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Block and Object Storage Solution with Ceph in Production

Talk #4 IOID2021

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About Me

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Agenda

- Community
- Ceph
- Deployment Planning
- Block Storage - RBD
- Object Storage - RGW
- Dashboard & Monitoring

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Community

/kəˈmjuːnəti/ a group of people who have the same interests, religion, etc.

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Join us

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Telegram Group: https://t.me/cephid
Current Members: 40

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Ceph

/ˈsɛf/

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What is Ceph?

Ceph is open source software-defined storage which provides 3-in-1 access types: **block, object, & file**. You can make storage cluster with **Ceph** on many nodes.

Ceph Logo
https://ceph.io/

Why use Ceph?

- Scalable storage
- Business continuity
- Long term solution
- **Object**, **Block**, and **File** Storage in one unified system

Ceph Logo
https://ceph.io/

Common Ceph Term

- **Ceph Monitor (ceph-mon)**
  The Ceph monitor software, which maintain the cluster state
- **Ceph Manager (ceph-mgr)**
  The Ceph manager software, which provide additional monitoring and interfaces to external monitoring and management systems
- **Object Storage Device (OSD)**
  A physical or logical storage unit used by **ceph-osd** daemon
- **CRUSH**
  Controlled Replication Under Scalable Hashing
- **CRUSH rule**
  The CRUSH data placement rule that applies to a particular pool(s)
- **Pool**
  Pools are logical partitions for storing objects
- **RADOS (Reliable Autonomic Distributed Object Store)**
  The core set of storage software which stores the user's data (MON+OSD).

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Deployment Planning

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Production Checklist (1)

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Ceph Monitor + Ceph Manager Hardware

- **6** cores for Ceph Monitor + Ceph Manager Daemon
- **32GB** RAM Per Ceph Monitor + Ceph Manager Daemon (Below 300 OSD)
- **10GbE+** NIC (larger is better)

Ceph OSD Hardware

- **1** core per OSD Daemon
- **4GB+** RAM Per OSD Daemon (more is better)
- **10GbE+** NIC (larger is better)

Production Checklist (2)

Ceph Object Gateway / RADOS Gateway

- **6** cores for RadosGW Daemon
- **32GB** RAM per RadosGW Daemon

Ceph Cluster Component

- **5** Ceph Monitor + Ceph Manager (**2** Nodes fail tolerance)
- **2 - 3** HAProxy + Keepalived Node (For **HA Object Storage**)
- **3 - 5** RADOS Gateway Node (For **HA Object Storage**)
- Enable Monitoring Feature

System Tuning

- Operating System Kernel Tuning

Operating System

This is based on **Ceph Pacific** Release (Latest)

Recommendation for LTS:

- **Ubuntu 20.04** (Focal)
  - Ubuntu Cloud Archive
- **RHEL 8** (Ootpa)
- **Debian Buster**
- **Debian Stretch**

Deployment Methods

Recommended Methods:

- cephadm
- rook (Operator for Kubernetes)

Others Methods:

- ceph-ansible
- ceph-deploy (**deprecated**)
- Ceph Juju
- Manual

Data Distribution

Create CRUSH rule for your data storing method:

Replica

- Store the data with N number of replica
- Faster than Erasure Code

Erasure Code

- Similar to RAID-6
- More Capacity but More Compute Cost
- Split data to some chunks, **data chunk** & **coding chunk**

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Block Storage - RBD

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