph's compression plugins. These include:

- **zlib**: Supported.
- **snappy**: Supported.
- **zstd**: Supported.

Configuration

To enable compression on a zone's placement target, provide the **--compression=*TYPE*** option to the **radosgw-admin zone placement modify** command. The compression ***TYPE*** refers to the name of the compression plugin to use when writing new object data.

Each compressed object stores the compression type. Changing the setting does not hinder the ability to decompress existing compressed objects, nor does it force the Ceph Object Gateway to recompress existing objects.

This compression setting applies to all new objects uploaded to buckets using this placement target.

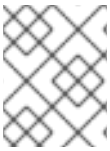
To disable compression on a zone's placement target, provide the **--compression=*TYPE*** option to the **radosgw-admin zone placement modify** command and specify an empty string or **none**.

Example

```
[root@host01 ~] radosgw-admin zone placement modify --rgw-zone=default --placement-id=default-placement --compression=zlib
{
...
    "placement_pools": [
        {
            "key": "default-placement",
            "val": {
                "index_pool": "default.rgw.buckets.index",
                "data_pool": "default.rgw.buckets.data",
                "data_extra_pool": "default.rgw.buckets.non-ec",
                "index_type": 0,
                "compression": "zlib"
            }
```

```
        }
    ],
...
}
```

After enabling or disabling compression, restart the Ceph Object Gateway instance so the change will take effect.



NOTE

Ceph Object Gateway creates a **default** zone and a set of pools. For production deployments, see the *Creating a Realm* section first.

Statistics

While all existing commands and APIs continue to report object and bucket sizes based on their uncompressed data, the **radosgw-admin bucket stats** command includes compression statistics for all buckets.

The usage types for the **radosgw-admin bucket stats** command are:

- **rgw.main** refers to regular entries or objects.
- **rgw.multimeta** refers to the metadata of incomplete multipart uploads.
- **rgw.cloudtiered** refers to objects that a lifecycle policy has transitioned to a cloud tier. When configured with **retain_head_object=true**, a head object is left behind that no longer contains data, but can still serve the object's metadata via HeadObject requests. These stub head objects use the **rgw.cloudtiered** category. See the *Transitioning data to Amazon S3 cloud service* section in the *Red Hat Ceph Storage Object Gateway Guide* for more information.

Syntax

```
radosgw-admin bucket stats --bucket=BUCKET_NAME
{
...
    "usage": {
        "rgw.main": {
            "size": 1075028,
            "size_actual": 1331200,
            "size_utilized": 592035,
            "size_kb": 1050,
            "size_kb_actual": 1300,
            "size_kb_utilized": 579,
            "num_objects": 104
        }
    },
...
}
```

The **size** is the accumulated size of the objects in the bucket, uncompressed and unencrypted. The **size_kb** is the accumulated size in kilobytes and is calculated as **ceiling(size/1024)**. In this example, it is **ceiling(1075028/1024) = 1050**.

The **size_actual** is the accumulated size of all the objects after each object is distributed in a set of

4096-byte blocks. If a bucket has two objects, one of size 4100 bytes and the other of 8500 bytes, the first object is rounded up to 8192 bytes, and the second one rounded 12288 bytes, and their total for the bucket is 20480 bytes. The **size_kb_actual** is the actual size in kilobytes and is calculated as **size_actual/1024**. In this example, it is **1331200/1024 = 1300**.

The **size_utilized** is the total size of the data in bytes after it has been compressed and/or encrypted. Encryption could increase the size of the object while compression could decrease it. The **size_kb_utilized** is the total size in kilobytes and is calculated as **ceiling(size_utilized/1024)**. In this example, it is **ceiling(592035/1024)= 579**.

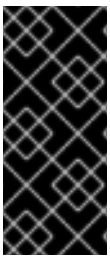
8.4. USER MANAGEMENT

Ceph Object Storage user management refers to users that are client applications of the Ceph Object Storage service; not the Ceph Object Gateway as a client application of the Ceph Storage Cluster. You must create a user, access key, and secret to enable client applications to interact with the Ceph Object Gateway service.

There are two user types:

- **User:** The term 'user' reflects a user of the S3 interface.
- **Subuser:** The term 'subuser' reflects a user of the Swift interface. A subuser is associated to a user .

You can create, modify, view, suspend, and remove users and subusers.



IMPORTANT

When managing users in a multi-site deployment, ALWAYS issue the **radosgw-admin** command on a Ceph Object Gateway node within the master zone of the master zone group to ensure that users synchronize throughout the multi-site cluster. DO NOT create, modify, or delete users on a multi-site cluster from a secondary zone or a secondary zone group.

In addition to creating user and subuser IDs, you may add a display name and an email address for a user. You can specify a key and secret, or generate a key and secret automatically. When generating or specifying keys, note that user IDs correspond to an S3 key type and subuser IDs correspond to a swift key type. Swift keys also have access levels of **read**, **write**, **readwrite** and **full**.

User management command line syntax generally follows the pattern **user *COMMAND USER_ID*** where ***USER_ID*** is either the **--uid=** option followed by the user's ID (S3) or the **--subuser=** option followed by the user name (Swift).

Syntax

```
radosgw-admin user <create|modify|info|rm|suspend|enable|check|stats> <--uid=USER_ID|--subuser=SUB_USER_NAME> [other-options]
```

Additional options may be required depending on the command you issue.

8.4.1. Multi-tenancy

The Ceph Object Gateway supports multi-tenancy for both the S3 and Swift APIs, where each user and bucket lies under a "tenant." Multi tenancy prevents namespace clashing when multiple tenants are using common bucket names, such as "test", "main", and so forth.

Each user and bucket lies under a tenant. For backward compatibility, a "legacy" tenant with an empty name is added. Whenever referring to a bucket without specifically specifying a tenant, the Swift API will assume the "legacy" tenant. Existing users are also stored under the legacy tenant, so they will access buckets and objects the same way as earlier releases.

Tenants as such do not have any operations on them. They appear and disappear as needed, when users are administered. In order to create, modify, and remove users with explicit tenants, either an additional option **--tenant** is supplied, or a syntax **"*TENANT*$*USER*"** is used in the parameters of the **radosgw-admin** command.

To create a user **testx$tester** for S3, run the following command:

Example

```
[root@host01 ~]# radosgw-admin --tenant testx --uid tester \
                --display-name "Test User" --access_key TESTER \
                --secret test123 user create
```

To create a user **testx$tester** for Swift, run one of the following commands:

Example

```
[root@host01 ~]# radosgw-admin --tenant testx --uid tester \
                --display-name "Test User" --subuser tester:swift \
                --key-type swift --access full subuser create

[root@host01 ~]# radosgw-admin key create --subuser 'testx$tester:swift' \
                --key-type swift --secret test123
```

NOTE

The subuser with explicit tenant had to be quoted in the shell.

8.4.2. Create a user

Use the **user create** command to create an S3-interface user. You MUST specify a user ID and a display name. You may also specify an email address. If you DO NOT specify a key or secret, **radosgw-admin** will generate them for you automatically. However, you may specify a key and/or a secret if you prefer not to use generated key/secret pairs.

Syntax

```
radosgw-admin user create --uid=USER_ID \
[--key-type=KEY_TYPE] [--gen-access-key|--access-key=ACCESS_KEY]\
[--gen-secret | --secret=SECRET_KEY] \
[--email=EMAIL] --display-name=DISPLAY_NAME
```

Example

```
[root@host01 ~]# radosgw-admin user create --uid=janedoe --access-
key=11BS02LGFB6AL6H1ADMW --secret=vzCEkuryfn060dfee4fgQPqFrncKEIkh3ZcdOANY --
email=jane@example.com --display-name=Jane Doe
```

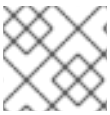
```
{ "user_id": "janedoe",
  "display_name": "Jane Doe",
  "email": "jane@example.com",
  "suspended": 0,
  "max_buckets": 1000,
  "auid": 0,
  "subusers": [],
  "keys": [
        { "user": "janedoe",
          "access_key": "11BS02LGFB6AL6H1ADMW",
          "secret_key": "vzCEkuryfn060dfee4fgQPqFrncKEIkh3ZcdOANY"}],
  "swift_keys": [],
  "caps": [],
  "op_mask": "read, write, delete",
  "default_placement": "",
  "placement_tags": [],
  "bucket_quota": { "enabled": false,
      "max_size_kb": -1,
      "max_objects": -1},
  "user_quota": { "enabled": false,
      "max_size_kb": -1,
      "max_objects": -1},
  "temp_url_keys": []}
```

IMPORTANT

Check the key output. Sometimes **radosgw-admin** generates a JSON escape (\) character, and some clients do not know how to handle JSON escape characters. Remedies include removing the JSON escape character (\), encapsulating the string in quotes, regenerating the key to ensure that it does not have a JSON escape character, or specifying the key and secret manually.

8.4.3. Create a subuser

To create a subuser (Swift interface), you must specify the user ID (**--uid=*USERNAME***), a subuser ID and the access level for the subuser. If you DO NOT specify a key or secret, **radosgw-admin** generates them for you automatically. However, you can specify a key, a secret, or both if you prefer not to use generated key and secret pairs.



NOTE

full is not **readwrite**, as it also includes the access control policy.

Syntax

```
radosgw-admin subuser create --uid=USER_ID --subuser=SUB_USER_ID --access=[ read | write |
readwrite | full ]
```

Example

```
[root@host01 ~]# radosgw-admin subuser create --uid=janedoe --subuser=janedoe:swift --
access=full

{ "user_id": "janedoe",
  "display_name": "Jane Doe",
  "email": "jane@example.com",
  "suspended": 0,
  "max_buckets": 1000,
  "auid": 0,
  "subusers": [
        { "id": "janedoe:swift",
          "permissions": "full-control"}],
  "keys": [
        { "user": "janedoe",
          "access_key": "11BS02LGFB6AL6H1ADMW",
          "secret_key": "vzCEkuryfn060dfee4fgQPqFrncKEIkh3ZcdOANY"}],
  "swift_keys": [],
  "caps": [],
  "op_mask": "read, write, delete",
  "default_placement": "",
  "placement_tags": [],
  "bucket_quota": { "enabled": false,
      "max_size_kb": -1,
      "max_objects": -1},
  "user_quota": { "enabled": false,
      "max_size_kb": -1,
      "max_objects": -1},
  "temp_url_keys": []}
```

8.4.4. Get user information

To get information about a user, specify **user info** and the user ID (**--uid=*USERNAME***).

Example

```
[root@host01 ~]# radosgw-admin user info --uid=janedoe
```

To get information about a tenanted user, specify both the user ID and the name of the tenant.

```
[root@host01 ~]# radosgw-admin user info --uid=janedoe --tenant=test
```

8.4.5. Modify user information

To modify information about a user, you must specify the user ID (**--uid=*USERNAME***) and the attributes you want to modify. Typical modifications are to keys and secrets, email addresses, display names, and access levels.

Example

```
[root@host01 ~]# radosgw-admin user modify --uid=janedoe --display-name="Jane E. Doe"
```

To modify subuser values, specify **subuser modify** and the subuser ID.

Example

```
[root@host01 ~]# radosgw-admin subuser modify --subuser=janedoe:swift --access=full
```

8.4.6. Enable and suspend users

When you create a user, the user is enabled by default. However, you may suspend user privileges and re-enable them at a later time. To suspend a user, specify **user suspend** and the user ID.

```
[root@host01 ~]# radosgw-admin user suspend --uid=johndoe
```

To re-enable a suspended user, specify **user enable** and the user ID:

```
[root@host01 ~]# radosgw-admin user enable --uid=johndoe
```

NOTE

Disabling the user disables the subuser.

8.4.7. Remove a user

When you remove a user, the user and subuser are removed from the system. However, you may remove only the subuser if you wish. To remove a user (and subuser), specify **user rm** and the user ID.

Syntax

```
radosgw-admin user rm --uid=USER_ID[--purge-keys] [--purge-data]
```

Example

```
[ceph: root@host01 /]# radosgw-admin user rm --uid=johndoe --purge-data
```

To remove the subuser only, specify **subuser rm** and the subuser name.

Example

```
[ceph: root@host01 /]# radosgw-admin subuser rm --subuser=johndoe:swift --purge-keys
```

Options include:

- **Purge Data:** The **--purge-data** option purges all data associated with the UID.
- **Purge Keys:** The **--purge-keys** option purges all keys associated with the UID.

8.4.8. Remove a subuser

When you remove a subuser, you are removing access to the Swift interface. The user remains in the system. To remove the subuser, specify **subuser rm** and the subuser ID.

Syntax

```
radosgw-admin subuser rm --subuser=SUB_USER_ID
```

Example

```
[root@host01 /]# radosgw-admin subuser rm --subuser=johndoe:swift
```

Options include:

- **Purge Keys:** The **--purge-keys** option purges all keys associated with the UID.

8.4.9. Rename a user

To change the name of a user, use the **radosgw-admin user rename** command. The time that this command takes depends on the number of buckets and objects that the user has. If the number is large, Red Hat recommends using the command in the **Screen** utility provided by the **screen** package.

Prerequisites

- A working Ceph cluster.
- **root** or **sudo** access to the host running the Ceph Object Gateway.
- Installed Ceph Object Gateway.

Procedure

1. Rename a user:

   Syntax

   ```
   radosgw-admin user rename --uid=CURRENT_USER_NAME --new-uid=NEW_USER_NAME
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin user rename --uid=user1 --new-uid=user2

   {
       "user_id": "user2",
       "display_name": "user 2",
       "email": "",
       "suspended": 0,
       "max_buckets": 1000,
       "auid": 0,
       "subusers": [],
       "keys": [
           {
               "user": "user2",
               "access_key": "59EKHI6AI9F8WOW8JQZJ",
               "secret_key": "XH0uY3rKCUcuL73X0ftjXbZqUbk0cavD11rD8MsA"
           }
       ],
       "swift_keys": [],
   ```

```
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "rgw"
}
```

If a user is inside a tenant, specify both the user name and the tenant:

Syntax

```
radosgw-admin user rename --uid USER_NAME --new-uid NEW_USER_NAME --tenant
TENANT
```

Example

```
[ceph: root@host01 /]# radosgw-admin user rename --uid=test$user1 --new-uid=test$user2 -
-tenant test

1000 objects processed in tvtester1. Next marker 80_tVtester1_99
2000 objects processed in tvtester1. Next marker 64_tVtester1_44
3000 objects processed in tvtester1. Next marker 48_tVtester1_28
4000 objects processed in tvtester1. Next marker 2_tVtester1_74
5000 objects processed in tvtester1. Next marker 14_tVtester1_53
6000 objects processed in tvtester1. Next marker 87_tVtester1_61
7000 objects processed in tvtester1. Next marker 6_tVtester1_57
8000 objects processed in tvtester1. Next marker 52_tVtester1_91
9000 objects processed in tvtester1. Next marker 34_tVtester1_74
9900 objects processed in tvtester1. Next marker 9_tVtester1_95
1000 objects processed in tvtester2. Next marker 82_tVtester2_93
2000 objects processed in tvtester2. Next marker 64_tVtester2_9
3000 objects processed in tvtester2. Next marker 48_tVtester2_22
4000 objects processed in tvtester2. Next marker 32_tVtester2_42
5000 objects processed in tvtester2. Next marker 16_tVtester2_36
6000 objects processed in tvtester2. Next marker 89_tVtester2_46
7000 objects processed in tvtester2. Next marker 70_tVtester2_78
8000 objects processed in tvtester2. Next marker 51_tVtester2_41
9000 objects processed in tvtester2. Next marker 33_tVtester2_32
9900 objects processed in tvtester2. Next marker 9_tVtester2_83
{
```

```
    "user_id": "test$user2",
    "display_name": "User 2",
    "email": "",
    "suspended": 0,
    "max_buckets": 1000,
    "auid": 0,
    "subusers": [],
    "keys": [
        {
            "user": "test$user2",
            "access_key": "user2",
            "secret_key": "123456789"
        }
    ],
    "swift_keys": [],
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "rgw"
}
```


2. Verify that the user has been renamed successfully:

Syntax

```
radosgw-admin user info --uid=NEW_USER_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin user info --uid=user2
```

If a user is inside a tenant, use the *TENANT*$*USER_NAME* format:

Syntax

```
radosgw-admin user info --uid= TENANT$USER_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin user info --uid=test$user2
```

Additional Resources

- The **screen(1)** manual page

8.4.10. Create a key

To create a key for a user, you must specify **key create**. For a user, specify the user ID and the **s3** key type. To create a key for a subuser, you must specify the subuser ID and the **swift** keytype.

Example

```
[ceph: root@host01 /]# radosgw-admin key create --subuser=johndoe:swift --key-type=swift --gen-secret

{ "user_id": "johndoe",
  "rados_uid": 0,
  "display_name": "John Doe",
  "email": "john@example.com",
  "suspended": 0,
  "subusers": [
    { "id": "johndoe:swift",
      "permissions": "full-control"}],
  "keys": [
   { "user": "johndoe",
     "access_key": "QFAMEDSJP5DEKJO0DDXY",
     "secret_key": "iaSFLDVvDdQt6lkNzHyW4fPLZugBAI1g17LO0+87"}],
  "swift_keys": [
   { "user": "johndoe:swift",
     "secret_key": "E9T2rUZNu2gxUjcwUBO8n\/Ev4KX6\/GprEuH4qhu1"}]}
```

8.4.11. Add and remove access keys

Users and subusers must have access keys to use the S3 and Swift interfaces. When you create a user or subuser and you do not specify an access key and secret, the key and secret get generated automatically. You may create a key and either specify or generate the access key and/or secret. You may also remove an access key and secret. Options include:

- **--secret=*SECRET_KEY*** specifies a secret key, for example, manually generated.
- **--gen-access-key** generates a random access key (for S3 users by default).
- **--gen-secret** generates a random secret key.
- **--key-type=*KEY_TYPE*** specifies a key type. The options are: swift and s3.

To add a key, specify the user:

Example

```
[root@host01 ~]# radosgw-admin key create --uid=johndoe --key-type=s3 --gen-access-key --gen-secret
```

You might also specify a key and a secret.

To remove an access key, you need to specify the user and the key:

1. Find the access key for the specific user:

   Example

   ```
   [root@host01 ~]# radosgw-admin user info --uid=johndoe
   ```

   The access key is the **"access_key"** value in the output:

   Example

   ```
   [root@host01 ~]# radosgw-admin user info --uid=johndoe
   {
       "user_id": "johndoe",
       ...
       "keys": [
           {
               "user": "johndoe",
               "access_key": "0555b35654ad1656d804",
               "secret_key":
   "h7GhxuBLTrlhVUyxSPUKUV8r/2EI4ngqJxD7iBdBYLhwluN30JaT3Q=="
           }
       ],
       ...
   }
   ```

2. Specify the user ID and the access key from the previous step to remove the access key:

   Syntax

   ```
   radosgw-admin key rm --uid=USER_ID --access-key ACCESS_KEY
   ```

   Example

   ```
   [root@host01 ~]# radosgw-admin key rm --uid=johndoe --access-key
   0555b35654ad1656d804
   ```

8.4.12. Add and remove admin capabilities

The Ceph Storage Cluster provides an administrative API that enables users to run administrative functions via the REST API. By default, users DO NOT have access to this API. To enable a user to exercise administrative functionality, provide the user with administrative capabilities.

To add administrative capabilities to a user, run the following command:

Syntax

```
radosgw-admin caps add --uid=USER_ID--caps=CAPS
```

You can add read, write, or all capabilities to users, buckets, metadata, and usage (utilization).

Syntax

```
--caps="[users|buckets|metadata|usage|zone]=[*|read|write|read, write]"
```

Example

```
[root@host01 ~]# radosgw-admin caps add --uid=johndoe --caps="users=*"
```

To remove administrative capabilities from a user, run the following command:

Example

```
[root@host01 ~]# radosgw-admin caps remove --uid=johndoe --caps={caps}
```

8.5. ROLE MANAGEMENT

As a storage administrator, you can create, delete, or update a role and the permissions associated with that role with the **radosgw-admin** commands.

A role is similar to a user and has permission policies attached to it. It can be assumed by any identity. If a user assumes a role, a set of dynamically created temporary credentials are returned to the user. A role can be used to delegate access to users, applications and services that do not have permissions to access some S3 resources.

8.5.1. Creating a role

Create a role for the user with the **radosgw-admin role create** command. You need to create a user with **assume-role-policy-doc** parameter in the command, which is the trust relationship policy document that grants an entity the permission to assume the role.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- An S3 user created with user access.

Procedure

- Create the role:

  #### Syntax

  ```
  radosgw-admin role create --role-name=ROLE_NAME [--path=="PATH_TO_FILE"] [--
  assume-role-policy-doc=TRUST_RELATIONSHIP_POLICY_DOCUMENT]
  ```

  #### Example

```
[root@host01 ~]# radosgw-admin role create --role-name=S3Access1 --
path=/application_abc/component_xyz/ --assume-role-policy-doc=\{\"Version\":\"2012-10-
17\",\"Statement\":\[\{\"Effect\":\"Allow\",\"Principal\":\{\"AWS\":\
[\"arn:aws:iam:::user/TESTER\"\]\},\"Action\":\[\"sts:AssumeRole\"\]\}\]\}

{
  "RoleId": "ca43045c-082c-491a-8af1-2eebca13deec",
  "RoleName": "S3Access1",
  "Path": "/application_abc/component_xyz/",
  "Arn": "arn:aws:iam:::role/application_abc/component_xyz/S3Access1",
  "CreateDate": "2022-06-17T10:18:29.116Z",
  "MaxSessionDuration": 3600,
  "AssumeRolePolicyDocument": "{\"Version\":\"2012-10-17\",\"Statement\":
[{\"Effect\":\"Allow\",\"Principal\":{\"AWS\":[\"arn:aws:iam:::user/TESTER\"]},\"Action\":
[\"sts:AssumeRole\"]}]}"
}
```

The value for **--path** is / by default.

8.5.2. Getting a role

Get the information about a role with the **get** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- Getting the information about the role:

  Syntax

  ```
  radosgw-admin role get --role-name=ROLE_NAME
  ```

  Example

  ```
  [root@host01 ~]# radosgw-admin role get --role-name=S3Access1

  {
    "RoleId": "ca43045c-082c-491a-8af1-2eebca13deec",
    "RoleName": "S3Access1",
    "Path": "/application_abc/component_xyz/",
    "Arn": "arn:aws:iam:::role/application_abc/component_xyz/S3Access1",
  ```

```
  "CreateDate": "2022-06-17T10:18:29.116Z",
  "MaxSessionDuration": 3600,
  "AssumeRolePolicyDocument": "{\"Version\":\"2012-10-17\",\"Statement\":
[{\"Effect\":\"Allow\",\"Principal\":{\"AWS\":[\"arn:aws:iam:::user/TESTER\"]},\"Action\":
[\"sts:AssumeRole\"]}]}"
}
```

Additional Resources

- See the *Creating a role* section in the *Red Hat Ceph Storage Object Gateway Guide* for details.

8.5.3. Listing a role

You can list the roles in the specific path with the **list** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- List the roles:

  Syntax

  ```
  radosgw-admin role list
  ```

  Example

  ```
  [root@host01 ~]# radosgw-admin role list

  [
     {
        "RoleId": "85fb46dd-a88a-4233-96f5-4fb54f4353f7",
        "RoleName": "kvm-sts",
        "Path": "/application_abc/component_xyz/",
        "Arn": "arn:aws:iam:::role/application_abc/component_xyz/kvm-sts",
        "CreateDate": "2022-09-13T11:55:09.39Z",
        "MaxSessionDuration": 7200,
        "AssumeRolePolicyDocument": "{\"Version\":\"2012-10-17\",\"Statement\":
  [{\"Effect\":\"Allow\",\"Principal\":{\"AWS\":[\"arn:aws:iam:::user/kvm\"]},\"Action\":
  [\"sts:AssumeRole\"]}]}"
     },
     {
  ```

```
        "RoleId": "9116218d-4e85-4413-b28d-cdfafba24794",
        "RoleName": "kvm-sts-1",
        "Path": "/application_abc/component_xyz/",
        "Arn": "arn:aws:iam:::role/application_abc/component_xyz/kvm-sts-1",
        "CreateDate": "2022-09-16T00:05:57.483Z",
        "MaxSessionDuration": 3600,
        "AssumeRolePolicyDocument": "{\"Version\":\"2012-10-17\",\"Statement\":
[{\"Effect\":\"Allow\",\"Principal\":{\"AWS\":[\"arn:aws:iam:::user/kvm\"]},\"Action\":
[\"sts:AssumeRole\"]}]}"
    }
]
```

8.5.4. Updating assume role policy document of a role

You can update the assume role policy document that grants an entity permission to assume the role with the **modify** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- Modify the assume role policy document of a role:

  Syntax

  ```
  radosgw-admin role-trust-policy modify --role-name=ROLE_NAME --assume-role-policy-
  doc=TRUST_RELATIONSHIP_POLICY_DOCUMENT
  ```

  Example

  ```
  [root@host01 ~]# radosgw-admin role-trust-policy modify --role-name=S3Access1 --assume-
  role-policy-doc=\{\"Version\":\"2012-10-17\",\"Statement\":\[\{\"Effect\":\"Allow\",\"Principal\":\
  {\"AWS\":\[\"arn:aws:iam:::user/TESTER\"\]\},\"Action\":\[\"sts:AssumeRole\"\]\}\]\}

  {
    "RoleId": "ca43045c-082c-491a-8af1-2eebca13deec",
    "RoleName": "S3Access1",
    "Path": "/application_abc/component_xyz/",
    "Arn": "arn:aws:iam:::role/application_abc/component_xyz/S3Access1",
    "CreateDate": "2022-06-17T10:18:29.116Z",
    "MaxSessionDuration": 3600,
    "AssumeRolePolicyDocument": "{\"Version\":\"2012-10-17\",\"Statement\":
  ```

```
[{\"Effect\":\"Allow\",\"Principal\":{\"AWS\":[\"arn:aws:iam:::user/TESTER\"]},\"Action\":
[\"sts:AssumeRole\"]}]}"
}
```

8.5.5. Getting permission policy attached to a role

You can get the specific permission policy attached to a role with the **get** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- Get the permission policy:

  #### Syntax

  ```
  radosgw-admin role-policy get --role-name=ROLE_NAME --policy-name=POLICY_NAME
  ```

  #### Example

  ```
  [root@host01 ~]# radosgw-admin role-policy get --role-name=S3Access1 --policy-
  name=Policy1

  {
    "Permission policy": "{\"Version\":\"2012-10-17\",\"Statement\":[{\"Effect\":\"Allow\",\"Action\":
  [\"s3:*\"],\"Resource\":\"arn:aws:s3:::example_bucket\"}]}"
  }
  ```

8.5.6. Deleting a role

You can delete the role only after removing the permission policy attached to it.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- A role created.

- An S3 bucket created.
- An S3 user created with user access.

Procedure

1. Delete the policy attached to the role:

   Syntax

   ```
   radosgw-admin role policy delete --role-name=ROLE_NAME --policy-name=POLICY_NAME
   ```

   Example

   ```
   [root@host01 ~]# radosgw-admin role policy delete --role-name=S3Access1 --policy-name=Policy1
   ```

2. Delete the role:

   Syntax

   ```
   radosgw-admin role delete --role-name=ROLE_NAME
   ```

   Example

   ```
   [root@host01 ~]# radosgw-admin role delete --role-name=S3Access1
   ```

8.5.7. Updating a policy attached to a role

You can either add or update the inline policy attached to a role with the **put** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- Update the inline policy:

  Syntax

  ```
  radosgw-admin role-policy put --role-name=ROLE_NAME --policy-name=POLICY_NAME --policy-doc=PERMISSION_POLICY_DOCUMENT
  ```

-

Example

```
[root@host01 ~]# radosgw-admin role-policy put --role-name=S3Access1 --policy-
name=Policy1 --policy-doc=\{\"Version\":\"2012-10-17\",\"Statement\":\[\
{\"Effect\":\"Allow\",\"Action\":\[\"s3:*\"\],\"Resource\":\"arn:aws:s3:::example_bucket\"\}\]\}
```

In this example, you attach the **Policy1** to the role **S3Access1** which allows all S3 actions on an **example_bucket**.

8.5.8. Listing permission policy attached to a role

You can list the names of the permission policies attached to a role with the **list** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- List the names of the permission policies:

  Syntax

  ```
  radosgw-admin role-policy list --role-name=ROLE_NAME
  ```

  Example

  ```
  [root@host01 ~]# radosgw-admin role-policy list --role-name=S3Access1

  [
    "Policy1"
  ]
  ```

8.5.9. Deleting policy attached to a role

You can delete the permission policy attached to a role with the **rm** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.

- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- Delete the permission policy:

  Syntax

  ```
  radosgw-admin role policy delete --role-name=ROLE_NAME --policy-name=POLICY_NAME
  ```

  Example

  ```
  [root@host01 ~]# radosgw-admin role policy delete --role-name=S3Access1 --policy-name=Policy1
  ```

8.5.10. Updating the session duration of a role

You can update the session duration of a role with the **update** command to control the length of time that a user can be signed into the account with the provided credentials.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- A role created.
- An S3 user created with user access.

Procedure

- Update the max-session-duration using the **update** command:

  Syntax

  ```
  [root@node1 ~]# radosgw-admin role update --role-name=ROLE_NAME --max-session-duration=7200
  ```

  Example

  ```
  [root@node1 ~]# radosgw-admin role update --role-name=test-sts-role --max-session-duration=7200
  ```

Verification

- List the roles to verify the updates:

  #### Example

```
[root@node1 ~]#radosgw-admin role list
[
    {
        "RoleId": "d4caf33f-caba-42f3-8bd4-48c84b4ea4d3",
        "RoleName": "test-sts-role",
        "Path": "/",
        "Arn": "arn:aws:iam:::role/test-role",
        "CreateDate": "2022-09-07T20:01:15.563Z",
        "MaxSessionDuration": 7200,    <<<<<<
        "AssumeRolePolicyDocument": "{\"Version\":\"2012-10-17\",\"Statement\":
[{\"Effect\":\"Allow\",\"Principal\":{\"AWS\":[\"arn:aws:iam:::user/kvm\"]},\"Action\":
[\"sts:AssumeRole\"]}]}"
    }
]
```

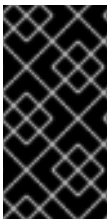
Additional Resources

- See the *REST APIs for manipulating a role* section in the *Red Hat Ceph Storage Developer Guide* for details.

8.6. QUOTA MANAGEMENT

The Ceph Object Gateway enables you to set quotas on users and buckets owned by users. Quotas include the maximum number of objects in a bucket and the maximum storage size in megabytes.

- **Bucket:** The **--bucket** option allows you to specify a quota for buckets the user owns.
- **Maximum Objects:** The **--max-objects** setting allows you to specify the maximum number of objects. A negative value disables this setting.
- **Maximum Size:** The **--max-size** option allows you to specify a quota for the maximum number of bytes. A negative value disables this setting.
- **Quota Scope:** The **--quota-scope** option sets the scope for the quota. The options are **bucket** and **user**. Bucket quotas apply to buckets a user owns. User quotas apply to a user.



IMPORTANT

Buckets with a large number of objects can cause serious performance issues. The recommended maximum number of objects in a one bucket is 100,000. To increase this number, configure bucket index sharding. See the *Configure bucket index resharding* for details.

8.6.1. Set user quotas

Before you enable a quota, you must first set the quota parameters.

Syntax

-

```
radosgw-admin quota set --quota-scope=user --uid=USER_ID [--max-objects=NUMBER_OF_OBJECTS] [--max-size=MAXIMUM_SIZE_IN_BYTES]
```

Example

```
[root@host01 ~]# radosgw-admin quota set --quota-scope=user --uid=johndoe --max-objects=1024 --max-size=1024
```

A negative value for num objects and / or max size means that the specific quota attribute check is disabled.

8.6.2. Enable and disable user quotas

Once you set a user quota, you can enable it.

Syntax

```
radosgw-admin quota enable --quota-scope=user --uid=USER_ID
```

You may disable an enabled user quota.

Syntax

```
radosgw-admin quota disable --quota-scope=user --uid=USER_ID
```

8.6.3. Set bucket quotas

Bucket quotas apply to the buckets owned by the specified **uid**. They are independent of the user.

Syntax

```
radosgw-admin quota set --uid=USER_ID --quota-scope=bucket --bucket=BUCKET_NAME [--max-objects=NUMBER_OF_OBJECTS] [--max-size=MAXIMUM_SIZE_IN_BYTES]
```

A negative value for *NUMBER_OF_OBJECTS*, *MAXIMUM_SIZE_IN_BYTES*, or both means that the specific quota attribute check is disabled.

8.6.4. Enable and disable bucket quotas

Once you set a bucket quota, you may enable it.

Syntax

```
radosgw-admin quota enable --quota-scope=bucket --uid=USER_ID
```

You may disable an enabled bucket quota.

Syntax

```
radosgw-admin quota disable --quota-scope=bucket --uid=USER_ID
```

8.6.5. Get quota settings

You may access each user's quota settings via the user information API. To read user quota setting information with the CLI interface, run the following command:

Syntax

```
radosgw-admin user info --uid=USER_ID
```

To get quota settings for a tenanted user, specify the user ID and the name of the tenant:

Syntax

```
radosgw-admin user info --uid=USER_ID --tenant=TENANT
```

8.6.6. Update quota stats

Quota stats get updated asynchronously. You can update quota statistics for all users and all buckets manually to retrieve the latest quota stats.

Syntax

```
radosgw-admin user stats --uid=USER_ID --sync-stats
```

8.6.7. Get user quota usage stats

To see how much of the quota a user has consumed, run the following command:

Syntax

```
radosgw-admin user stats --uid=USER_ID
```

NOTE

You should run the **radosgw-admin user stats** command with the **--sync-stats** option to receive the latest data.

8.6.8. Quota cache

Quota statistics are cached for each Ceph Gateway instance. If there are multiple instances, then the cache can keep quotas from being perfectly enforced, as each instance will have a different view of the quotas. The options that control this are **rgw bucket quota ttl**, **rgw user quota bucket sync interval**, and **rgw user quota sync interval**. The higher these values are, the more efficient quota operations are, but the more out-of-sync multiple instances will be. The lower these values are, the closer to perfect enforcement multiple instances will achieve. If all three are 0, then quota caching is effectively disabled, and multiple instances will have perfect quota enforcement.

8.6.9. Reading and writing global quotas

You can read and write quota settings in a zonegroup map. To get a zonegroup map:

```
[root@host01 ~]# radosgw-admin global quota get
```

The global quota settings can be manipulated with the **global quota** counterparts of the **quota set**, **quota enable**, and **quota disable** commands, for example:

```
[root@host01 ~]# radosgw-admin global quota set --quota-scope bucket --max-objects 1024
[root@host01 ~]# radosgw-admin global quota enable --quota-scope bucket
```

NOTE

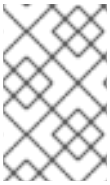
In a multi-site configuration, where there is a realm and period present, changes to the global quotas must be committed using **period update --commit**. If there is no period present, the Ceph Object Gateways must be restarted for the changes to take effect.

8.7. BUCKET MANAGEMENT

As a storage administrator, when using the Ceph Object Gateway you can manage buckets by moving them between users and renaming them. You can create bucket notifications to trigger on specific events. Also, you can find orphan or leaky objects within the Ceph Object Gateway that can occur over the lifetime of a storage cluster.

NOTE

When millions of objects are uploaded to a Ceph Object Gateway bucket with a high ingest rate, incorrect **num_objects** are reported with the **radosgw-admin bucket stats** command. With the **radosgw-admin bucket list** command you can correct the value of **num_objects** parameter.



NOTE

In a multi-site cluster, deletion of a bucket from the secondary site does not sync the metadata changes with the primary site. Hence, Red Hat recommends to delete a bucket only from the primary site and not from the secondary site.

8.7.1. Renaming buckets

You can rename buckets. If you want to allow underscores in bucket names, then set the **rgw_relaxed_s3_bucket_names** option to **true**.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- An existing bucket.

Procedure

1. List the buckets:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket list
   ```

```
[
    "34150b2e9174475db8e191c188e920f6/swcontainer",
    "s3bucket1",
    "34150b2e9174475db8e191c188e920f6/swimpfalse",
    "c278edd68cfb4705bb3e07837c7ad1a8/ec2container",
    "c278edd68cfb4705bb3e07837c7ad1a8/demoten1",
    "c278edd68cfb4705bb3e07837c7ad1a8/demo-ct",
    "c278edd68cfb4705bb3e07837c7ad1a8/demopostup",
    "34150b2e9174475db8e191c188e920f6/postimpfalse",
    "c278edd68cfb4705bb3e07837c7ad1a8/demoten2",
    "c278edd68cfb4705bb3e07837c7ad1a8/postupsw"
]
```

2. Rename the bucket:

Syntax

```
radosgw-admin bucket link --bucket=ORIGINAL_NAME --bucket-new-name=NEW_NAME --uid=USER_ID
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket link --bucket=s3bucket1 --bucket-new-name=s3newb --uid=testuser
```

If the bucket is inside a tenant, specify the tenant as well:

Syntax

```
radosgw-admin bucket link --bucket=tenant/ORIGINAL_NAME --bucket-new-name=NEW_NAME --uid=TENANT$USER_ID
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket link --bucket=test/s3bucket1 --bucket-new-name=s3newb --uid=test$testuser
```

3. Verify the bucket was renamed:

Example

```
[ceph: root@host01 /]# radosgw-admin bucket list
[
    "34150b2e9174475db8e191c188e920f6/swcontainer",
    "34150b2e9174475db8e191c188e920f6/swimpfalse",
    "c278edd68cfb4705bb3e07837c7ad1a8/ec2container",
    "s3newb",
    "c278edd68cfb4705bb3e07837c7ad1a8/demoten1",
    "c278edd68cfb4705bb3e07837c7ad1a8/demo-ct",
    "c278edd68cfb4705bb3e07837c7ad1a8/demopostup",
    "34150b2e9174475db8e191c188e920f6/postimpfalse",
```

```
    "c278edd68cfb4705bb3e07837c7ad1a8/demoten2",
    "c278edd68cfb4705bb3e07837c7ad1a8/postupsw"
]
```

8.7.2. Removing buckets

Remove buckets from a Red Hat Ceph Storage cluster with the Ceph Object Gateway configuration.

When the bucket does not have objects, you can run the **radosgw-admin bucket rm** command. If there are objects in the buckets, then you can use the **--purge-objects** option.

For multi-site configuration, Red Hat recommends to delete the buckets from the primary site.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.
- An existing bucket.

Procedure

1. List the buckets.

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket list
   [
       "34150b2e9174475db8e191c188e920f6/swcontainer",
       "s3bucket1",
       "34150b2e9174475db8e191c188e920f6/swimpfalse",
       "c278edd68cfb4705bb3e07837c7ad1a8/ec2container",
       "c278edd68cfb4705bb3e07837c7ad1a8/demoten1",
       "c278edd68cfb4705bb3e07837c7ad1a8/demo-ct",
       "c278edd68cfb4705bb3e07837c7ad1a8/demopostup",
       "34150b2e9174475db8e191c188e920f6/postimpfalse",
       "c278edd68cfb4705bb3e07837c7ad1a8/demoten2",
       "c278edd68cfb4705bb3e07837c7ad1a8/postupsw"
   ]
   ```

2. Remove the bucket.

   Syntax

   ```
   radosgw-admin bucket rm --bucket=BUCKET_NAME
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket rm --bucket=s3bucket1
   ```

3. If the bucket has objects, then run the following command:

   Syntax

```
radosgw-admin bucket rm --bucket=BUCKET --purge-objects --bypass-gc
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket rm --bucket=s3bucket1 --purge-objects --bypass-gc
```

The **--purge-objects** option purges the objects and **--bypass-gc** option triggers deletion of objects without the garbage collector to make the process more efficient.

4. Verify the bucket was removed.

Example

```
[ceph: root@host01 /]# radosgw-admin bucket list
[
    "34150b2e9174475db8e191c188e920f6/swcontainer",
    "34150b2e9174475db8e191c188e920f6/swimpfalse",
    "c278edd68cfb4705bb3e07837c7ad1a8/ec2container",
    "c278edd68cfb4705bb3e07837c7ad1a8/demoten1",
    "c278edd68cfb4705bb3e07837c7ad1a8/demo-ct",
    "c278edd68cfb4705bb3e07837c7ad1a8/demopostup",
    "34150b2e9174475db8e191c188e920f6/postimpfalse",
    "c278edd68cfb4705bb3e07837c7ad1a8/demoten2",
    "c278edd68cfb4705bb3e07837c7ad1a8/postupsw"
]
```

8.7.3. Moving buckets

The **radosgw-admin bucket** utility provides the ability to move buckets between users. To do so, link the bucket to a new user and change the ownership of the bucket to the new user.

You can move buckets:

- between two non-tenanted users
- between two tenanted users
- between a non-tenanted user to a tenanted user

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Ceph Object Gateway is installed.
- An S3 bucket.
- Various tenanted and non-tenanted users.

8.7.3.1. Moving buckets between non-tenanted users

The **radosgw-admin bucket chown** command provides the ability to change the ownership of buckets and all objects they contain from one user to another. To do so, unlink a bucket from the current user, link it to a new user, and change the ownership of the bucket to the new user.

Procedure

1. Link the bucket to a new user:

   Syntax

   ```
   radosgw-admin bucket link --uid=USER --bucket=BUCKET
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket link --uid=user2 --bucket=data
   ```

2. Verify that the bucket has been linked to **user2** successfully:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket list --uid=user2
   [
       "data"
   ]
   ```

3. Change the ownership of the bucket to the new user:

   Syntax

   ```
   radosgw-admin bucket chown --uid=user --bucket=bucket
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket chown --uid=user2 --bucket=data
   ```

4. Verify that the ownership of the **data** bucket has been successfully changed by checking the **owner** line in the output of the following command:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin bucket list --bucket=data
   ```

8.7.3.2. Moving buckets between tenanted users

You can move buckets between one tenanted user and another.

Procedure

1. Link the bucket to a new user:

   Syntax

```
radosgw-admin bucket link --bucket=CURRENT_TENANT/BUCKET --
uid=NEW_TENANT$USER
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket link --bucket=test/data --uid=test2$user2
```

2. Verify that the bucket has been linked to **user2** successfully:

```
[ceph: root@host01 /]# radosgw-admin bucket list --uid=test$user2
[
    "data"
]
```

3. Change the ownership of the bucket to the new user:

Syntax

```
radosgw-admin bucket chown --bucket=NEW_TENANT/BUCKET --
uid=NEW_TENANT$USER
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket chown --bucket='test2/data' --uid='test$tuser2'
```

4. Verify that the ownership of the **data** bucket has been successfully changed by checking the **owner** line in the output of the following command:

```
[ceph: root@host01 /]# radosgw-admin bucket list --bucket=test2/data
```

8.7.3.3. Moving buckets from non-tenanted users to tenanted users

You can move buckets from a non-tenanted user to a tenanted user.

Procedure

1. Optional: If you do not already have multiple tenants, you can create them by enabling **rgw_keystone_implicit_tenants** and accessing the Ceph Object Gateway from an external tenant:
   Enable the **rgw_keystone_implicit_tenants** option:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_keystone_implicit_tenants true
   ```

   Access the Ceph Object Gateway from an eternal tenant using either the **s3cmd** or **swift** command:

   Example

   ```
   [ceph: root@host01 /]# swift list
   ```

Or use **s3cmd**:

Example

```
[ceph: root@host01 /]# s3cmd ls
```

The first access from an external tenant creates an equivalent Ceph Object Gateway user.

2. Move a bucket to a tenanted user:

Syntax

```
radosgw-admin bucket link --bucket=/BUCKET --uid='TENANT$USER'
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket link --bucket=/data --uid='test$tenanted-user'
```

3. Verify that the **data** bucket has been linked to **tenanted-user** successfully:

Example

```
[ceph: root@host01 /]# radosgw-admin bucket list --uid='test$tenanted-user'
[
    "data"
]
```

4. Change the ownership of the bucket to the new user:

Syntax

```
radosgw-admin bucket chown --bucket='tenant/bucket name' --uid='tenant$user'
```

Example

```
[ceph: root@host01 /]# radosgw-admin bucket chown --bucket='test/data' --
uid='test$tenanted-user'
```

5. Verify that the ownership of the **data** bucket has been successfully changed by checking the **owner** line in the output of the following command:

Example

```
[ceph: root@host01 /]# radosgw-admin bucket list --bucket=test/data
```

8.7.3.4. Finding orphan and leaky objects

A healthy storage cluster does not have any orphan or leaky objects, but in some cases orphan or leaky objects can occur.

An orphan object exists in a storage cluster and has an object ID associated with the RADOS object. However, there is no reference of the RADOS object with the S3 object in the bucket index reference.

For example, if the Ceph Object Gateway goes down in the middle of an operation, this can cause some objects to become orphans. Also, an undiscovered bug can cause orphan objects to occur.

You can see how the Ceph Object Gateway objects map to the RADOS objects. The **radosgw-admin** command provides a tool to search for and produce a list of these potential orphan or leaky objects. Using the **radoslist** subcommand displays objects stored within buckets, or all buckets in the storage cluster. The **rgw-orphan-list** script displays orphan objects within a pool.

NOTE

The **radoslist** subcommand is replacing the deprecated **orphans find** and **orphans finish** subcommands.

IMPORTANT

Do not use this command where **Indexless** buckets are in use as all the objects appear as **orphaned**.

Another alternate way to identity orphaned objects is to run the **rados -p <pool> ls | grep *BUCKET_ID*** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A running Ceph Object Gateway.

Procedure

1. Generate a list of objects that hold data within a bucket.

   Syntax

   ```
   radosgw-admin bucket radoslist --bucket BUCKET_NAME
   ```

   Example

   ```
   [root@host01 ~]# radosgw-admin bucket radoslist --bucket mybucket
   ```

   NOTE

   If the *BUCKET_NAME* is omitted, then all objects in all buckets are displayed.

2. Check the version of **rgw-orphan-list**.

   Example

   ```
   [root@host01 ~]# head /usr/bin/rgw-orphan-list
   ```

   The version should be **2023-01-11** or newer.

3. Create a directory where you need to generate the list of orphans.

Example

```
[root@host01 ~]# mkdir orphans
```

4. Navigate to the directory created earlier.

Example

```
[root@host01 ~]# cd orphans
```

5. From the pool list, select the pool in which you want to find orphans. This script might run for a long time depending on the objects in the cluster.

Example

```
[root@host01 orphans]# rgw-orphan-list
```

Example

```
Available pools:
   .rgw.root
   default.rgw.control
   default.rgw.meta
   default.rgw.log
   default.rgw.buckets.index
   default.rgw.buckets.data
   rbd
   default.rgw.buckets.non-ec
   ma.rgw.control
   ma.rgw.meta
   ma.rgw.log
   ma.rgw.buckets.index
   ma.rgw.buckets.data
   ma.rgw.buckets.non-ec
Which pool do you want to search for orphans?
```

Enter the pool name to search for orphans.

IMPORTANT

A data pool must be specified when using the **rgw-orphan-list** command, and not a metadata pool.

6. View the details of the **rgw-orphan-list** tool usage.

Synatx

```
rgw-orphan-list -h
rgw-orphan-list POOL_NAME/DIRECTORY
```

Example

```
[root@host01 orphans]# rgw-orphan-list default.rgw.buckets.data /orphans

2023-09-12 08:41:14 ceph-host01 Computing delta...
2023-09-12 08:41:14 ceph-host01 Computing results...
10 potential orphans found out of a possible 2412 (0%).          <<<<<<< orphans detected
The results can be found in './orphan-list-20230912124113.out'.
    Intermediate files are './rados-20230912124113.intermediate' and './radosgw-admin-
20230912124113.intermediate'.
***
*** WARNING: This is EXPERIMENTAL code and the results should be used
***          only with CAUTION!
***
Done at 2023-09-12 08:41:14.
```

7. Run the **ls -l** command to verify the files ending with error should be zero length indicating the script ran without any issues.

   Example

```
[root@host01 orphans]# ls -l

-rw-r--r--. 1 root root    770 Sep 12 03:59 orphan-list-20230912075939.out
-rw-r--r--. 1 root root      0 Sep 12 03:59 rados-20230912075939.error
-rw-r--r--. 1 root root 248508 Sep 12 03:59 rados-20230912075939.intermediate
-rw-r--r--. 1 root root      0 Sep 12 03:59 rados-20230912075939.issues
-rw-r--r--. 1 root root      0 Sep 12 03:59 radosgw-admin-20230912075939.error
-rw-r--r--. 1 root root 247738 Sep 12 03:59 radosgw-admin-20230912075939.intermediate
```

8. Review the orphan objects listed.

   Example

```
[root@host01 orphans]# cat ./orphan-list-20230912124113.out

a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.0
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.1
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.2
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.3
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.4
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.5
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.6
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.7
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.8
a9c042bc-be24-412c-9052-dda6b2f01f55.16749.1_key1.cherylf.433-bucky-4865-0.9
```

9. Remove orphan objects:

   Syntax

```
rados -p POOL_NAME rm OBJECT_NAME
```

   Example

```
[root@host01 orphans]# rados -p default.rgw.buckets.data rm myobject
```

WARNING

Verify you are removing the correct objects. Running the **rados rm** command removes data from the storage cluster.

8.7.3.5. Managing bucket index entries

You can manage the bucket index entries of the Ceph Object Gateway in a Red Hat Ceph Storage cluster using the **radosgw-admin bucket check** sub-command.

Each bucket index entry related to a piece of a multipart upload object is matched against its corresponding **.meta** index entry. There should be one **.meta** entry for all the pieces of a given multipart upload. If it fails to find a corresponding **.meta** entry for a piece, it lists out the "orphaned" piece entries in a section of the output.

The stats for the bucket are stored in the bucket index headers. This phase loads those headers and also iterates through all the plain object entries in the bucket index and recalculates the stats. It then displays the actual and calculated stats in sections labeled "existing_header" and "calculated_header" respectively, so they can be compared.

If you use the **--fix** option with the **bucket check** sub-command, it removes the "orphaned" entries from the bucket index and also overwrites the existing stats in the header with those that it calculated. It causes all entries, including the multiple entries used in versioning, to be listed in the output.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A running Ceph Object Gateway.
- A newly created bucket.

Procedure

1. Check the bucket index of a specific bucket:

   Syntax

   ```
   radosgw-admin bucket check --bucket=BUCKET_NAME
   ```

   Example

   ```
   [root@rgw ~]# radosgw-admin bucket check --bucket=mybucket
   ```

2. Fix the inconsistencies in the bucket index, including removal of orphaned objects:

   Syntax

```
radosgw-admin bucket check --fix --bucket=BUCKET_NAME
```

Example

```
[root@rgw ~]# radosgw-admin bucket check --fix --bucket=mybucket
```

8.7.3.6. Bucket notifications

Bucket notifications provide a way to send information out of the Ceph Object Gateway when certain events happen in the bucket. Bucket notifications can be sent to HTTP, AMQP0.9.1, and Kafka endpoints. A notification entry must be created to send bucket notifications for events on a specific bucket and to a specific topic. A bucket notification can be created on a subset of event types or by default for all event types. The bucket notification can filter out events based on key prefix or suffix, regular expression matching the keys, and on the metadata attributes attached to the object, or the object tags. Bucket notifications have a REST API to provide configuration and control interfaces for the bucket notification mechanism.

NOTE

The bucket notifications API is enabled by default. If **rgw_enable_apis** configuration parameter is explicitly set, ensure that **s3**, and **notifications** are included. To verify this, run the **ceph --admin-daemon /var/run/ceph/ceph-client.rgw.*NAME*.asok config get rgw_enable_apis** command. Replace *NAME* with the Ceph Object Gateway instance name.

Topic management using CLI

You can manage list, get, and remove topics for the Ceph Object Gateway buckets:

- **List topics**: Run the following command to list the configuration of all topics:

  Example

  ```
  [ceph: host01 /]# radosgw-admin topic list
  ```

- **Get topics**: Run the following command to get the configuration of a specific topic:

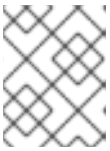
  Example

  ```
  [ceph: host01 /]# radosgw-admin topic get --topic=topic1
  ```

- **Remove topics**: Run the following command to remove the configuration of a specific topic:

  Example

  ```
  [ceph: host01 /]# radosgw-admin topic rm --topic=topic1
  ```



NOTE

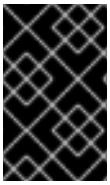
The topic is removed even if the Ceph Object Gateway bucket is configured to that topic.

8.7.3.7. Creating bucket notifications

Create bucket notifications at the bucket level. The notification configuration has the Red Hat Ceph Storage Object Gateway S3 events, **ObjectCreated**, **ObjectRemoved**, and **ObjectLifecycle:Expiration**. These need to be published with the destination to send the bucket notifications. Bucket notifications are S3 operations.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A running HTTP server, RabbitMQ server, or a Kafka server.
- Root-level access.
- Installation of the Red Hat Ceph Storage Object Gateway.
- User access key and secret key.
- Endpoint parameters.



IMPORTANT

Red Hat supports **ObjectCreate** events, such as **put**, **post**, **multipartUpload**, and **copy**. Red Hat also supports **ObjectRemove** events, such as **object_delete** and **s3_multi_object_delete**.

Procedure

1. Create an S3 bucket.
2. Create an SNS topic for **http**,**amqp**, or **kafka** protocol.
3. Create an S3 bucket notification for **s3:objectCreate**, **s3:objectRemove**, and **s3:ObjectLifecycle:Expiration** events:

   Example

```
client.put_bucket_notification_configuration(
   Bucket=bucket_name,
   NotificationConfiguration={
      'TopicConfigurations': [
         {
            'Id': notification_name,
            'TopicArn': topic_arn,
            'Events': ['s3:ObjectCreated:*', 's3:ObjectRemoved:*',
's3:ObjectLifecycle:Expiration:*']
         }]})
```

4. Create S3 objects in the bucket.
5. Verify the object creation events at the **http**, **rabbitmq**, or **kafka** receiver.
6. Delete the objects.
7. Verify the object deletion events at the **http**, **rabbitmq**, or **kafka** receiver.

8.7.4. S3 bucket replication API (Technology Preview)

IMPORTANT

S3 bucket replication is a Technology Preview feature only for Red Hat Ceph Storage 7.0. Technology Preview features are not supported with Red Hat production service level agreements (SLAs), might not be functionally complete, and Red Hat does not recommend using them for production. These features provide early access to upcoming product features, enabling customers to test functionality and provide feedback during the development process.

See the support scope for Red Hat Technology Preview features for more details.

The S3 bucket replication API is implemented, and allows users to create replication rules between different buckets. Note though that while the AWS replication feature allows bucket replication within the same zone, Ceph Object Gateway does not allow it at the moment. However, the Ceph Object Gateway API also added a **Zone** array that allows users to select to what zones the specific bucket will be synced.

8.7.4.1. Creating S3 bucket replication

Create a replication configuration for a bucket or replace an existing one.

A replication configuration must include at least one rule. Each rule identifies a subset of objects to replicate by filtering the objects in the source bucket.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.

Procedure

1. Create a replication configuration file that contains the details of replication:

   Syntax

```
{
"Role": "arn:aws:iam::account-id:role/role-name",
   "Rules": [
      {
         "Status": "Enabled",
         "Priority": 1,
         "DeleteMarkerReplication": { "Status": "Disabled" },
         "Filter" : { "Prefix": ""},
         "Destination": {
            "Bucket": "BUCKET_NAME"
         }
      }
   ]
}
```

   Example

```
[root@host01 ~]# cat replication.json
{
   "Role": "arn:aws:iam::account-id:role/role-name",
   "Rules": [
      {
         "Status": "Enabled",
         "Priority": 1,
         "DeleteMarkerReplication": { "Status": "Disabled" },
         "Filter" : { "Prefix": ""},
         "Destination": {
            "Bucket": "testbucket"
         }
      }
   ]
}
```

2. Create the S3 API put bucket replication:

Syntax

```
aws --endpoint-url=RADOSGW_ENDPOINT_URL s3api put-bucket-replication --bucket
BUCKET_NAME --replication-configuration file://REPLICATION_CONFIIRATION_FILE.json
```

Example

```
[root@host01 ~]# aws --endpoint-url=http://host01:80 s3api put-bucket-replication --bucket
testbucket --replication-configuration file://replication.json
```

8.7.4.2. Getting S3 bucket replication

You can retrieve the replication configuration of the bucket.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.
- An S3 bucket replication created.

Procedure

- Get the S3 API put bucket replication:

Syntax

```
aws s3api get-bucket-replication --bucket BUCKET_NAME --endpoint-
url=RADOSGW_ENDPOINT_URL
```

Example

```
[root@host01 ~]# aws s3api get-bucket-replication --bucket testbucket --endpoint-
url=http://host01:80
```

```
{

"ReplicationConfiguration": {
    "Role": "arn:aws:iam::account-id:role/role-name",
    "Rules": [
        {
            "Status": "Enabled",
            "Priority": 1,
            "DeleteMarkerReplication": { "Status": "Disabled" },
            "Filter" : { "Prefix": ""},
            "Destination": {
                Bucket": "testbucket"
            }
        }
    ]
 }

}
```

8.7.4.3. Deleting S3 bucket replication

Delete a replication configuration from a bucket.

The bucket owner can grant permission to others to remove the replication configuration.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- The Ceph Object Gateway is installed.
- An S3 bucket replication created.

Procedure

1. Delete the S3 API put bucket replication:

   Syntax

   ```
   aws s3api delete-bucket-replication --bucket BUCKET_NAME --endpoint-
   url=RADOSGW_ENDPOINT_URL
   ```

   Example

   ```
   [root@host01 ~]# aws s3api delete-bucket-replication --bucket testbucket --endpoint-
   url=http://host01:80
   ```

2. Verify that the existing replication rules are deleted:

   Syntax

   ```
   aws s3api get-bucket-replication --bucket BUCKET_NAME --endpoint-
   url=RADOSGW_ENDPOINT_URL
   ```

Example

```
[root@host01 ~]# aws s3api get-bucket-replication --bucket testbucket --endpoint-
url=http://host01:80
{

"ReplicationConfiguration": {
    "Role": "arn:aws:iam::account-id:role/role-name",
    "Rules": [
        {
            "Status": "Enabled",
            "Priority": 1,
            "DeleteMarkerReplication": { "Status": "Disabled" },
            "Filter" : { "Prefix": ""},
            "Destination": {
                "Bucket": "testbucket"
            }
        }
    ]
  }

}
```

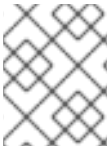
Additional Resources

- See the *Red Hat Ceph Storage Developer Guide* for more information.

8.8. BUCKET LIFECYCLE

As a storage administrator, you can use a bucket lifecycle configuration to manage your objects so they are stored effectively throughout their lifetime. For example, you can transition objects to less expensive storage classes, archive, or even delete them based on your use case.

RADOS Gateway supports S3 API object expiration by using rules defined for a set of bucket objects. Each rule has a prefix, which selects the objects, and a number of days after which objects become unavailable.



NOTE

The **radosgw-admin lc reshard** command is deprecated in Red Hat Ceph Storage 3.3 and not supported in Red Hat Ceph Storage 4 and later releases.

8.8.1. Creating a lifecycle management policy

You can manage a bucket lifecycle policy configuration using standard S3 operations rather than using the **radosgw-admin** command. RADOS Gateway supports only a subset of the Amazon S3 API policy language applied to buckets. The lifecycle configuration contains one or more rules defined for a set of bucket objects.

Prerequisites

- A running Red Hat Storage cluster.
- Installation of the Ceph Object Gateway.

- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- An S3 user created with user access.
- Access to a Ceph Object Gateway client with the **AWS CLI** package installed.

Procedure

1. Create a JSON file for lifecycle configuration:

   Example

   ```
   [user@client ~]$ vi lifecycle.json
   ```

2. Add the specific lifecycle configuration rules in the file:

   Example

   ```
   {
    "Rules": [
           {
          "Filter": {
           "Prefix": "images/"
          },
          "Status": "Enabled",
          "Expiration": {
           "Days": 1
          },
          "ID": "ImageExpiration"
         }
       ]
   }
   ```

   The lifecycle configuration example expires objects in the images directory after 1 day.

3. Set the lifecycle configuration on the bucket:

   Syntax

   ```
   aws --endpoint-url=RADOSGW_ENDPOINT_URL:PORT s3api put-bucket-lifecycle-
   configuration --bucket BUCKET_NAME --lifecycle-configuration
   file://PATH_TO_LIFECYCLE_CONFIGURATION_FILE/LIFECYCLE_CONFIGURATION_FIL
   E.json
   ```

   Example

   ```
   [user@client ~]$ aws --endpoint-url=http://host01:80 s3api put-bucket-lifecycle-configuration
   --bucket testbucket --lifecycle-configuration file://lifecycle.json
   ```

   In this example, the **lifecycle.json** file exists in the current directory.

Verification

- Retrieve the lifecycle configuration for the bucket:

  Syntax

  ```
  aws --endpoint-url=RADOSGW_ENDPOINT_URL:PORT s3api get-bucket-lifecycle-configuration --bucket BUCKET_NAME
  ```

  Example

  ```
  [user@client ~]$ aws --endpoint-url=http://host01:80 s3api get-bucket-lifecycle-configuration --bucket testbucket
  {
   "Rules": [
          {
        "Expiration": {
         "Days": 1
        },
        "ID": "ImageExpiration",
        "Filter": {
         "Prefix": "images/"
        },
        "Status": "Enabled"
       }
      ]
  }
  ```

- Optional: From the Ceph Object Gateway node, log into the Cephadm shell and retrieve the bucket lifecycle configuration:

  Syntax

  ```
  radosgw-admin lc get --bucket=BUCKET_NAME
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin lc get --bucket=testbucket
  {
   "prefix_map": {
    "images/": {
     "status": true,
     "dm_expiration": false,
     "expiration": 1,
     "noncur_expiration": 0,
     "mp_expiration": 0,
     "transitions": {},
     "noncur_transitions": {}
    }
   },
   "rule_map": [
          {
    "id": "ImageExpiration",
    "rule": {
     "id": "ImageExpiration",
  ```

```
    "prefix": "",
    "status": "Enabled",
    "expiration": {
     "days": "1",
     "date": ""
    },
    "mp_expiration": {
     "days": "",
     "date": ""
    },
    "filter": {
     "prefix": "images/",
     "obj_tags": {
      "tagset": {}
     }
    },
    "transitions": {},
    "noncur_transitions": {},
    "dm_expiration": false
   }
  }
   ]
}
```

Additional Resources

- See the *S3 bucket lifecycle* section in the *Red Hat Ceph Storage Developer Guide* for details.
- For more information on using the **AWS CLI** to manage lifecycle configurations, see the *Setting lifecycle configuration on a bucket* section of the *Amazon Simple Storage Service* documentation.

8.8.2. Deleting a lifecycle management policy

You can delete the lifecycle management policy for a specified bucket by using the **s3api delete-bucket-lifecycle** command.

Prerequisites

- A running Red Hat Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- An S3 user created with user access.
- Access to a Ceph Object Gateway client with the **AWS CLI** package installed.

Procedure

- Delete a lifecycle configuration:

Syntax

```
aws --endpoint-url=RADOSGW_ENDPOINT_URL:PORT s3api delete-bucket-lifecycle --bucket BUCKET_NAME
```

Example

```
[user@client ~]$ aws --endpoint-url=http://host01:80 s3api delete-bucket-lifecycle --bucket testbucket
```

Verification

- Retrieve lifecycle configuration for the bucket:

  Syntax

  ```
  aws --endpoint-url=RADOSGW_ENDPOINT_URL:PORT s3api get-bucket-lifecycle-configuration --bucket BUCKET_NAME
  ```

  Example

  ```
  [user@client ~]# aws --endpoint-url=http://host01:80  s3api get-bucket-lifecycle-configuration --bucket testbucket
  ```

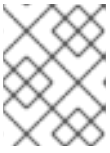
- Optional: From the Ceph Object Gateway node, retrieve the bucket lifecycle configuration:

  Syntax

  ```
  radosgw-admin lc get --bucket=BUCKET_NAME
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin lc get --bucket=testbucket
  ```



NOTE

The command does not return any information if a bucket lifecycle policy is not present.

Additional Resources

- See the *S3 bucket lifecycle* section in the *Red Hat Ceph Storage Developer Guide* for details.

8.8.3. Updating a lifecycle management policy

You can update a lifecycle management policy by using the **s3cmd put-bucket-lifecycle-configuration** command.

NOTE

The **put-bucket-lifecycle-configuration** overwrites an existing bucket lifecycle configuration. If you want to retain any of the current lifecycle policy settings, you must include them in the lifecycle configuration file.

Prerequisites

- A running Red Hat Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.
- An S3 bucket created.
- An S3 user created with user access.
- Access to a Ceph Object Gateway client with the **AWS CLI** package installed.

Procedure

1. Create a JSON file for the lifecycle configuration:

   Example

   ```
   [user@client ~]$ vi lifecycle.json
   ```

2. Add the specific lifecycle configuration rules to the file:

   Example

   ```
   {
    "Rules": [
          {
        "Filter": {
         "Prefix": "images/"
        },
        "Status": "Enabled",
        "Expiration": {
         "Days": 1
        },
        "ID": "ImageExpiration"
       },
     {
      "Filter": {
       "Prefix": "docs/"
      },
      "Status": "Enabled",
      "Expiration": {
       "Days": 30
      },
      "ID": "DocsExpiration"
   ```

```
    }
  ]
}
```

3. Update the lifecycle configuration on the bucket:

Syntax

```
aws --endpoint-url=RADOSGW_ENDPOINT_URL:PORT s3api put-bucket-lifecycle-configuration --bucket BUCKET_NAME --lifecycle-configuration file://PATH_TO_LIFECYCLE_CONFIGURATION_FILE/LIFECYCLE_CONFIGURATION_FILE.json
```

Example

```
[user@client ~]$ aws --endpoint-url=http://host01:80 s3api put-bucket-lifecycle-configuration --bucket testbucket --lifecycle-configuration file://lifecycle.json
```

Verification

- Retrieve the lifecycle configuration for the bucket:

Syntax

```
aws --endpointurl=RADOSGW_ENDPOINT_URL:PORT s3api get-bucket-lifecycle-configuration --bucket BUCKET_NAME
```

Example

```
[user@client ~]$ aws -endpoint-url=http://host01:80 s3api get-bucket-lifecycle-configuration --bucket testbucket

{
    "Rules": [
        {
            "Expiration": {
                "Days": 30
            },
            "ID": "DocsExpiration",
            "Filter": {
                "Prefix": "docs/"
            },
            "Status": "Enabled"
        },
        {
            "Expiration": {
                "Days": 1
            },
            "ID": "ImageExpiration",
            "Filter": {
                "Prefix": "images/"
            },
            "Status": "Enabled"
```

```
        }
    ]
}
```

- Optional: From the Ceph Object Gateway node, log into the Cephadm shell and retrieve the bucket lifecycle configuration:

  Syntax

  ```
  radosgw-admin lc get --bucket=BUCKET_NAME
  ```

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin lc get --bucket=testbucket
  {
   "prefix_map": {
         "docs/": {
    "status": true,
    "dm_expiration": false,
    "expiration": 1,
    "noncur_expiration": 0,
    "mp_expiration": 0,
    "transitions": {},
    "noncur_transitions": {}
   },
   "images/": {
    "status": true,
    "dm_expiration": false,
    "expiration": 1,
    "noncur_expiration": 0,
    "mp_expiration": 0,
    "transitions": {},
    "noncur_transitions": {}
   }
  },
  "rule_map": [
        {
         "id": "DocsExpiration",
      "rule": {
       "id": "DocsExpiration",
       "prefix": "",
       "status": "Enabled",
       "expiration": {
        "days": "30",
        "date": ""
       },
            "noncur_expiration": {
                "days": "",
                "date": ""
            },
       "mp_expiration": {
        "days": "",
        "date": ""
       },
       "filter": {
  ```

```
        "prefix": "docs/",
        "obj_tags": {
         "tagset": {}
        }
       },
       "transitions": {},
       "noncur_transitions": {},
       "dm_expiration": false
      }
     },
     {
    "id": "ImageExpiration",
    "rule": {
     "id": "ImageExpiration",
     "prefix": "",
     "status": "Enabled",
     "expiration": {
      "days": "1",
      "date": ""
     },
     "mp_expiration": {
      "days": "",
      "date": ""
     },
     "filter": {
      "prefix": "images/",
      "obj_tags": {
       "tagset": {}
      }
     },
     "transitions": {},
     "noncur_transitions": {},
     "dm_expiration": false
    }
   }
    ]
}
```


Additional Resources

- See the *Red Hat Ceph Storage Developer Guide* for details on Amazon S3 bucket lifecycles.

8.8.4. Monitoring bucket lifecycles

You can monitor lifecycle processing and manually process the lifecycle of buckets with the **radosgw-admin lc list** and **radosgw-admin lc process** commands.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to a Ceph Object Gateway node.
- Creation of an S3 bucket with a lifecycle configuration policy applied.

Procedure

1. Log into the Cephadm shell:

   Example

   ```
   [root@host01 ~]# cephadm shell
   ```

2. List bucket lifecycle progress:

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin lc list

   [
     {
         “bucket”: “:testbucket:8b63d584-9ea1-4cf3-8443-a6a15beca943.54187.1”,
         “started”: “Thu, 01 Jan 1970 00:00:00 GMT”,
         “status” : “UNINITIAL”
     },
     {
         “bucket”: “:testbucket1:8b635499-9e41-4cf3-8443-a6a15345943.54187.2”,
         “started”: “Thu, 01 Jan 1970 00:00:00 GMT”,
         “status” : “UNINITIAL”
     }
   ]
   ```

   The bucket lifecycle processing status can be one of the following:

   - UNINITIAL - The process has not run yet.
   - PROCESSING - The process is currently running.
   - COMPLETE - The process has completed.

3. Optional: You can manually process bucket lifecycle policies:

   a. Process the lifecycle policy for a single bucket:

      Syntax

      ```
      radosgw-admin lc process --bucket=BUCKET_NAME
      ```

      Example

      ```
      [ceph: root@host01 /]# radosgw-admin lc process --bucket=testbucket1
      ```

   b. Process all bucket lifecycle policies immediately:

      Example

      ```
      [ceph: root@host01 /]# radosgw-admin lc process
      ```

Verification

- List the bucket lifecycle policies:

```
[ceph: root@host01 /]# radosgw-admin lc list
[
    {
        “bucket”: “:testbucket:8b63d584-9ea1-4cf3-8443-a6a15beca943.54187.1”,
        “started”: “Thu, 17 Mar 2022 21:48:50 GMT”,
        “status” : “COMPLETE”
    }
    {
        “bucket”: “:testbucket1:8b635499-9e41-4cf3-8443-a6a15345943.54187.2”,
        “started”: “Thu, 17 Mar 2022 20:38:50 GMT”,
        “status” : “COMPLETE”
    }
]
```

Additional Resources

- See the *S3 bucket lifecycle* section in the *Red Hat Ceph Storage Developer Guide* for details.

8.8.5. Configuring lifecycle expiration window

You can set the time that the lifecycle management process runs each day by setting the **rgw_lifecycle_work_time** parameter. By default, lifecycle processing occurs once per day, at midnight.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway.
- Root-level access to a Ceph Object Gateway node.

Procedure

1. Log into the Cephadm shell:

   Example

   ```
   [root@host01 ~]# cephadm shell
   ```

2. Set the lifecycle expiration time:

   Syntax

   ```
   ceph config set client.rgw rgw_lifecycle_work_time %D:%D-%D:%D
   ```

   Replace *%d:%d-%d:%d* with **start_hour:start_minute-end_hour:end_minute**.

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_lifecycle_work_time 06:00-08:00
   ```

Verification

- Retrieve the lifecycle expiration work time:

  Example

  ```
  [ceph: root@host01 /]# ceph config get client.rgw rgw_lifecycle_work_time

  06:00-08:00
  ```

Additional Resources

- See the *S3 bucket lifecycle* section in the *Red Hat Ceph Storage Developer Guide* for details.

8.8.6. S3 bucket lifecycle transition within a storage cluster

You can use a bucket lifecycle configuration to manage objects so objects are stored effectively throughout the object's lifetime. The object lifecycle transition rule allows you to manage, and effectively store the objects throughout the object's lifetime. You can transition objects to less expensive storage classes, archive, or even delete them.

You can create storage classes for:

- Fast media, such as SSD or NVMe for I/O sensitive workloads.
- Slow magnetic media, such as SAS or SATA for archiving.

You can create a schedule for data movement between a hot storage class and a cold storage class. You can schedule this movement after a specified time so that the object expires and is deleted permanently for example you can transition objects to a storage class 30 days after you have created or even archived the objects to a storage class one year after creating them. You can do this through a transition rule. This rule applies to an object transitioning from one storage class to another. The lifecycle configuration contains one or more rules using the **<Rule>** element.

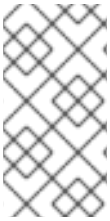
Additional Resources

- See the *Red Hat Ceph Storage Developer Guide* for details on bucket lifecycle.

8.8.7. Transitioning an object from one storage class to another

The object lifecycle transition rule allows you to transition an object from one storage class to another class.

You can migrate data between replicated pools, erasure-coded pools, replicated to erasure-coded pools, or erasure-coded to replicated pools with the Ceph Object Gateway lifecycle transition policy.



NOTE

In a multi-site configuration, when the lifecycle transition rule is applied on the first site, to transition objects from one data pool to another in the same storage cluster, then the same rule is valid for the second site, if the second site has the respective data pool created and enabled with **rgw** application.

Prerequisites

- Installation of the Ceph Object Gateway software.
- Root-level access to the Ceph Object Gateway node.
- An S3 user created with user access.

Procedure

1. Create a new data pool:

   Syntax

   ```
   ceph osd pool create POOL_NAME
   ```

   Example

   ```
   [ceph: root@host01 /]# ceph osd pool create test.hot.data
   ```

2. Add a new storage class:

   Syntax

   ```
   radosgw-admin zonegroup placement add  --rgw-zonegroup default --placement-id
   PLACEMENT_TARGET --storage-class STORAGE_CLASS
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin zonegroup placement add  --rgw-zonegroup default --
   placement-id default-placement --storage-class hot.test
   {
           "key": "default-placement",
           "val": {
               "name": "default-placement",
               "tags": [],
               "storage_classes": [
                   "STANDARD",
                   "hot.test"
               ]
           }
       }
   ```

3. Provide the zone placement information for the new storage class:

   Syntax

   ```
   radosgw-admin zone placement add --rgw-zone default --placement-id
   PLACEMENT_TARGET --storage-class STORAGE_CLASS --data-pool DATA_POOL
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin zone placement add --rgw-zone default --placement-
   id default-placement --storage-class hot.test --data-pool test.hot.data
   {
   ```

```
        "key": "default-placement",
        "val": {
            "index_pool": "test_zone.rgw.buckets.index",
            "storage_classes": {
                "STANDARD": {
                    "data_pool": "test.hot.data"
                },
                "hot.test": {
                    "data_pool": "test.hot.data",
                }
            },
            "data_extra_pool": "",
            "index_type": 0
        }
```

NOTE

Consider setting the **compression_type** when creating cold or archival data storage pools with write once.

4. Enable the **rgw** application on the data pool:

   Syntax

   ```
   ceph osd pool application enable POOL_NAME rgw
   ```

   Example

   ```
   [ceph: root@host01 /]# ceph osd pool application enable test.hot.data rgw
   enabled application 'rgw' on pool 'test.hot.data'
   ```

5. Restart all the **rgw** daemons.

6. Create a bucket:

   Example

   ```
   [ceph: root@host01 /]# aws s3api create-bucket --bucket testbucket10 --create-bucket-
   configuration LocationConstraint=default:default-placement --endpoint-url
   http://10.0.0.80:8080
   ```

7. Add the object:

   Example

   ```
   [ceph: root@host01 /]# aws --endpoint=http://10.0.0.80:8080 s3api put-object --bucket
   testbucket10  --key compliance-upload --body /root/test2.txt
   ```

8. Create a second data pool:

   Syntax

```
ceph osd pool create POOL_NAME
```

Example

```
[ceph: root@host01 /]# ceph osd pool create test.cold.data
```

9. Add a new storage class:

Syntax

```
radosgw-admin zonegroup placement add  --rgw-zonegroup default --placement-id
PLACEMENT_TARGET --storage-class STORAGE_CLASS
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup placement add  --rgw-zonegroup default --
placement-id default-placement --storage-class cold.test
{
        "key": "default-placement",
        "val": {
            "name": "default-placement",
            "tags": [],
            "storage_classes": [
                "STANDARD",
                "cold.test"
            ]
        }
    }
```

10. Provide the zone placement information for the new storage class:

Syntax

```
radosgw-admin zone placement add --rgw-zone default --placement-id
PLACEMENT_TARGET --storage-class STORAGE_CLASS --data-pool DATA_POOL
```

Example

```
[ceph: root@host01 /]# radosgw-admin zone placement add --rgw-zone default --placement-
id default-placement --storage-class cold.test --data-pool test.cold.data
```

11. Enable **rgw** application on the data pool:

Syntax

```
ceph osd pool application enable POOL_NAME rgw
```

Example

```
[ceph: root@host01 /]# ceph osd pool application enable test.cold.data rgw
enabled application 'rgw' on pool 'test.cold.data'
```

12. Restart all the **rgw** daemons.

13. To view the zone group configuration, run the following command:

    Syntax

```
radosgw-admin zonegroup get
{
    "id": "3019de59-ddde-4c5c-b532-7cdd29de09a1",
    "name": "default",
    "api_name": "default",
    "is_master": "true",
    "endpoints": [],
    "hostnames": [],
    "hostnames_s3website": [],
    "master_zone": "adacbe1b-02b4-41b8-b11d-0d505b442ed4",
    "zones": [
        {
            "id": "adacbe1b-02b4-41b8-b11d-0d505b442ed4",
            "name": "default",
            "endpoints": [],
            "log_meta": "false",
            "log_data": "false",
            "bucket_index_max_shards": 11,
            "read_only": "false",
            "tier_type": "",
            "sync_from_all": "true",
            "sync_from": [],
            "redirect_zone": ""
        }
    ],
    "placement_targets": [
        {
            "name": "default-placement",
            "tags": [],
            "storage_classes": [
                "hot.test",
                "cold.test",
                "STANDARD"
            ]
        }
    ],
    "default_placement": "default-placement",
    "realm_id": "",
    "sync_policy": {
        "groups": []
    }
}
```

14. To view the zone configuration, run the following command:

    Syntax

```
radosgw-admin zone get
{
```

```
    "id": "adacbe1b-02b4-41b8-b11d-0d505b442ed4",
    "name": "default",
    "domain_root": "default.rgw.meta:root",
    "control_pool": "default.rgw.control",
    "gc_pool": "default.rgw.log:gc",
    "lc_pool": "default.rgw.log:lc",
    "log_pool": "default.rgw.log",
    "intent_log_pool": "default.rgw.log:intent",
    "usage_log_pool": "default.rgw.log:usage",
    "roles_pool": "default.rgw.meta:roles",
    "reshard_pool": "default.rgw.log:reshard",
    "user_keys_pool": "default.rgw.meta:users.keys",
    "user_email_pool": "default.rgw.meta:users.email",
    "user_swift_pool": "default.rgw.meta:users.swift",
    "user_uid_pool": "default.rgw.meta:users.uid",
    "otp_pool": "default.rgw.otp",
    "system_key": {
        "access_key": "",
        "secret_key": ""
    },
    "placement_pools": [
        {
            "key": "default-placement",
            "val": {
                "index_pool": "default.rgw.buckets.index",
                "storage_classes": {
                    "cold.test": {
                        "data_pool": "test.cold.data"
                    },
                    "hot.test": {
                        "data_pool": "test.hot.data"
                    },
                    "STANDARD": {
                        "data_pool": "default.rgw.buckets.data"
                    }
                },
                "data_extra_pool": "default.rgw.buckets.non-ec",
                "index_type": 0
            }
        }
    ],
    "realm_id": "",
    "notif_pool": "default.rgw.log:notif"
}
```


15. Create a bucket:

Example

```
[ceph: root@host01 /]# aws s3api create-bucket --bucket testbucket10 --create-bucket-configuration LocationConstraint=default:default-placement --endpoint-url http://10.0.0.80:8080
```

16. List the objects prior to transition:

Example

.

```
[ceph: root@host01 /]# radosgw-admin bucket list --bucket testbucket10

        {
            "ETag": "\"211599863395c832a3dfcba92c6a3b90\"",
            "Size": 540,
            "StorageClass": "STANDARD",
            "Key": "obj1",
            "VersionId": "W95teRsXPSJI4YWJwwSG30KxSCzSgk-",
            "IsLatest": true,
            "LastModified": "2023-11-23T10:38:07.214Z",
            "Owner": {
                "DisplayName": "test-user",
                "ID": "test-user"
            }
        }
```

17. Create a JSON file for lifecycle configuration:

    Example

    ```
    [ceph: root@host01 /]# vi lifecycle.json
    ```

18. Add the specific lifecycle configuration rule in the file:

    Example

    ```
    {
        "Rules": [
            {
                "Filter": {
                    "Prefix": ""
                },
                "Status": "Enabled",
                "Transitions": [
                    {
                        "Days": 5,
                        "StorageClass": "hot.test"
                    },
     {
                        "Days": 20,
                        "StorageClass": "cold.test"
                    }
                ],
                "Expiration": {
                    "Days": 365
                },
                "ID": "double transition and expiration"
            }
        ]
    }
    ```

    The lifecycle configuration example shows an object that will transition from the default **STANDARD** storage class to the **hot.test** storage class after 5 days, again transitions after 20

days to the **cold.test** storage class, and finally expires after 365 days in the **cold.test** storage class.

19. Set the lifecycle configuration on the bucket:

    Example

    ```
    [ceph: root@host01 /]# aws s3api put-bucket-lifecycle-configuration --bucket testbucket10 --
    lifecycle-configuration file://lifecycle.json
    ```

20. Retrieve the lifecycle configuration on the bucket:

    Example

    ```
    [ceph: root@host01 /]# aws s3api get-bucket-lifecycle-configuration --bucket testbucke10
    {
        "Rules": [
            {
                "Expiration": {
                    "Days": 365
                },
                "ID": "double transition and expiration",
                "Prefix": "",
                "Status": "Enabled",
                "Transitions": [
                    {
                        "Days": 20,
                        "StorageClass": "cold.test"
                    },
                    {
                        "Days": 5,
                        "StorageClass": "hot.test"
                    }
                ]
            }
        ]
    }
    ```

21. Verify that the object is transitioned to the given storage class:

    Example

    ```
    [ceph: root@host01 /]# radosgw-admin bucket list --bucket testbucket10

            {
                "ETag": "\"211599863395c832a3dfcba92c6a3b90\"",
                "Size": 540,
                "StorageClass": "cold.test",
                "Key": "obj1",
                "VersionId": "W95teRsXPSJI4YWJwwSG30KxSCzSgk-",
                "IsLatest": true,
                "LastModified": "2023-11-23T10:38:07.214Z",
                "Owner": {
                    "DisplayName": "test-user",
    ```

```
            "ID": "test-user"
        }
    }
```

Additional Resources

- See the *Red Hat Ceph Storage Developer Guide* for details on bucket lifecycle.

8.8.8. Enabling object lock for S3

Using the S3 object lock mechanism, you can use object lock concepts like retention period, legal hold, and bucket configuration to implement Write-Once-Read-Many (WORM) functionality as part of the custom workflow overriding data deletion permissions.

IMPORTANT

The object version(s), not the object name, is the defining and required value for object lock to perform correctly to support the **GOVERNANCE** or **COMPLIANCE** mode. You need to know the version of the object when it is written so that you can retrieve it at a later time.

Prerequisites

- A running Red Hat Ceph Storage cluster with Ceph Object Gateway installed.
- Root-level access to the Ceph Object Gateway node.
- S3 user with version-bucket creation access.

Procedure

1. Create a bucket with object lock enabled:

   #### Syntax

   ```
   aws --endpoint=http://RGW_PORT:8080 s3api create-bucket --bucket BUCKET_NAME --object-lock-enabled-for-bucket
   ```

   #### Example

   ```
   [root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api create-bucket --bucket worm-bucket --object-lock-enabled-for-bucket
   ```

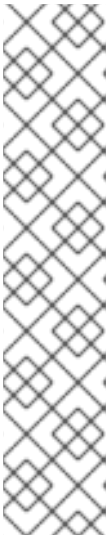
2. Set a retention period for the bucket:

   #### Syntax

   ```
   aws --endpoint=http://RGW_PORT:8080 s3api put-object-lock-configuration --bucket BUCKET_NAME --object-lock-configuration '{ "ObjectLockEnabled": "Enabled", "Rule": { "DefaultRetention": { "Mode": "RETENTION_MODE", "Days": NUMBER_OF_DAYS }}}'
   ```

   #### Example

```
[root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api put-object-lock-configuration --bucket worm-bucket --object-lock-configuration '{ "ObjectLockEnabled": "Enabled", "Rule": { "DefaultRetention": { "Mode": "COMPLIANCE", "Days": 10 }}}'
```



NOTE

You can choose either the **GOVERNANCE** or **COMPLIANCE** mode for the *RETENTION_MODE* in S3 object lock, to apply different levels of protection to any object version that is protected by object lock.

In **GOVERNANCE** mode, users cannot overwrite or delete an object version or alter its lock settings unless they have special permissions.

In **COMPLIANCE** mode, a protected object version cannot be overwritten or deleted by any user, including the root user in your AWS account. When an object is locked in **COMPLIANCE** mode, its *RETENTION_MODE* cannot be changed, and its retention period cannot be shortened. **COMPLIANCE** mode helps ensure that an object version cannot be overwritten or deleted for the duration of the period.

3. Put the object into the bucket with a retention time set:

Syntax

```
aws --endpoint=http://RGW_PORT:8080 s3api put-object --bucket BUCKET_NAME --object-lock-mode RETENTION_MODE --object-lock-retain-until-date "DATE" --key compliance-upload --body TEST_FILE
```

Example

```
[root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api put-object --bucket worm-bucket --object-lock-mode COMPLIANCE --object-lock-retain-until-date "2022-05-31" --key compliance-upload --body test.dd
{
    "ETag": "\"d560ea5652951637ba9c594d8e6ea8c1\"",
    "VersionId": "Nhhk5kRS6Yp6dZXVWpZZdRcpSpBKToD"
}
```

4. Upload a new object using the same key:

Syntax

```
aws --endpoint=http://RGW_PORT:8080 s3api put-object --bucket BUCKET_NAME --object-lock-mode RETENTION_MODE --object-lock-retain-until-date "DATE" --key compliance-upload --body PATH
```

Example

```
[root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api put-object --bucket worm-bucket --object-lock-mode COMPLIANCE --object-lock-retain-until-date "2022-05-31" --key compliance-upload --body /etc/fstab
{
```

```
    "ETag": "\"d560ea5652951637ba9c594d8e6ea8c1\"",
    "VersionId": "Nhhk5kRS6Yp6dZXVWpZZdRcpSpBKToD"
}
```

Command line options

- Set an object lock legal hold on an object version:

  Example

  ```
  [root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api put-object-legal-hold --bucket worm-bucket --key compliance-upload --legal-hold Status=ON
  ```

  NOTE

  Using the object lock legal hold operation, you can place a legal hold on an object version, thereby preventing an object version from being overwritten or deleted. A legal hold doesn't have an associated retention period and hence, remains in effect until removed.

- List the objects from the bucket to retrieve only the latest version of the object:

  Example

  ```
  [root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api list-objects --bucket worm-bucket
  ```

- List the object versions from the bucket:

  Example

  ```
  [root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api list-objects --bucket worm-bucket
  {
      "Versions": [
          {
              "ETag": "\"d560ea5652951637ba9c594d8e6ea8c1\"",
              "Size": 288,
              "StorageClass": "STANDARD",
              "Key": "hosts",
              "VersionId": "Nhhk5kRS6Yp6dZXVWpZZdRcpSpBKToD",
              "IsLatest": true,
              "LastModified": "2022-06-17T08:51:17.392000+00:00",
              "Owner": {
                  "DisplayName": "Test User in Tenant test",
                  "ID": "test$test.user"
              }
              }
          }
      ]
  }
  ```

- Access objects using version-ids:

Example

```
[root@rgw-2 ~]# aws --endpoint=http://rgw.ceph.com:8080 s3api get-object --bucket worm-bucket  --key compliance-upload --version-id 'IGOU.vdIs3SPduZglrB-RBaK.sfXpcd' download.1
{
    "AcceptRanges": "bytes",
    "LastModified": "2022-06-17T08:51:17+00:00",
    "ContentLength": 288,
    "ETag": "\"d560ea5652951637ba9c594d8e6ea8c1\"",
    "VersionId": "Nhhk5kRS6Yp6dZXVWpZZdRcpSpBKToD",
    "ContentType": "binary/octet-stream",
    "Metadata": {},
    "ObjectLockMode": "COMPLIANCE",
    "ObjectLockRetainUntilDate": "2023-06-17T08:51:17+00:00"
}
```

8.9. USAGE

The Ceph Object Gateway logs usage for each user. You can track user usage within date ranges too.

Options include:

- **Start Date:** The **--start-date** option allows you to filter usage stats from a particular start date (**format: yyyy-mm-dd[HH:MM:SS]**).
- **End Date:** The **--end-date** option allows you to filter usage up to a particular date (**format: yyyy-mm-dd[HH:MM:SS]**).
- **Log Entries:** The **--show-log-entries** option allows you to specify whether or not to include log entries with the usage stats (options: **true** | **false**).

NOTE

You can specify time with minutes and seconds, but it is stored with 1 hour resolution.

8.9.1. Show usage

To show usage statistics, specify the **usage show**. To show usage for a particular user, you must specify a user ID. You may also specify a start date, end date, and whether or not to show log entries.

Example

```
[ceph: root@host01 /]# radosgw-admin usage show \
            --uid=johndoe --start-date=2022-06-01 \
            --end-date=2022-07-01
```

You may also show a summary of usage information for all users by omitting a user ID.

Example

```
[ceph: root@host01 /]# radosgw-admin usage show --show-log-entries=false
```

8.9.2. Trim usage

With heavy use, usage logs can begin to take up storage space. You can trim usage logs for all users and for specific users. You may also specify date ranges for trim operations.

Example

```
[ceph: root@host01 /]# radosgw-admin usage trim --start-date=2022-06-01 \
                      --end-date=2022-07-31

[ceph: root@host01 /]# radosgw-admin usage trim --uid=johndoe
[ceph: root@host01 /]# radosgw-admin usage trim --uid=johndoe --end-date=2021-04-31
```

8.10. CEPH OBJECT GATEWAY DATA LAYOUT

Although RADOS only knows about pools and objects with their Extended Attributes (**xattrs**) and object map (OMAP), conceptually Ceph Object Gateway organizes its data into three different kinds:

- metadata
- bucket index
- data

Metadata

There are three sections of metadata:

- **user**: Holds user information.
- **bucket**: Holds a mapping between bucket name and bucket instance ID.
- **bucket.instance**: Holds bucket instance information.

You can use the following commands to view metadata entries:

Syntax

```
radosgw-admin metadata get bucket:BUCKET_NAME
radosgw-admin metadata get bucket.instance:BUCKET:BUCKET_ID
radosgw-admin metadata get user:USER
radosgw-admin metadata set user:USER
```

Example

```
[ceph: root@host01 /]# radosgw-admin metadata list
[ceph: root@host01 /]# radosgw-admin metadata list bucket
[ceph: root@host01 /]# radosgw-admin metadata list bucket.instance
[ceph: root@host01 /]# radosgw-admin metadata list user
```

Every metadata entry is kept on a single RADOS object.

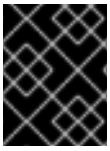
NOTE

A Ceph Object Gateway object might consist of several RADOS objects, the first of which is the head that contains the metadata, such as manifest, Access Control List (ACL), content type, ETag, and user-defined metadata. The metadata is stored in **xattrs**. The head might also contain up to 512 KB of object data, for efficiency and atomicity. The manifest describes how each object is laid out in RADOS objects.

Bucket index

It is a different kind of metadata, and kept separately. The bucket index holds a key-value map in RADOS objects. By default, it is a single RADOS object per bucket, but it is possible to shard the map over multiple RADOS objects.

The map itself is kept in OMAP associated with each RADOS object. The key of each OMAP is the name of the objects, and the value holds some basic metadata of that object, the metadata that appears when listing the bucket. Each OMAP holds a header, and we keep some bucket accounting metadata in that header such as number of objects, total size, and the like.



IMPORTANT

When using the **radosgw-admin** tool, ensure that the tool and the Ceph Cluster are of the same version. The use of mismatched versions is **not** supported.

NOTE

OMAP is a key-value store, associated with an object, in a way similar to how extended attributes associate with a POSIX file. An object's OMAP is not physically located in the object's storage, but its precise implementation is invisible and immaterial to the Ceph Object Gateway.

Data

Objects data is kept in one or more RADOS objects for each Ceph Object Gateway object.

8.10.1. Object lookup path

When accessing objects, REST APIs come to Ceph Object Gateway with three parameters:

- Account information, which has the access key in S3 or account name in Swift
- Bucket or container name
- Object name or key

At present, Ceph Object Gateway only uses account information to find out the user ID and for access control. It uses only the bucket name and object key to address the object in a pool.

Account information

The user ID in Ceph Object Gateway is a string, typically the actual user name from the user credentials and not a hashed or mapped identifier.

When accessing a user's data, the user record is loaded from an object ***USER_ID*** in the **default.rgw.meta** pool with **users.uid** namespace. .Bucket names They are represented in the **default.rgw.meta** pool with **root** namespace. Bucket record is loaded in order to obtain a marker, which

serves as a bucket ID.

Object names

The object is located in the **default.rgw.buckets.data** pool. Object name is ***MARKER_KEY***, for example **default.7593.4_image.png**, where the marker is **default.7593.4** and the key is **image.png**. These concatenated names are not parsed and are passed down to RADOS only. Therefore, the choice of the separator is not important and causes no ambiguity. For the same reason, slashes are permitted in object names, such as keys.

8.10.1.1. Multiple data pools

It is possible to create multiple data pools so that different users' buckets are created in different RADOS pools by default, thus providing the necessary scaling. The layout and naming of these pools is controlled by a **policy** setting.

8.10.2. Bucket and object listing

Buckets that belong to a given user are listed in an OMAP of an object named ***USER_ID*.buckets**, for example, **foo.buckets**, in the **default.rgw.meta** pool with **users.uid** namespace. These objects are accessed when listing buckets, when updating bucket contents, and updating and retrieving bucket statistics such as quota. These listings are kept consistent with buckets in the **.rgw** pool.

NOTE

See the user-visible, encoded class **cls_user_bucket_entry** and its nested class **cls_user_bucket** for the values of these OMAP entries.

Objects that belong to a given bucket are listed in a bucket index. The default naming for index objects is **.dir.MARKER** in the **default.rgw.buckets.index** pool.

Additional Resources

- See the *Configure bucket index resharding* section in the *Red Hat Ceph Storage Object Gateway Guide* for more details.

8.10.3. Object Gateway data layout parameters

This is a list of data layout parameters for Ceph Object Gateway.

Known pools:

.rgw.root

Unspecified region, zone, and global information records, one per object.

***ZONE*.rgw.control**

notify.*N*

***ZONE*.rgw.meta**

Multiple namespaces with different kinds of metadata

namespace: root

BUCKET .bucket.meta.*BUCKET:MARKER* # see put_bucket_instance_info()
The tenant is used to disambiguate buckets, but not bucket instances.

Example

```
.bucket.meta.prodtx:test%25star:default.84099.6
.bucket.meta.testcont:default.4126.1
.bucket.meta.prodtx:testcont:default.84099.4
prodtx/testcont
prodtx/test%25star
testcont
```

namespace: users.uid

Contains per-user information (RGWUserInfo) in ***USER*** objects and per-user lists of buckets in omaps of ***USER*.buckets** objects. The ***USER*** might contain the tenant if non-empty.

Example

```
prodtx$prodt
test2.buckets
prodtx$prodt.buckets
test2
```

namespace: users.email

Unimportant

namespace: users.keys

47UA98JSTJZ9YAN3OS3O
This allows Ceph Object Gateway to look up users by their access keys during authentication.

namespace: users.swift

test:tester

***ZONE*.rgw.buckets.index**

Objects are named **.dir.*MARKER***, each contains a bucket index. If the index is sharded, each shard appends the shard index after the marker.

***ZONE*.rgw.buckets.data**

default.7593.4__shadow_.488urDFerTYXavx4yAd-Op8mxehnvTI_1 MARKER_KEY
An example of a marker would be **default.16004.1** or **default.7593.4**. The current format is ***ZONE.INSTANCE_ID.BUCKET_ID***, but once generated, a marker is not parsed again, so its format might change freely in the future.

Additional Resources

- See the *Ceph Object Gateway data layout* in the *Red Hat Ceph Storage Object Gateway Guide* for more details.

8.11. RATE LIMITS FOR INGESTING DATA

As a storage administrator, you can set rate limits on users and buckets based on the operations and bandwidth when saving an object in a Red Hat Ceph Storage cluster with a Ceph Object Gateway configuration.

8.11.1. Purpose of rate limits in a storage cluster

You can set rate limits on users and buckets in a Ceph Object Gateway configuration. The rate limit includes the maximum number of read operations, write operations per minute, and how many bytes per minute can be written or read per user or per bucket.

Requests that use GET or HEAD method in the REST are “read requests”, else they are “write requests”.

The Ceph Object Gateway tracks the user and bucket requests separately and does not share with other gateways, which means that the desired limits configured should be divided by the number of active Object Gateways.

For example, if user A should be limited by ten ops per minute and there are two Ceph Object Gateways in the cluster, the limit over user A should be five, that is, ten ops per minute for two Ceph Object Gateways. If the requests are not balanced between Ceph Object Gateways, the rate limit may be underutilized. For example, if the ops limit is five and there are two Ceph Object Gateways, but the load balancer sends load only to one of those Ceph Object Gateways, the effective limit would be five ops, because this limit is enforced per Ceph Object Gateway.

If there is a limit reached for the bucket, but not for the user, or vice versa the request would be canceled as well.

The bandwidth counting happens after the request is accepted. As a result, this request proceeds even if the bucket or the user has reached its bandwidth limit in the middle of the request.

The Ceph Object Gateway keeps a “debt” of used bytes more than the configured value and prevents this user or bucket from sending more requests until their “debt” is paid. The “debt” maximum size is twice the max-read/write-bytes per minute. If user A has 1 byte read limit per minute and this user tries to GET 1 GB object, the user can do it.

After user A completes this 1 GB operation, the Ceph Object Gateway blocks the user request for up to two minutes until user A is able to send the GET request again.

Different options for limiting rates:

- Bucket: The **--bucket** option allows you to specify a rate limit for a bucket.
- User: The **--uid** option allows you to specify a rate limit for a user.
- Maximum read ops: The **--max-read-ops** setting allows you to specify the maximum number of read ops per minute per Ceph Object Gateway. A value of **0** disables this setting, which means unlimited access.
- Maximum read bytes: The **--max-read-bytes** setting allows you to specify the maximum number of read bytes per minute per Ceph Object Gateway. A value of **0** disables this setting, which means unlimited access.
- Maximum write ops: The **--max-write-ops** setting allows you to specify the maximum number of write ops per minute per Ceph Object Gateway. A value of **0** disables this setting, which means unlimited access.
- Maximum write bytes: The **--max-write-bytes** setting allows you to specify the maximum number of write bytes per minute per Ceph Object Gateway. A value of **0** disables this setting, which means unlimited access.
- Rate limit scope: The **--rate-limit-scope** option sets the scope for the rate limit. The options are **bucket**, **user**, and **anonymous**. Bucket rate limit applies to buckets, user rate limit applies to a

user, and anonymous applies to an unauthenticated user. Anonymous scope is only available for global rate limit.

8.11.2. Enabling user rate limit

You can set rate limits on users in a Ceph Object Gateway configuration. The rate limit on users include the maximum number of read operations, write operations per minute, and how many bytes per minute can be written or read per user.

You can enable the rate limit on users after setting the value of rate limits by using the **radosgw-admin ratelimit set** command with the **ratelimit-scope** set as **user**.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed.

Procedure

1. Set the rate limit for the user:

   Syntax

   ```
   radosgw-admin ratelimit set --ratelimit-scope=user --uid=USER_ID [--max-read-ops=NUMBER_OF_OPERATIONS] [--max-read-bytes=NUMBER_OF_BYTES] [--max-write-ops=NUMBER_OF_OPERATIONS] [--max-write-bytes=NUMBER_OF_BYTES]
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin ratelimit set --ratelimit-scope=user --uid=testing --max-read-ops=1024 --max-write-bytes=10240
   ```

   A value of **0** for *NUMBER_OF_OPERATIONS* or *NUMBER_OF_BYTES* means that the specific rate limit attribute check is disabled.

2. Get the user rate limit:

   Syntax

   ```
   radosgw-admin ratelimit get --ratelimit-scope=user --uid=USER_ID
   ```

   Example

   ```
   [ceph: root@host01 /]# radosgw-admin ratelimit get --ratelimit-scope=user --uid=testing

   {
       "user_ratelimit": {
           "max_read_ops": 1024,
           "max_write_ops": 0,
           "max_read_bytes": 0,
           "max_write_bytes": 10240,
   ```

```
        "enabled": false
    }
}
```

3. Enable user rate limit:

Syntax

```
radosgw-admin ratelimit enable --ratelimit-scope=user --uid=USER_ID
```

Example

```
[ceph: root@host01 /]# radosgw-admin ratelimit enable --ratelimit-scope=user --uid=testing

{
    "user_ratelimit": {
        "max_read_ops": 1024,
        "max_write_ops": 0,
        "max_read_bytes": 0,
        "max_write_bytes": 10240,
        "enabled": true
    }
}
```

4. Optional: Disable user rate limit:

Syntax

```
radosgw-admin ratelimit disable --ratelimit-scope=user --uid=USER_ID
```

Example

```
[ceph: root@host01 /]# radosgw-admin ratelimit disable --ratelimit-scope=user --uid=testing
```

8.11.3. Enabling bucket rate limit

You can set rate limits on buckets in a Ceph Object Gateway configuration. The rate limit on buckets include the maximum number of read operations, write operations per minute, and how many bytes per minute can be written or read per user.

You can enable the rate limit on buckets after setting the value of rate limits by using the **radosgw-admin ratelimit set** command with the **ratelimit-scope** set as **bucket**.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed.

Procedure

1. Set the rate limit for the bucket:

Syntax

```
radosgw-admin ratelimit set --ratelimit-scope=bucket --bucket= BUCKET_NAME [--max-read-ops=NUMBER_OF_OPERATIONS] [--max-read-bytes=NUMBER_OF_BYTES] [--max-write-ops=NUMBER_OF_OPERATIONS] [--max-write-bytes=NUMBER_OF_BYTES]
```

Example

```
[ceph: root@host01 /]# radosgw-admin ratelimit set --ratelimit-scope=bucket --bucket=mybucket --max-read-ops=1024 --max-write-bytes=10240
```

A value of **0** for *NUMBER_OF_OPERATIONS* or *NUMBER_OF_BYTES* means that the specific rate limit attribute check is disabled.

2. Get the bucket rate limit:

Syntax

```
radosgw-admin ratelimit get --ratelimit-scope=bucket --bucket=BUCKET_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin ratelimit get --ratelimit-scope=bucket --bucket=mybucket

{
    "bucket_ratelimit": {
        "max_read_ops": 1024,
        "max_write_ops": 0,
        "max_read_bytes": 0,
        "max_write_bytes": 10240,
        "enabled": false
    }
}
```

3. Enable bucket rate limit:

Syntax

```
radosgw-admin ratelimit enable --ratelimit-scope=bucket --bucket=BUCKET_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin ratelimit enable --ratelimit-scope=bucket --bucket=mybucket

{
    "bucket_ratelimit": {
        "max_read_ops": 1024,
        "max_write_ops": 0,
        "max_read_bytes": 0,
        "max_write_bytes": 10240,
```

```
        "enabled": true
    }
}
```

4. Optional: Disable bucket rate limit:

Syntax

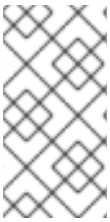
```
radosgw-admin ratelimit disable --ratelimit-scope=bucket --bucket=BUCKET_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin ratelimit disable --ratelimit-scope=bucket --
bucket=mybucket
```

8.11.4. Configuring global rate limits

You can read or write global rate limit settings in period configuration. You can override the user or bucket rate limit configuration by manipulating the global rate limit settings with the **global ratelimit** parameter, which is the counterpart of **ratelimit set**, **ratelimit enable**, and **ratelimit disable** commands.



NOTE

In a multi-site configuration, where there is a realm and period present, changes to the global rate limit must be committed using **period update --commit** command. If there is no period present, the Ceph Object Gateways must be restarted for the changes to take effect.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- A Ceph Object Gateway installed.

Procedure

1. View the global rate limit settings:

Syntax

```
radosgw-admin global ratelimit get
```

Example

```
[ceph: root@host01 /]# radosgw-admin global ratelimit get

{
    "bucket_ratelimit": {
        "max_read_ops": 1024,
        "max_write_ops": 0,
        "max_read_bytes": 0,
        "max_write_bytes": 0,
        "enabled": false
```

```
    },
    "user_ratelimit": {
        "max_read_ops": 0,
        "max_write_ops": 0,
        "max_read_bytes": 0,
        "max_write_bytes": 0,
        "enabled": false
    },
    "anonymous_ratelimit": {
        "max_read_ops": 0,
        "max_write_ops": 0,
        "max_read_bytes": 0,
        "max_write_bytes": 0,
        "enabled": false
    }
}
```

2. Configure and enable rate limit scope for the buckets:

   a. Set the global rate limits for bucket:

      Syntax

      ```
      radosgw-admin global ratelimit set --ratelimit-scope=bucket [--max-read-ops=NUMBER_OF_OPERATIONS] [--max-read-bytes=NUMBER_OF_BYTES] [--max-write-ops=NUMBER_OF_OPERATIONS] [--max-write-bytes=NUMBER_OF_BYTES]
      ```

      Example

      ```
      [ceph: root@host01 /]# radosgw-admin global ratelimit set --ratelimit-scope bucket --max-read-ops=1024
      ```

   b. Enable bucket rate limit:

      Syntax

      ```
      radosgw-admin global ratelimit enable --ratelimit-scope=bucket
      ```

      Example

      ```
      [ceph: root@host01 /]# radosgw-admin global ratelimit enable --ratelimit-scope bucket
      ```

3. Configure and enable rate limit scope for authenticated users:

   a. Set the global rate limits for users:

      Syntax

      ```
      radosgw-admin global ratelimit set --ratelimit-scope=user [--max-read-ops=NUMBER_OF_OPERATIONS] [--max-read-bytes=NUMBER_OF_BYTES] [--max-write-ops=NUMBER_OF_OPERATIONS] [--max-write-bytes=NUMBER_OF_BYTES]
      ```

Example

```
[ceph: root@host01 /]# radosgw-admin global ratelimit set --ratelimit-scope=user --max-read-ops=1024
```

b. Enable user rate limit:

Syntax

```
radosgw-admin global ratelimit enable --ratelimit-scope=user
```

Example

```
[ceph: root@host01 /]# radosgw-admin global ratelimit enable --ratelimit-scope=user
```

4. Configure and enable rate limit scope for unauthenticated users:

a. Set the global rate limits for unauthenticated users:

Syntax

```
radosgw-admin global ratelimit set --ratelimit-scope=anonymous [--max-read-ops=NUMBER_OF_OPERATIONS] [--max-read-bytes=NUMBER_OF_BYTES] [--max-write-ops=NUMBER_OF_OPERATIONS] [--max-write-bytes=NUMBER_OF_BYTES]
```

Example

```
[ceph: root@host01 /]# radosgw-admin global ratelimit set --ratelimit-scope=anonymous --max-read-ops=1024
```

b. Enable user rate limit:

Syntax

```
radosgw-admin global ratelimit enable --ratelimit-scope=anonymous
```

Example

```
[ceph: root@host01 /]# radosgw-admin global ratelimit enable --ratelimit-scope=anonymous
```

8.12. OPTIMIZE THE CEPH OBJECT GATEWAY'S GARBAGE COLLECTION

When new data objects are written into the storage cluster, the Ceph Object Gateway immediately allocates the storage for these new objects. After you delete or overwrite data objects in the storage cluster, the Ceph Object Gateway deletes those objects from the bucket index. Some time afterward, the Ceph Object Gateway then purges the space that was used to store the objects in the storage cluster. The process of purging the deleted object data from the storage cluster is known as Garbage Collection, or GC.

Garbage collection operations typically run in the background. You can configure these operations to either run continuously, or to run only during intervals of low activity and light workloads. By default, the Ceph Object Gateway conducts GC operations continuously. Because GC operations are a normal part of Ceph Object Gateway operations, deleted objects that are eligible for garbage collection exist most of the time.

8.12.1. Viewing the garbage collection queue

Before you purge deleted and overwritten objects from the storage cluster, use **radosgw-admin** to view the objects awaiting garbage collection.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to the Ceph Object Gateway.

Procedure

- To view the queue of objects awaiting garbage collection:

  Example

  ```
  [ceph: root@host01 /]# radosgw-admin gc list
  ```

NOTE

To list all entries in the queue, including unexpired entries, use the **--include-all** option.

8.12.2. Adjusting Garbage Collection Settings

The Ceph Object Gateway allocates storage for new and overwritten objects immediately. Additionally, the parts of a multi-part upload also consume some storage.

The Ceph Object Gateway purges the storage space used for deleted objects after deleting the objects from the bucket index. Similarly, the Ceph Object Gateway will delete data associated with a multi-part upload after the multi-part upload completes or when the upload has gone inactive or failed to complete for a configurable amount of time. The process of purging the deleted object data from the Red Hat Ceph Storage cluster is known as garbage collection (GC).

Viewing the objects awaiting garbage collection can be done with the following command:

```
radosgw-admin gc list
```

Garbage collection is a background activity that runs continuously or during times of low loads, depending upon how the storage administrator configures the Ceph Object Gateway. By default, the Ceph Object Gateway conducts garbage collection operations continuously. Since garbage collection operations are a normal function of the Ceph Object Gateway, especially with object delete operations, objects eligible for garbage collection exist most of the time.

Some workloads can temporarily or permanently outpace the rate of garbage collection activity. This is especially true of delete-heavy workloads, where many objects get stored for a short period of time and then deleted. For these types of workloads, storage administrators can increase the priority of garbage collection operations relative to other operations with the following configuration parameters:

- The **rgw_gc_obj_min_wait** configuration option waits a minimum length of time, in seconds, before purging a deleted object's data. The default value is two hours, or 7200 seconds. The object is not purged immediately, because a client might be reading the object. Under heavy workloads, this setting can consume too much storage or have a large number of deleted objects to purge. Red Hat recommends not setting this value below 30 minutes, or 1800 seconds.

- The **rgw_gc_processor_period** configuration option is the garbage collection cycle run time. That is, the amount of time between the start of consecutive runs of garbage collection threads. If garbage collection runs longer than this period, the Ceph Object Gateway will not wait before running a garbage collection cycle again.

- The **rgw_gc_max_concurrent_io** configuration option specifies the maximum number of concurrent IO operations that the gateway garbage collection thread will use when purging deleted data. Under delete heavy workloads, consider increasing this setting to a larger number of concurrent IO operations.

- The **rgw_gc_max_trim_chunk** configuration option specifies the maximum number of keys to remove from the garbage collector log in a single operation. Under delete heavy operations, consider increasing the maximum number of keys so that more objects are purged during each garbage collection operation.

Starting with Red Hat Ceph Storage 4.1, offloading the index object's OMAP from the garbage collection log helps lessen the performance impact of garbage collection activities on the storage cluster. Some new configuration parameters have been added to Ceph Object Gateway to tune the garbage collection queue, as follows:

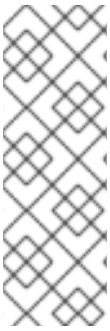
- The **rgw_gc_max_deferred_entries_size** configuration option sets the maximum size of deferred entries in the garbage collection queue.

- The **rgw_gc_max_queue_size** configuration option sets the maximum queue size used for garbage collection. This value should not be greater than **osd_max_object_size** minus **rgw_gc_max_deferred_entries_size** minus 1 KB.

- The **rgw_gc_max_deferred** configuration option sets the maximum number of deferred entries stored in the garbage collection queue.

NOTE

These garbage collection configuration parameters are for Red Hat Ceph Storage 7 and higher.



NOTE

In testing, with an evenly balanced delete-write workload, such as 50% delete and 50% write operations, the storage cluster fills completely in 11 hours. This is because Ceph Object Gateway garbage collection fails to keep pace with the delete operations. The cluster status switches to the **HEALTH_ERR** state if this happens. Aggressive settings for parallel garbage collection tunables significantly delayed the onset of storage cluster fill in testing and can be helpful for many workloads. Typical real-world storage cluster workloads are not likely to cause a storage cluster fill primarily due to garbage collection.

8.12.3. Adjusting garbage collection for delete-heavy workloads

Some workloads may temporarily or permanently outpace the rate of garbage collection activity. This is especially true of delete-heavy workloads, where many objects get stored for a short period of time and

are then deleted. For these types of workloads, consider increasing the priority of garbage collection operations relative to other operations. Contact Red Hat Support with any additional questions about Ceph Object Gateway Garbage Collection.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to all nodes in the storage cluster.

Procedure

1. Set the value of **rgw_gc_max_concurrent_io** to **20**, and the value of **rgw_gc_max_trim_chunk** to **64**:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_gc_max_concurrent_io 20
   [ceph: root@host01 /]# ceph config set client.rgw rgw_gc_max_trim_chunk 64
   ```

2. Restart the Ceph Object Gateway to allow the changed settings to take effect.
3. Monitor the storage cluster during GC activity to verify that the increased values do not adversely affect performance.

IMPORTANT

Never modify the value for the **rgw_gc_max_objs** option in a running cluster. You should only change this value before deploying the RGW nodes.

Additional Resources

- Ceph RGW - GC Tuning Options
- RGW General Settings
- Configuration Reference

8.13. OPTIMIZE THE CEPH OBJECT GATEWAY'S DATA OBJECT STORAGE

Bucket lifecycle configuration optimizes data object storage to increase its efficiency and to provide effective storage throughout the lifetime of the data.

The S3 API in the Ceph Object Gateway currently supports a subset of the AWS bucket lifecycle configuration actions:

- Expiration
- NoncurrentVersionExpiration
- AbortIncompleteMultipartUpload

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to all of the nodes in the storage cluster.

8.13.1. Parallel thread processing for bucket life cycles

The Ceph Object Gateway now allows for parallel thread processing of bucket life cycles across multiple Ceph Object Gateway instances. Increasing the number of threads that run in parallel enables the Ceph Object Gateway to process large workloads more efficiently. In addition, the Ceph Object Gateway now uses a numbered sequence for index shard enumeration instead of using in-order numbering.

8.13.2. Optimizing the bucket lifecycle

Two options in the Ceph configuration file affect the efficiency of bucket lifecycle processing:

- **rgw_lc_max_worker** specifies the number of lifecycle worker threads to run in parallel. This enables the simultaneous processing of both bucket and index shards. The default value for this option is 3.
- **rgw_lc_max_wp_worker** specifies the number of threads in each lifecycle worker thread's work pool. This option helps to accelerate processing for each bucket. The default value for this option is 3.

For a workload with a large number of buckets – for example, a workload with thousands of buckets – consider increasing the value of the **rgw_lc_max_worker** option.

For a workload with a smaller number of buckets but with a higher number of objects in each bucket – such as in the hundreds of thousands – consider increasing the value of the **rgw_lc_max_wp_worker** option.

NOTE

Before increasing the value of either of these options, please validate current storage cluster performance and Ceph Object Gateway utilization. Red Hat does not recommend that you assign a value of 10 or above for either of these options.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to all of the nodes in the storage cluster.

Procedure

1. To increase the number of threads to run in parallel, set the value of **rgw_lc_max_worker** to a value between **3** and **9**:

   Example

   ```
   [ceph: root@host01 /]# ceph config set client.rgw rgw_lc_max_worker 7
   ```

2. To increase the number of threads in each thread's work pool, set the value of **rgw_lc_max_wp_worker** to a value between **3** and **9**:

Example

```
[ceph: root@host01 /]# ceph config set client.rgw rgw_lc_max_wp_worker 7
```

3. Restart the Ceph Object Gateway to allow the changed settings to take effect.
4. Monitor the storage cluster to verify that the increased values do not adversely affect performance.

Additional Resources

- For more information about the bucket lifecycle and parallel thread processing, see *Bucket lifecycle parallel processing*
- For more information about Ceph Object Gateway lifecycle, contact *Red Hat Support*.

8.14. TRANSITIONING DATA TO AMAZON S3 CLOUD SERVICE

You can transition data to a remote cloud service as part of the lifecycle configuration using storage classes to reduce cost and improve manageability. The transition is unidirectional and data cannot be transitioned back from the remote zone. This feature is to enable data transition to multiple cloud providers such as Amazon (S3).

Use **cloud-s3** as **tier-type** to configure the remote cloud S3 object store service to which the data needs to be transitioned. These do not need a data pool and are defined in terms of the zonegroup placement targets.

Prerequisites

- A Red Hat Ceph Storage cluster with Ceph Object Gateway installed.
- User credentials for the remote cloud service, Amazon S3.
- Target path created on Amazon S3.
- **s3cmd** installed on the bootstrapped node.
- Amazon AWS configured locally to download data.

Procedure

1. Create a user with access key and secret key:

Syntax

```
radosgw-admin user create --uid=USER_NAME --display-name="DISPLAY_NAME" [--access-key ACCESS_KEY --secret-key SECRET_KEY]
```

Example

```
[ceph: root@host01 /]# radosgw-admin user create --uid=test-user --display-name="test-user" --access-key a21e86bce636c3aa1 --secret-key cf764951f1fdde5e
{
    "user_id": "test-user",
```

```
    "display_name": "test-user",
    "email": "",
    "suspended": 0,
    "max_buckets": 1000,
    "subusers": [],
    "keys": [
        {
            "user": "test-user",
            "access_key": "a21e86bce636c3aa1",
            "secret_key": "cf764951f1fdde5e"
        }
    ],
    "swift_keys": [],
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "default_storage_class": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "rgw",
    "mfa_ids": []
}
```

2. On the bootstrapped node, add a storage class with the tier type as **cloud-s3**:

NOTE

Once a storage class is created with the **--tier-type=cloud-s3** option , it cannot be later modified to any other storage class type.

Syntax

```
radosgw-admin zonegroup placement add --rgw-zonegroup =ZONE_GROUP_NAME \
                      --placement-id=PLACEMENT_ID \
                      --storage-class =STORAGE_CLASS_NAME \
                      --tier-type=cloud-s3
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup placement add --rgw-zonegroup=default \
```

```
                                --placement-id=default-placement \
                                --storage-class=CLOUDTIER \
                                --tier-type=cloud-s3
[
    {
        "key": "default-placement",
        "val": {
            "name": "default-placement",
            "tags": [],
            "storage_classes": [
                "CLOUDTIER",
                "STANDARD"
            ],
            "tier_targets": [
                {
                    "key": "CLOUDTIER",
                    "val": {
                        "tier_type": "cloud-s3",
                        "storage_class": "CLOUDTIER",
                        "retain_head_object": "false",
                        "s3": {
                            "endpoint": "",
                            "access_key": "",
                            "secret": "",
                            "host_style": "path",
                            "target_storage_class": "",
                            "target_path": "",
                            "acl_mappings": [],
                            "multipart_sync_threshold": 33554432,
                            "multipart_min_part_size": 33554432
                        }
                    }
                }
            ]
        }
    }
]
```

3. Update **storage_class**:

NOTE

If the cluster is part of a multi-site setup, run **period update --commit** so that the zonegroup changes are propagated to all the zones in the multi-site.

NOTE

Make sure **access_key** and **secret** do not start with a digit.

Mandatory parameters are:

- **access_key** is the remote cloud S3 access key used for a specific connection.
- **secret** is the secret key for the remote cloud S3 service.

- **endpoint** is the URL of the remote cloud S3 service endpoint.
- **region** (for AWS) is the remote cloud S3 service region name.

Optional parameters are:

- **target_path** defines how the target path is created. The target path specifies a prefix to which the source **bucket-name/object-name** is appended. If not specified, the target_path created is **rgwx-*ZONE_GROUP_NAME*-*STORAGE_CLASS_NAME*-cloud-bucket**.
- **target_storage_class** defines the target storage class to which the object transitions. If not specified, the object is transitioned to STANDARD storage class.
- **retain_head_object**, if true, retains the metadata of the object transitioned to cloud. If false (default), the object is deleted post transition. This option is ignored for current versioned objects.
- **multipart_sync_threshold** specifies that objects this size or larger are transitioned to the cloud using multipart upload.
- **multipart_min_part_size** specifies the minimum part size to use when transitioning objects using multipart upload.

Syntax

```
radosgw-admin zonegroup placement modify --rgw-zonegroup ZONE_GROUP_NAME \
                                --placement-id PLACEMENT_ID \
                                --storage-class STORAGE_CLASS_NAME  \
                                --tier-config=endpoint=AWS_ENDPOINT_URL,\

access_key=AWS_ACCESS_KEY,secret=AWS_SECRET_KEY,\
                                target_path="TARGET_BUCKET_ON_AWS",\
                                multipart_sync_threshold=44432,\
                                multipart_min_part_size=44432,\
                                retain_head_object=true
                                 region=REGION_NAME
```

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup placement modify --rgw-zonegroup
default
                                                --placement-id default-placement \
                                                --storage-class CLOUDTIER \
                                                --tier-config=endpoint=http://10.0.210.010:8080,\

access_key=a21e86bce636c3aa2,secret=cf764951f1fdde5f,\
                                                target_path="dfqe-bucket-01",\
                                                multipart_sync_threshold=44432,\
                                                multipart_min_part_size=44432,\
                                                retain_head_object=true
                                                region=us-east-1

[
   {
      "key": "default-placement",
      "val": {
```

```
            "name": "default-placement",
            "tags": [],
            "storage_classes": [
                "CLOUDTIER",
                "STANDARD",
                "cold.test",
                "hot.test"
            ],
            "tier_targets": [
                {
                    "key": "CLOUDTIER",
                    "val": {
                        "tier_type": "cloud-s3",
                        "storage_class": "CLOUDTIER",
                        "retain_head_object": "true",
                        "s3": {
                            "endpoint": "http://10.0.210.010:8080",
                            "access_key": "a21e86bce636c3aa2",
                            "secret": "cf764951f1fdde5f",
                            "region": "",
                            "host_style": "path",
                            "target_storage_class": "",
                            "target_path": "dfqe-bucket-01",
                            "acl_mappings": [],
                            "multipart_sync_threshold": 44432,
                            "multipart_min_part_size": 44432
                        }
                    }
                }
            ]
        }
    }
]
]
```

4. Restart the Ceph Object Gateway:

   Syntax

   ```
   ceph orch restart CEPH_OBJECT_GATEWAY_SERVICE_NAME
   ```

   Example

   ```
   [ceph: root@host 01 /]# ceph orch restart rgw.rgw.1

   Scheduled to restart rgw.rgw.1.host03.vkfldf on host 'host03'
   ```

5. Exit the shell and as a root user, configure Amazon S3 on your bootstrapped node:

   Example

   ```
   [root@host01 ~]# s3cmd --configure

   Enter new values or accept defaults in brackets with Enter.
   ```

```
Refer to user manual for detailed description of all options.

Access key and Secret key are your identifiers for Amazon S3. Leave them empty for using
the env variables.
Access Key: a21e86bce636c3aa2
Secret Key: cf764951f1fdde5f
Default Region [US]:

Use "s3.amazonaws.com" for S3 Endpoint and not modify it to the target Amazon S3.
S3 Endpoint [s3.amazonaws.com]: 10.0.210.78:80

Use "%(bucket)s.s3.amazonaws.com" to the target Amazon S3. "%(bucket)s" and "%
(location)s" vars can be used
if the target S3 system supports dns based buckets.
DNS-style bucket+hostname:port template for accessing a bucket [%
(bucket)s.s3.amazonaws.com]: 10.0.210.78:80

Encryption password is used to protect your files from reading
by unauthorized persons while in transfer to S3
Encryption password:
Path to GPG program [/usr/bin/gpg]:

When using secure HTTPS protocol all communication with Amazon S3
servers is protected from 3rd party eavesdropping. This method is
slower than plain HTTP, and can only be proxied with Python 2.7 or newer
Use HTTPS protocol [Yes]: No

On some networks all internet access must go through a HTTP proxy.
Try setting it here if you can't connect to S3 directly
HTTP Proxy server name:

New settings:
  Access Key: a21e86bce636c3aa2
  Secret Key: cf764951f1fdde5f
  Default Region: US
  S3 Endpoint: 10.0.210.78:80
  DNS-style bucket+hostname:port template for accessing a bucket: 10.0.210.78:80
  Encryption password:
  Path to GPG program: /usr/bin/gpg
  Use HTTPS protocol: False
  HTTP Proxy server name:
  HTTP Proxy server port: 0

Test access with supplied credentials? [Y/n] Y
Please wait, attempting to list all buckets...
Success. Your access key and secret key worked fine :-)

Now verifying that encryption works...
Not configured. Never mind.

Save settings? [y/N] y
Configuration saved to '/root/.s3cfg'
```

6. Create the S3 bucket:

Syntax

```
s3cmd mb s3://NAME_OF_THE_BUCKET_FOR_S3
```

Example

```
[root@host01 ~]# s3cmd mb s3://awstestbucket
Bucket 's3://awstestbucket/' created
```

7. Create your file, input all the data, and move it to S3 service:

Syntax

```
s3cmd put FILE_NAME  s3://NAME_OF_THE_BUCKET_ON_S3
```

Example

```
[root@host01 ~]# s3cmd put test.txt s3://awstestbucket

upload: 'test.txt' -> 's3://awstestbucket/test.txt'  [1 of 1]
 21 of 21   100% in    1s    16.75 B/s  done
```

8. Create the lifecycle configuration transition policy:

Syntax

```
<LifecycleConfiguration>
  <Rule>
    <ID>RULE_NAME</ID>
    <Filter>
      <Prefix></Prefix>
    </Filter>
    <Status>Enabled</Status>
    <Transition>
      <Days>DAYS</Days>
      <StorageClass>STORAGE_CLASS_NAME</StorageClass>
    </Transition>
  </Rule>
</LifecycleConfiguration>
```

Example

```
[root@host01 ~]# cat lc_cloud.xml
<LifecycleConfiguration>
  <Rule>
    <ID>Archive all objects</ID>
    <Filter>
      <Prefix></Prefix>
    </Filter>
    <Status>Enabled</Status>
    <Transition>
      <Days>2</Days>
      <StorageClass>CLOUDTIER</StorageClass>
```

```
    </Transition>
  </Rule>
</LifecycleConfiguration>
```

9. Set the lifecycle configuration transition policy:

Syntax

```
s3cmd setlifecycle FILE_NAME s3://NAME_OF_THE_BUCKET_FOR_S3
```

Example

```
[root@host01 ~]#  s3cmd setlifecycle lc_config.xml s3://awstestbucket

s3://awstestbucket/: Lifecycle Policy updated
```

10. Log in to **cephadm shell**:

Example

```
[root@host 01 ~]# cephadm shell
```

11. Restart the Ceph Object Gateway:

Syntax

```
ceph orch restart CEPH_OBJECT_GATEWAY_SERVICE_NAME
```

Example

```
[ceph: root@host 01 /]# ceph orch restart rgw.rgw.1

Scheduled to restart rgw.rgw.1.host03.vkfldf on host 'host03'
```

Verification

1. On the source cluster, verify if the data has moved to S3 with **radosgw-admin lc list** command:

Example

```
[ceph: root@host01 /]# radosgw-admin lc list
[
    {
        "bucket": ":awstestbucket:552a3adb-39e0-40f6-8c84-00590ed70097.54639.1",
        "started": "Mon, 26 Sep 2022 18:32:07 GMT",
        "status": "COMPLETE"
    }
]
```

2. Verify object transition at cloud endpoint:

Example

```
[root@client ~]$ radosgw-admin bucket list
[
    "awstestbucket"
]
```

3. List the objects in the bucket:

Example

```
[root@host01 ~]$ aws s3api list-objects --bucket awstestbucket --
endpoint=http://10.0.209.002:8080
{
    "Contents": [
        {
            "Key": "awstestbucket/test",
            "LastModified": "2022-08-25T16:14:23.118Z",
            "ETag": "\"378c905939cc4459d249662dfae9fd6f\"",
            "Size": 29,
            "StorageClass": "STANDARD",
            "Owner": {
                "DisplayName": "test-user",
                "ID": "test-user"
            }
        }
    ]
}
```

4. List the contents of the S3 bucket:

Example

```
[root@host01 ~]# s3cmd ls s3://awstestbucket
2022-08-25 09:57            0  s3://awstestbucket/test.txt
```

5. Check the information of the file:

Example

```
[root@host01 ~]# s3cmd info s3://awstestbucket/test.txt
s3://awstestbucket/test.txt (object):
   File size: 0
   Last mod:  Mon, 03 Aug 2022 09:57:49 GMT
   MIME type: text/plain
   Storage:   CLOUDTIER
   MD5 sum:   991d2528bb41bb839d1a9ed74b710794
   SSE:       none
   Policy:    none
   CORS:      none
   ACL:       test-user: FULL_CONTROL
   x-amz-meta-s3cmd-attrs:
atime:1664790668/ctime:1664790668/gid:0/gname:root/md5:991d2528bb41bb839d1a9ed74b7
10794/mode:33188/mtime:1664790668/uid:0/uname:root
```

6. Download data locally from Amazon S3:

a. Configure AWS:

Example

```
[client@client01 ~]$ aws configure

AWS Access Key ID [****************6VVP]:
AWS Secret Access Key [****************pXqy]:
Default region name [us-east-1]:
Default output format [json]:
```

b. List the contents of the AWS bucket:

Example

```
[client@client01 ~]$ aws s3 ls s3://dfqe-bucket-01/awstest
PRE awstestbucket/
```

c. Download data from S3:

Example

```
[client@client01 ~]$ aws s3 cp s3://dfqe-bucket-01/awstestbucket/test.txt .

download: s3://dfqe-bucket-01/awstestbucket/test.txt to ./test.txt
```

8.15. TRANSITIONING DATA TO AZURE CLOUD SERVICE

You can transition data to a remote cloud service as part of the lifecycle configuration using storage classes to reduce cost and improve manageability. The transition is unidirectional and data cannot be transitioned back from the remote zone. This feature is to enable data transition to multiple cloud providers such as Azure. One of the key differences with the AWS configuration is that you need to configure the multi-cloud gateway (MCG) and use MCG to translate from the S3 protocol to Azure Blob.

Use **cloud-s3** as **tier-type** to configure the remote cloud S3 object store service to which the data needs to be transitioned. These do not need a data pool and are defined in terms of the zonegroup placement targets.

Prerequisites

- A Red Hat Ceph Storage cluster with Ceph Object Gateway installed.
- User credentials for the remote cloud service, Azure.
- Azure configured locally to download data.
- **s3cmd** installed on the bootstrapped node.
- Azure container for the for MCG namespace created. In this example, it is **mcgnamespace**.

Procedure

1. Create a user with access key and secret key:

Syntax

```
radosgw-admin user create --uid=USER_NAME --display-name="DISPLAY_NAME" [--access-key ACCESS_KEY --secret-key SECRET_KEY]
```

Example

```
[ceph: root@host01 /]# radosgw-admin user create --uid=test-user --display-name="test-user" --access-key a21e86bce636c3aa1 --secret-key cf764951f1fdde5e
{
    "user_id": "test-user",
    "display_name": "test-user",
    "email": "",
    "suspended": 0,
    "max_buckets": 1000,
    "subusers": [],
    "keys": [
        {
            "user": "test-user",
            "access_key": "a21e86bce636c3aa1",
            "secret_key": "cf764951f1fdde5e"
        }
    ],
    "swift_keys": [],
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "default_storage_class": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "rgw",
    "mfa_ids": []
}
```

2. As a root user, configure AWS CLI with the user credentials and create a bucket with default placement:

Syntax

```
aws s3 --ca-bundle CA_PERMISSION --profile rgw  --endpoint ENDPOINT_URL --region default mb s3://BUCKET_NAME
```

-

Example

```
[root@host01 ~]$ aws s3   --ca-bundle  /etc/pki/ca-trust/source/anchors/myCA.pem --profile
rgw  --endpoint https://host02.example.com:8043 --region default mb s3://transition
```

3. Verify that the bucket is using **default-placement** with the placement rule:

Example

```
[root@host01 ~]# radosgw-admin bucket stats --bucket transition
{
    "bucket": "transition",
    "num_shards": 11,
    "tenant": "",
    "zonegroup": "b29b0e50-1301-4330-99fc-5cdcfc349acf",
    "placement_rule": "default-placement",
    "explicit_placement": {
        "data_pool": "",
        "data_extra_pool": "",
        "index_pool": ""
    },
```

4. Log into the OpenShift Container Platform (OCP) cluster with OpenShift Data Foundation (ODF) deployed:

Example

```
[root@host01 ~]$ oc project openshift-storage
[root@host01 ~]$ oc get clusterversion
NAME     VERSION   AVAILABLE   PROGRESSING   SINCE   STATUS
version   4.11.6    True        False         4d1h    Cluster version is 4.11.6

[root@host01 ~]$ oc get storagecluster
NAME                 AGE   PHASE   EXTERNAL   CREATED AT            VERSION
ocs-storagecluster   4d    Ready              2023-06-27T15:23:01Z   4.11.0
```

5. Configure the multi-cloud gateway (MCG) namespace Azure bucket running on an OCP cluster in Azure:

Syntax

```
noobaa namespacestore create azure-blob az --account-key='ACCOUNT_KEY' --account-
name='ACCOUNT_NAME' --target-blob-container='_AZURE_CONTAINER_NAME'
```

Example

```
[root@host01 ~]$ noobaa namespacestore create azure-blob  az --account-
key='iq3+6hRtt9bQ46QfHKQ0nSm2aP+tyMzdn8dBSRW4XWrFhY+1nwfqEj4hk2q66nmD85E/o
5OrrUqo+AStkKwm9w==' --account-name='transitionrgw' --target-blob-
container='mcgnamespace'
```

6. Create an MCG bucket class pointing to the **namespacestore**:

Example

```
[root@host01 ~]$ noobaa bucketclass create namespace-bucketclass single aznamespace-bucket-class --resource az -n openshift-storage
```

7. Create an object bucket claim (OBC) for the transition to cloud:

Syntax

```
noobaa obc create OBC_NAME --bucketclass aznamespace-bucket-class -n openshift-storage
```

Example

```
[root@host01 ~]$ noobaa obc create rgwobc --bucketclass aznamespace-bucket-class -n openshift-storage
```

NOTE

Use the credentials provided by OBC to configure zonegroup placement on the Ceph Object Gateway.

8. On the bootstrapped node, create a storage class with the tier type as **cloud-s3** on the default placement within the default zonegroup on the previously configured MCG in Azure:

NOTE

Once a storage class is created with the **--tier-type=cloud-s3** option , it cannot be later modified to any other storage class type.

Syntax

```
radosgw-admin zonegroup placement add --rgw-zonegroup =ZONE_GROUP_NAME \
                      --placement-id=PLACEMENT_ID \
                      --storage-class =STORAGE_CLASS_NAME \
                      --tier-type=cloud-s3
```

Example

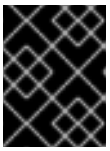
```
[ceph: root@host01 /]# radosgw-admin zonegroup placement add --rgw-zonegroup=default \
                                    --placement-id=default-placement \
                                    --storage-class=AZURE \
                                    --tier-type=cloud-s3
[
   {
      "key": "default-placement",
      "val": {
         "name": "default-placement",
         "tags": [],
         "storage_classes": [
            "AZURE",
            "STANDARD"
```

```
            ],
            "tier_targets": [
                {
                    "key": "AZURE",
                    "val": {
                        "tier_type": "cloud-s3",
                        "storage_class": "AZURE",
                        "retain_head_object": "false",
                        "s3": {
                            "endpoint": "",
                            "access_key": "",
                            "secret": "",
                            "host_style": "path",
                            "target_storage_class": "",
                            "target_path": "",
                            "acl_mappings": [],
                            "multipart_sync_threshold": 33554432,
                            "multipart_min_part_size": 33554432
                        }
                    }
                }
            ]
        }
    }
]
```

9. Configure the cloud S3 cloud storage class:

Syntax

```
radosgw-admin zonegroup placement modify --rgw-zonegroup ZONE_GROUP_NAME \
                                         --placement-id PLACEMENT_ID \
                                         --storage-class STORAGE_CLASS_NAME  \
                                         --tier-config=endpoint=ENDPOINT_URL,\
                                         access_key=ACCESS_KEY,secret=SECRET_KEY,\
                                         target_path="TARGET_BUCKET_ON",\
                                         multipart_sync_threshold=44432,\
                                         multipart_min_part_size=44432,\
                                         retain_head_object=true
                                         region=REGION_NAME
```



IMPORTANT

Setting the **retain_head_object** parameter to **true** retains the metadata or the head of the object to list the objects that are transitioned.

Example

```
[ceph: root@host01 /]# radosgw-admin zonegroup placement modify --rgw-zonegroup default
                                                --placement-id default-placement \
                                                --storage-class AZURE \
                                                --tier-config=endpoint="https://s3-openshift-
storage.apps.ocp410.0e73azopenshift.com",\
```

```
access_key=a21e86bce636c3aa2,secret=cf764951f1fdde5f,\
                                                target_path="dfqe-bucket-01",\
                                                multipart_sync_threshold=44432,\
                                                multipart_min_part_size=44432,\
                                                retain_head_object=true
                                                region=us-east-1

[
   {
      "key": "default-placement",
      "val": {
         "name": "default-placement",
         "tags": [],
         "storage_classes": [
            "AZURE",
            "STANDARD",
            "cold.test",
            "hot.test"
         ],
         "tier_targets": [
            {
               "key": "AZURE",
               "val": {
                  "tier_type": "cloud-s3",
                  "storage_class": "AZURE",
                  "retain_head_object": "true",
                  "s3": {
                     "endpoint": "https://s3-openshift-
storage.apps.ocp410.0e73azopenshift.com",
                     "access_key": "a21e86bce636c3aa2",
                     "secret": "cf764951f1fdde5f",
                     "region": "",
                     "host_style": "path",
                     "target_storage_class": "",
                     "target_path": "dfqe-bucket-01",
                     "acl_mappings": [],
                     "multipart_sync_threshold": 44432,
                     "multipart_min_part_size": 44432
                  }
               }
            }
         ]
      }
   }
]
]
```

10. Restart the Ceph Object Gateway:

Syntax

```
ceph orch restart CEPH_OBJECT_GATEWAY_SERVICE_NAME
```

Example

```
[ceph: root@host 01 /]# ceph orch restart client.rgw.objectgwhttps.host02.udyllp

Scheduled to restart client.rgw.objectgwhttps.host02.udyllp on host 'host02
```

11. Create the lifecycle configuration transition policy for the bucket created previously. In this example, the bucket is **transition**:

Syntax

```
cat transition.json
{
   "Rules": [
      {
         "Filter": {
            "Prefix": ""
         },
         "Status": "Enabled",
         "Transitions": [
            {
               "Days": 30,
               "StorageClass": "STORAGE_CLASS"
            }
         ],
         "ID": "TRANSITION_ID"
      }
   ]
      }
```

NOTE

All the objects in the bucket older than 30 days are transferred to the cloud storage class called **AZURE**.

Example

```
[root@host01 ~]$ cat transition.json
{
   "Rules": [
      {
         "Filter": {
            "Prefix": ""
         },
         "Status": "Enabled",
         "Transitions": [
            {
               "Days": 30,
               "StorageClass": "AZURE"
            }
         ],
         "ID": "Transition Objects in bucket to AZURE Blob after 30 days"
      }
   ]
      }
```

12. Apply the bucket lifecycle configuration using AWS CLI:

Syntax

```
aws s3api --ca-bundle CA_PERMISSION --profile rgw --endpoint ENDPOINT_URL--region default put-bucket-lifecycle-configuration --lifecycle-configuration file://BUCKET.json --bucket BUCKET_NAME
```

Example

```
[root@host01 ~]$ aws s3api --ca-bundle /etc/pki/ca-trust/source/anchors/myCA.pem --profile rgw --endpoint https://host02.example.com:8043 --region default put-bucket-lifecycle-configuration --lifecycle-configuration file://transition.json --bucket transition
```

13. Optional: Get the lifecycle configuration:

Syntax

```
aws s3api --ca-bundle CA_PERMISSION --profile rgw --endpoint ENDPOINT_URL--region default get-bucket-lifecycle-configuration --lifecycle-configuration file://BUCKET.json --bucket BUCKET_NAME
```

Example

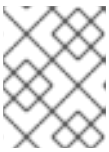
```
[root@host01 ~]$ aws s3api --ca-bundle /etc/pki/ca-trust/source/anchors/myCA.pem --profile rgw --endpoint https://host02.example.com:8043 --region default get-bucket-lifecycle-configuration --bucket transition
{
    "Rules": [
        {
            "ID": "Transition Objects in bucket to AZURE Blob after 30 days",
            "Prefix": "",
            "Status": "Enabled",
            "Transitions": [
                {
                    "Days": 30,
                    "StorageClass": "AZURE"
                }
            ]
        }
    ]
}
```

14. Optional: Get the lifecycle configuration with the **radosgw-admin lc list** command:

Example

```
[root@host 01 ~]# radosgw-admin lc list
[
    {
        "bucket": ":transition:d9c4f708-5598-4c44-9d36-849552a08c4d.169377.1",
        "started": "Thu, 01 Jan 1970 00:00:00 GMT",
```

```
        "status": "UNINITIAL"
    }
]
```



NOTE

The **UNINITAL** status implies that the lifecycle configuration is not processed. It moves to **COMPLETED** state after the transition process is complete.

15. Log in to **cephadm shell**:

    Example

    ```
    [root@host 01 ~]# cephadm shell
    ```

16. Restart the Ceph Object Gateway daemon:

    Syntax

    ```
    ceph orch daemon CEPH_OBJECT_GATEWAY_DAEMON_NAME
    ```

    Example

    ```
    [ceph: root@host 01 /]# ceph orch daemon restart rgw.objectgwhttps.host02.udyllp
    [ceph: root@host 01 /]# ceph orch daemon restart rgw.objectgw.host02.afwvyq
    [ceph: root@host 01 /]# ceph orch daemon restart rgw.objectgw.host05.ucpsrr
    ```

17. Migrate data from the source cluster to Azure:

    Example

    ```
    [root@host 01 ~]# for i in 1 2 3 4 5
    do
    aws s3 --ca-bundle  /etc/pki/ca-trust/source/anchors/myCA.pem --profile rgw --endpoint
    https://host02.example.com:8043 --region default cp /etc/hosts s3://transition/transition$i
    done
    ```

18. Verify transition of data:

    Example

    ```
    [root@host 01 ~]# aws s3 --ca-bundle  /etc/pki/ca-trust/source/anchors/myCA.pem --profile
    rgw  --endpoint https://host02.example.com:8043 --region default ls s3://transition
    2023-06-30 10:24:01       3847 transition1
    2023-06-30 10:24:04       3847 transition2
    2023-06-30 10:24:07       3847 transition3
    2023-06-30 10:24:09       3847 transition4
    2023-06-30 10:24:13       3847 transition5
    ```

19. Verify if the data has moved to Azure with **rados ls** command:

    Example

```
[root@host 01 ~]# rados ls -p default.rgw.buckets.data | grep transition
d9c4f708-5598-4c44-9d36-849552a08c4d.169377.1_transition1
d9c4f708-5598-4c44-9d36-849552a08c4d.169377.1_transition4
d9c4f708-5598-4c44-9d36-849552a08c4d.169377.1_transition2
d9c4f708-5598-4c44-9d36-849552a08c4d.169377.1_transition3
d9c4f708-5598-4c44-9d36-849552a08c4d.169377.1_transition5
```

20. If the data is not transitioned, you can run the **lc process** command:

    Example

    ```
    [root@host 01 ~]# radosgw-admin lc process
    ```

    This will force the lifecycle process to start and evaluates all the bucket lifecycle policies configured. It then starts the transition of data wherever needed.

Verification

1. Run the **radosgw-admin lc list** command to verify the completion of the transition:

   Example

   ```
   [root@host 01 ~]#  radosgw-admin lc list
   [
       {
           "bucket": ":transition:d9c4f708-5598-4c44-9d36-849552a08c4d.170017.5",
           "started": "Mon, 30 Jun 2023-06-30 16:52:56 GMT",
           "status": "COMPLETE"
       }
   ]
   ```

2. List the objects in the bucket:

   Example

   ```
   [root@host01 ~]$ aws s3api list-objects --bucket awstestbucket --
   endpoint=http://10.0.209.002:8080
   {
       "Contents": [
           {
               "Key": "awstestbucket/test",
               "LastModified": "2023-06-25T16:14:23.118Z",
               "ETag": "\"378c905939cc4459d249662dfae9fd6f\"",
               "Size": 29,
               "StorageClass": "STANDARD",
               "Owner": {
                   "DisplayName": "test-user",
                   "ID": "test-user"
               }
           }
       ]
   }
   ```

3. List the objects on the cluster:

Example

```
[root@host01 ~]$ aws s3 --ca-bundle  /etc/pki/ca-trust/source/anchors/myCA.pem --profile
rgw  --endpoint https://host02.example.com:8043 --region default ls s3://transition
2023-06-30 17:52:56          0 transition1
2023-06-30 17:51:59          0 transition2
2023-06-30 17:51:59          0 transition3
2023-06-30 17:51:58          0 transition4
2023-06-30 17:51:59          0 transition5
```

The objects are **0** in size. You can list the objects, but cannot copy them since they are transitioned to Azure.

4. Check the head of the object using the S3 API:

Example

```
[root@host01 ~]$ aws s3api --ca-bundle  /etc/pki/ca-trust/source/anchors/myCA.pem --profile
rgw  --endpoint https://host02.example.com:8043 --region default head-object --key
transition1 --bucket transition
{
    "AcceptRanges": "bytes",
    "LastModified": "2023-06-31T16:52:56+00:00",
    "ContentLength": 0,
    "ETag": "\"46ecb42fd0def0e42f85922d62d06766\"",
    "ContentType": "binary/octet-stream",
    "Metadata": {},
    "StorageClass": "CLOUDTIER"
}
```

You can see that the storage class has changed from **STANDARD** to **CLOUDTIER**.

CHAPTER 9. TESTING

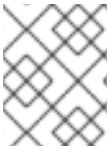
As a storage administrator, you can do basic functionality testing to verify that the Ceph Object Gateway environment is working as expected. You can use the REST interfaces by creating an initial Ceph Object Gateway user for the S3 interface, and then create a subuser for the Swift interface.

Prerequisites

- A healthy running Red Hat Ceph Storage cluster.
- Installation of the Ceph Object Gateway software.

9.1. CREATE AN S3 USER

To test the gateway, create an S3 user and grant the user access. The **man radosgw-admin** command provides information on additional command options.



NOTE

In a multi-site deployment, always create a user on a host in the master zone of the master zone group.

Prerequisites

- **root** or **sudo** access
- Ceph Object Gateway installed

Procedure

1. Create an S3 user:

   Syntax

   ```
   radosgw-admin user create --uid=name --display-name="USER_NAME"
   ```

   Replace *name* with the name of the S3 user:

   Example

   ```
   [root@host01 ~]# radosgw-admin user create --uid="testuser" --display-name="Jane Doe"
   {
       "user_id": "testuser",
       "display_name": "Jane Doe",
       "email": "",
       "suspended": 0,
       "max_buckets": 1000,
       "auid": 0,
       "subusers": [],
       "keys": [
           {
               "user": "testuser",
               "access_key": "CEP28KDIQXBKU4M15PDC",
   ```

```
            "secret_key": "MARoio8HFc8JxhEilES3dKFVj8tV3NOOYymihTLO"
        }
    ],
    "swift_keys": [],
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "rgw"
}
```


2. Verify the output to ensure that the values of **access_key** and **secret_key** do not include a JSON escape character (\). These values are needed for access validation, but certain clients cannot handle if the values include JSON escape characters. To fix this problem, perform one of the following actions:

   - Remove the JSON escape character.
   - Encapsulate the string in quotes.
   - Regenerate the key and ensure that it does not include a JSON escape character.
   - Specify the key and secret manually.

   Do not remove the forward slash / because it is a valid character.

9.2. CREATE A SWIFT USER

To test the Swift interface, create a Swift subuser. Creating a Swift user is a two-step process. The first step is to create the user. The second step is to create the secret key.

NOTE

In a multi-site deployment, always create a user on a host in the master zone of the master zone group.

Prerequisites

- Installation of the Ceph Object Gateway.

- Root-level access to the Ceph Object Gateway node.

Procedure

1. Create the Swift user:

   Syntax

   ```
   radosgw-admin subuser create --uid=NAME --subuser=NAME:swift --access=full
   ```

   Replace ***NAME*** with the Swift user name, for example:

   Example

   ```
   [root@host01 ~]# radosgw-admin subuser create --uid=testuser --subuser=testuser:swift --
   access=full
   {
       "user_id": "testuser",
       "display_name": "First User",
       "email": "",
       "suspended": 0,
       "max_buckets": 1000,
       "auid": 0,
       "subusers": [
           {
               "id": "testuser:swift",
               "permissions": "full-control"
           }
       ],
       "keys": [
           {
               "user": "testuser",
               "access_key": "O8JDE41XMI74O185EHKD",
               "secret_key": "i4Au2yxG5wtr1JK01mI8kjJPM93HNAoVWOSTdJd6"
           }
       ],
       "swift_keys": [
           {
               "user": "testuser:swift",
               "secret_key": "13TLtdEW7bCqgttQgPzxFxziu0AgabtOc6vM8DLA"
           }
       ],
       "caps": [],
       "op_mask": "read, write, delete",
       "default_placement": "",
       "placement_tags": [],
       "bucket_quota": {
           "enabled": false,
           "check_on_raw": false,
           "max_size": -1,
           "max_size_kb": 0,
           "max_objects": -1
       },
       "user_quota": {
           "enabled": false,
   ```

```
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "rgw"
}
```

2. Create the secret key:

Syntax

```
radosgw-admin key create --subuser=NAME:swift --key-type=swift --gen-secret
```

Replace ***NAME*** with the Swift user name, for example:

Example

```
[root@host01 ~]# radosgw-admin key create --subuser=testuser:swift --key-type=swift --gen-
secret
{
    "user_id": "testuser",
    "display_name": "First User",
    "email": "",
    "suspended": 0,
    "max_buckets": 1000,
    "auid": 0,
    "subusers": [
        {
            "id": "testuser:swift",
            "permissions": "full-control"
        }
    ],
    "keys": [
        {
            "user": "testuser",
            "access_key": "O8JDE41XMI74O185EHKD",
            "secret_key": "i4Au2yxG5wtr1JK01mI8kjJPM93HNAoVWOSTdJd6"
        }
    ],
    "swift_keys": [
        {
            "user": "testuser:swift",
            "secret_key": "a4ioT4jEP653CDcdU8p4OuhruwABBRZmyNUbnSSt"
        }
    ],
    "caps": [],
    "op_mask": "read, write, delete",
    "default_placement": "",
    "placement_tags": [],
    "bucket_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
```

```
        "max_size_kb": 0,
        "max_objects": -1
    },
    "user_quota": {
        "enabled": false,
        "check_on_raw": false,
        "max_size": -1,
        "max_size_kb": 0,
        "max_objects": -1
    },
    "temp_url_keys": [],
    "type": "rgw"
}
```

9.3. TEST S3 ACCESS

You need to write and run a Python test script for verifying S3 access. The S3 access test script will connect to the **radosgw**, create a new bucket, and list all buckets. The values for **aws_access_key_id** and **aws_secret_access_key** are taken from the values of **access_key** and **secret_key** returned by the **radosgw_admin** command.

Prerequisites

- A running Red Hat Ceph Storage cluster.
- Root-level access to the nodes.

Procedure

1. Enable the High Availability repository for Red Hat Enterprise Linux 9:

```
subscription-manager repos --enable=rhel-9-for-x86_64-highavailability-rpms
```

2. Install the **python3-boto3** package:

```
dnf install python3-boto3
```

3. Create the Python script:

```
vi s3test.py
```

4. Add the following contents to the file:

Syntax

```
import boto3

endpoint = "" # enter the endpoint URL along with the port "http://URL:PORT"

access_key = 'ACCESS'
secret_key = 'SECRET'

s3 = boto3.client(
```

```
        's3',
        endpoint_url=endpoint,
        aws_access_key_id=access_key,
        aws_secret_access_key=secret_key
        )

s3.create_bucket(Bucket='my-new-bucket')

response = s3.list_buckets()
for bucket in response['Buckets']:
    print("{name}\t{created}".format(
  name = bucket['Name'],
  created = bucket['CreationDate']
))
```

a. Replace ***endpoint*** with the URL of the host where you have configured the gateway service. That is, the **gateway host**. Ensure that the **host** setting resolves with DNS. Replace ***PORT*** with the port number of the gateway.

b. Replace ***ACCESS*** and ***SECRET*** with the **access_key** and **secret_key** values from the *Create an S3 User* section in the *Red Hat Ceph Storage Object Gateway Guide*.

5. Run the script:

```
python3 s3test.py
```

The output will be something like the following:

```
my-new-bucket 2022-05-31T17:09:10.000Z
```

9.4. TEST SWIFT ACCESS

Swift access can be verified via the **swift** command line client. The command **man swift** will provide more information on available command line options.

To install the **swift** client, run the following command:

```
sudo yum install python-setuptools
sudo easy_install pip
sudo pip install --upgrade setuptools
sudo pip install --upgrade python-swiftclient
```

To test swift access, run the following command:

Syntax

```
# swift -A http://IP_ADDRESS:PORT/auth/1.0 -U testuser:swift -K 'SWIFT_SECRET_KEY' list
```

Replace ***IP_ADDRESS*** with the public IP address of the gateway server and ***SWIFT_SECRET_KEY*** with its value from the output of the **radosgw-admin key create** command issued for the **swift** user. Replace *PORT* with the port number you are using with Beast. If you do not replace the port, it will default to port **80**.

For example:

```
swift -A http://10.10.143.116:80/auth/1.0 -U testuser:swift -K
'244+fz2gSqoHwR3lYtSbIyomyPHf3i7rgSJrF/IA' list
```

The output should be:

```
my-new-bucket
```

APPENDIX A. CONFIGURATION REFERENCE

As a storage administrator, you can set various options for the Ceph Object Gateway. These options contain default values. If you do not specify each option, then the default value is set automatically.

To set specific values for these options, update the configuration database by using the **ceph config set client.rgw *OPTION VALUE*** command.

A.1. GENERAL SETTINGS

Name	Description	Type	Default
rgw_data	Sets the location of the data files for Ceph Object Gateway.	String	**/var/lib/ceph/radosgw/$cluster-$id**
rgw_enable_apis	Enables the specified APIs.	String	**s3, s3website, swift, swift_auth, admin, sts, iam, notifications**
rgw_cache_enabled	Whether the Ceph Object Gateway cache is enabled.	Boolean	**true**
rgw_cache_lru_size	The number of entries in the Ceph Object Gateway cache.	Integer	**10000**
rgw_socket_path	The socket path for the domain socket. **FastCgiExternalServer** uses this socket. If you do not specify a socket path, Ceph Object Gateway will not run as an external server. The path you specify here must be the same as the path specified in the **rgw.conf** file.	String	N/A
rgw_host	The host for the Ceph Object Gateway instance. Can be an IP address or a hostname.	String	**0.0.0.0**
rgw_port	Port the instance listens for requests. If not specified, Ceph Object Gateway runs external FastCGI.	String	None
rgw_dns_name	The DNS name of the served domain. See also the **hostnames** setting within zone groups.	String	None
rgw_script_uri	The alternative value for the **SCRIPT_URI** if not set in the request.	String	None

Name	Description	Type	Default
rgw_request_uri	The alternative value for the **REQUEST_URI** if not set in the request.	String	None
rgw_print_continue	Enable **100-continue** if it is operational.	Boolean	**true**
rgw_remote_addr_param	The remote address parameter. For example, the HTTP field containing the remote address, or the **X-Forwarded-For** address if a reverse proxy is operational.	String	**REMOTE_ADDR**
rgw_op_thread_timeout	The timeout in seconds for open threads.	Integer	600
rgw_op_thread_suicide_timeout	The **timeout** in seconds before a Ceph Object Gateway process dies. Disabled if set to **0**.	Integer	**0**
rgw_thread_pool_size	The size of the thread pool.	Integer	512 threads.
rgw_num_control_oids	The number of notification objects used for cache synchronization between different **rgw** instances.	Integer	**8**
rgw_init_timeout	The number of seconds before Ceph Object Gateway gives up on initialization.	Integer	**30**
rgw_mime_types_file	The path and location of the MIME types. Used for Swift auto-detection of object types.	String	**/etc/mime.types**
rgw_gc_max_objs	The maximum number of objects that may be handled by garbage collection in one garbage collection processing cycle.	Integer	**32**
rgw_gc_obj_min_wait	The minimum wait time before the object may be removed and handled by garbage collection processing.	Integer	**2 * 3600**
rgw_gc_processor_max_time	The maximum time between the beginning of two consecutive garbage collection processing cycles.	Integer	**3600**
rgw_gc_processor_period	The cycle time for garbage collection processing.	Integer	**3600**

Name	Description	Type	Default
rgw_s3 success_create_obj_ status	The alternate success status response for **create-obj**.	Integer	**0**
rgw_resolve_cname	Whether **rgw** should use the DNS CNAME record of the request hostname field (if hostname is not equal to **rgw_dns name**).	Boolean	**false**
rgw_object_stripe_si ze	The size of an object stripe for Ceph Object Gateway objects.	Integer	**4 << 20**
rgw_extended_http_ attrs	Add a new set of attributes that could be set on an object. These extra attributes can be set through HTTP header fields when putting the objects. If set, these attributes will return as HTTP fields when doing GET/HEAD on the object.	String	None. For example: "content_foo, content_bar"
rgw_exit_timeout_se cs	Number of seconds to wait for a process before exiting unconditionally.	Integer	**120**
rgw_get_obj_window _size	The window size in bytes for a single object request.	Integer	**16 << 20**
rgw_get_obj_max_re q_size	The maximum request size of a single get operation sent to the Ceph Storage Cluster.	Integer	**4 << 20**
rgw_relaxed_s3_buc ket_names	Enables relaxed S3 bucket names rules for zone group buckets.	Boolean	**false**
rgw_list buckets_max_chunk	The maximum number of buckets to retrieve in a single operation when listing user buckets.	Integer	**1000**
rgw_override_bucket _index_max_shards	The number of shards for the bucket index object. A value of **0** indicates there is no sharding. Red Hat does not recommend setting a value too large (for example, **1000**) as it increases the cost for bucket listing. This variable should be set in the **[client]** or the **[global]** section so it is automatically applied to **radosgw-admin** commands.	Integer	**0**

Name	Description	Type	Default
rgw_curl_wait_timeout_ms	The timeout in milliseconds for certain **curl** calls.	Integer	**1000**
rgw_copy_obj_progress	Enables output of object progress during long copy operations.	Boolean	**true**
rgw_copy_obj_progress_every_bytes	The minimum bytes between copy progress output.	Integer	**1024 * 1024**
rgw_admin_entry	The entry point for an admin request URL.	String	**admin**
rgw_content_length_compat	Enable compatibility handling of FCGI requests with both CONTENT_LENGTH AND HTTP_CONTENT_LENGTH set.	Boolean	**false**
rgw_bucket_default_quota_max_objects	The default maximum number of objects per bucket. This value is set on new users if no other quota is specified. It has no effect on existing users. This variable should be set in the **[client]** or the **[global]** section so it is automatically applied to **radosgw-admin** commands.	Integer	**-1**
rgw_bucket_quota_ttl	The amount of time in seconds cached quota information is trusted. After this timeout, the quota information will be re-fetched from the cluster.	Integer	600
rgw_user_quota_bucket_sync_interval	The amount of time in seconds bucket quota information is accumulated before syncing to the cluster. During this time, other RGW instances will not see the changes in bucket quota stats from operations on this instance.	Integer	180
rgw_user_quota_sync_interval	The amount of time in seconds user quota information is accumulated before syncing to the cluster. During this time, other RGW instances will not see the changes in user quota stats from operations on this instance.	Integer	3600 * 24
log_meta	A zone parameter to determine whether or not the gateway logs the metadata operations.	Boolean	**false**

Name	Description	Type	Default
log_data	A zone parameter to determine whether or not the gateway logs the data operations.	Boolean	**false**
sync_from_all	A **radosgw-admin** command to set or unset whether zone syncs from all zonegroup peers.	Boolean	**false**

A.2. ABOUT POOLS

Ceph zones map to a series of Ceph Storage Cluster pools.

Manually Created Pools vs. Generated Pools

If the user key for the Ceph Object Gateway contains write capabilities, the gateway has the ability to create pools automatically. This is convenient for getting started. However, the Ceph Object Storage Cluster uses the placement group default values unless they were set in the Ceph configuration file. Additionally, Ceph will use the default CRUSH hierarchy. These settings are **NOT** ideal for production systems.

The default pools for the Ceph Object Gateway's default zone include:

- **.rgw.root**
- **.default.rgw.control**
- **.default.rgw.meta**
- **.default.rgw.log**
- **.default.rgw.buckets.index**
- **.default.rgw.buckets.data**
- **.default.rgw.buckets.non-ec**

The Ceph Object Gateway creates pools on a per zone basis. If you create the pools manually, prepend the zone name. The system pools store objects related to, for example, system control, logging, and user information. By convention, these pool names have the zone name prepended to the pool name.

- **.<zone-name>.rgw.control**: The control pool.
- **.<zone-name>.log**: The log pool contains logs of all bucket/container and object actions, such as create, read, update, and delete.
- **.<zone-name>.rgw.buckets.index**: This pool stores the index of the buckets.
- **.<zone-name>.rgw.buckets.data**: This pool stores the data of the buckets.
- **.<zone-name>.rgw.meta**: The metadata pool stores **user_keys** and other critical metadata.
- **.<zone-name>.meta:users.uid**: The user ID pool contains a map of unique user IDs.

- **.<zone-name>.meta:users.keys**: The keys pool contains access keys and secret keys for each user ID.
- **.<zone-name>.meta:users.email**: The email pool contains email addresses associated with a user ID.
- **.<zone-name>.meta:users.swift**: The Swift pool contains the Swift subuser information for a user ID.

Ceph Object Gateways store data for the bucket index (**index_pool**) and bucket data (**data_pool**) in placement pools. These may overlap; that is, you may use the same pool for the index and the data. The index pool for default placement is **{zone-name}.rgw.buckets.index** and for the data pool for default placement is **{zone-name}.rgw.buckets**.

Name	Description	Type	Default
rgw_zonegroup_root_pool	The pool for storing all zone group-specific information.	String	**.rgw.root**
rgw_zone_root_pool	The pool for storing zone-specific information.	String	**.rgw.root**

A.3. LIFECYCLE SETTINGS

As a storage administrator, you can set various bucket lifecycle options for a Ceph Object Gateway. These options contain default values. If you do not specify each option, then the default value is set automatically.

To set specific values for these options, update the configuration database by using the **ceph config set client.rgw *OPTION VALUE*** command.

Name	Description	Type	Default
rgw_lc_debug_interval	For developer use only to debug lifecycle rules by scaling expiration rules from days into an interval in seconds. Red Hat recommends that this option not be used in a production cluster.	Integer	**-1**
rgw_lc_lock_max_time	The timeout value used internally by the Ceph Object Gateway.	Integer	**90**
rgw_lc_max_objs	Controls the sharding of the RADOS Gateway internal lifecycle work queues, and should only be set as part of a deliberate resharding workflow. Red Hat recommends not changing this setting after the setup of your cluster, without first contacting Red Hat support.	Integer	**32**
rgw_lc_max_rules	The number of lifecycle rules to include in one, per bucket, lifecycle configuration document. The Amazon Web Service (AWS) limit is 1000 rules.	Integer	**1000**

Name	Description	Type	Default
rgw_lc_max_worker	The number of lifecycle worker threads to run in parallel, processing bucket and index shards simultaneously. Red Hat does not recommend setting a value larger than 10 without contacting Red Hat support.	Integer	**3**
rgw_lc_max_wp_worker	The number of buckets that each lifecycle worker thread can process in parallel. Red Hat does not recommend setting a value larger than 10 without contacting Red Hat Support.	Integer	**3**
rgw_lc_thread_delay	A delay, in milliseconds, that can be injected into shard processing at several points. The default value is 0. Setting a value from 10 to 100 ms would reduce CPU utilization on RADOS Gateway instances and reduce the proportion of workload capacity of lifecycle threads relative to ingest if saturation is being observed.	Integer	**0**

A.4. SWIFT SETTINGS

Name	Description	Type	Default
rgw_enforce_swift_acls	Enforces the Swift Access Control List (ACL) settings.	Boolean	**true**
rgw_swift_token_expiration	The time in seconds for expiring a Swift token.	Integer	**24 * 3600**
rgw_swift_url	The URL for the Ceph Object Gateway Swift API.	String	None
rgw_swift_url_prefix	The URL prefix for the Swift API, for example, **http://fqdn.com/swift**.	**swift**	N/A
rgw_swift_auth_url	Default URL for verifying v1 auth tokens (if not using internal Swift auth).	String	None
rgw_swift_auth_entry	The entry point for a Swift auth URL.	String	**auth**

A.5. LOGGING SETTINGS

Name	Description	Type	Default
debug_rgw_datacache	Low level D3N logs can be enabled by the **debug_rgw_datacache** subsystem (up to **debug_rgw_datacache=30**)	Integer	**1/5**
rgw_log_nonexistent_bucket	Enables Ceph Object Gateway to log a request for a non-existent bucket.	Boolean	**false**
rgw_log_object_name	The logging format for an object name. See manpage date for details about format specifiers.	Date	**%Y-%m-%d-%H-%i-%n**
rgw_log_object_name_utc	Whether a logged object name includes a UTC time. If **false**, it uses the local time.	Boolean	**false**
rgw_usage_max_shards	The maximum number of shards for usage logging.	Integer	**32**
rgw_usage_max_user_shards	The maximum number of shards used for a single user's usage logging.	Integer	**1**
rgw_enable_ops_log	Enable logging for each successful Ceph Object Gateway operation.	Boolean	**false**
rgw_enable_usage_log	Enable the usage log.	Boolean	**false**
rgw_ops_log_rados	Whether the operations log should be written to the Ceph Storage Cluster backend.	Boolean	**true**
rgw_ops_log_socket_path	The Unix domain socket for writing operations logs.	String	None
rgw_ops_log_data-backlog	The maximum data backlog data size for operations logs written to a Unix domain socket.	Integer	**5 << 20**
rgw_usage_log_flush_threshold	The number of dirty merged entries in the usage log before flushing synchronously.	Integer	1024
rgw_usage_log_tick_interval	Flush pending usage log data every **n** seconds.	Integer	**30**
rgw_intent_log_object_name	The logging format for the intent log object name. See manpage date for details about format specifiers.	Date	**%Y-%m-%d-%i-%n**

Name	Description	Type	Default
rgw_intent_log_object_name_utc	Whether the intent log object name includes a UTC time. If **false**, it uses the local time.	Boolean	**false**
rgw_data_log_window	The data log entries window in seconds.	Integer	**30**
rgw_data_log_changes_size	The number of in-memory entries to hold for the data changes log.	Integer	**1000**
rgw_data_log_num_shards	The number of shards (objects) on which to keep the data changes log.	Integer	**128**
rgw_data_log_obj_prefix	The object name prefix for the data log.	String	**data_log**
rgw_replica_log_obj_prefix	The object name prefix for the replica log.	String	**replica log**
rgw_md_log_max_shards	The maximum number of shards for the metadata log.	Integer	**64**
rgw_log_http_headers	Comma-delimited list of HTTP headers to include with ops log entries. Header names are case insensitive, and use the full header name with words separated by underscores.	String	None

A.6. KEYSTONE SETTINGS

Name	Description	Type	Default
rgw_keystone_url	The URL for the Keystone server.	String	None
rgw_keystone_admin_token	The Keystone admin token (shared secret).	String	None
rgw_keystone_accepted_roles	The roles required to serve requests.	String	**Member, admin**
rgw_keystone_token_cache_size	The maximum number of entries in each Keystone token cache.	Integer	**10000**

A.7. KEYSTONE INTEGRATION CONFIGURATION OPTIONS

You can integrate your configuration options into Keystone. See below for a detailed description of the available Keystone integration configuration options:

IMPORTANT

After updating the Ceph configuration file, you must copy the new Ceph configuration file to all Ceph nodes in the storage cluster.

rgw_s3_auth_use_keystone

Description

If set to **true**, the Ceph Object Gateway will authenticate users using Keystone.

Type

Boolean

Default

false

nss_db_path

Description

The path to the NSS database.

Type

String

Default

""

rgw_keystone_url

Description

The URL for the administrative RESTful API on the Keystone server.

Type

String

Default

""

rgw_keystone_admin_token

Description

The token or shared secret that is configured internally in Keystone for administrative requests.

Type

String

Default

""

rgw_keystone_admin_user

Description

The keystone admin user name.

Type

String

Default

""

rgw_keystone_admin_password

Description

The keystone admin user password.

Type

String

Default

""

rgw_keystone_admin_tenant

Description

The Keystone admin user tenant for keystone v2.0.

Type

String

Default

""

rgw_keystone_admin_project

Description

the keystone admin user project for keystone v3.

Type

String

Default

""

rgw_trust_forwarded_https

Description

When a proxy in front of the Ceph Object Gateway is used for SSL termination, it does not whether incoming http connections are secure. Enable this option to trust the forwarded and X-forwarded headers sent by the proxy when determining when the connection is secure. This is mainly required for server-side encryption.

Type

Boolean

Default

false

rgw_swift_account_in_url

Description

Whether the Swift account is encoded in the URL path. You **must** set this option to **true** and update the Keystone service catalog if you want the Ceph Object Gateway to support publicly-readable containers and temporary URLs.

Type

Boolean

Default

false

rgw_keystone_admin_domain

Description

The Keystone admin user domain.

Type

String

Default

""

rgw_keystone_api_version

Description

The version of the Keystone API to use. Valid options are **2** or **3**.

Type

Integer

Default

2

rgw_keystone_accepted_roles

Description

The roles required to serve requests.

Type

String

Default

member, Member, admin,

rgw_keystone_accepted_admin_roles

Description

The list of roles allowing a user to gain administrative privileges.

Type

String

Default

ResellerAdmin, swiftoperator

rgw_keystone_token_cache_size

Description

The maximum number of entries in the Keystone token cache.

Type

Integer

Default

10000

rgw_keystone_verify_ssl

Description

If **true** Ceph will try to verify Keystone's SSL certificate.

Type

Boolean

Default

true

rgw_keystone_implicit_tenants

Description

Create new users in their own tenants of the same name. Set this to **true** or **false** under most circumstances. For compatibility with previous versions of Red Hat Ceph Storage, it is also possible to set this to **s3** or **swift**. This has the effect of splitting the identity space such that only the indicated protocol will use implicit tenants. Some older versions of Red Hat Ceph Storage only supported implicit tenants with Swift.

Type

String

Default

false

rgw_max_attr_name_len

Description

The maximum length of metadata name. 0 skips the check.

Type

Size

Default

0

rgw_max_attrs_num_in_req

Description

The maximum number of metadata items that can be put with a single request.

Type

uint

Default

0

rgw_max_attr_size

Description

The maximum length of metadata value. 0 skips the check

Type

Size

Default

0

rgw_swift_versioning_enabled

Description

Enable Swift versioning.

Type

Boolean

Default

0 or **1**

rgw_keystone_accepted_reader_roles

Description

List of roles that can only be used for reads.

Type

String

Default

""

rgw_swift_enforce_content_length

Description

Send content length when listing containers

Type

String

Default

false`

A.8. LDAP SETTINGS

Name	Description	Type	Example
rgw_ldap_uri	A space-separated list of LDAP servers in URI format.	String	**ldaps://<ldap.your.domain>**
rgw_ldap_searchdn	The LDAP search domain name, also known as base domain.	String	**cn=users,cn=accounts,dc=example,dc=com**

Name	Description	Type	Example
rgw_ldap_binddn	The gateway will bind with this LDAP entry (user match).	String	**uid=admin,cn=users,dc=example,dc=com**
rgw_ldap_secret	A file containing credentials for **rgw_ldap_binddn**.	String	**/etc/openldap/secret**
rgw_ldap_dnattr	LDAP attribute containing Ceph object gateway user names (to form binddns).	String	**uid**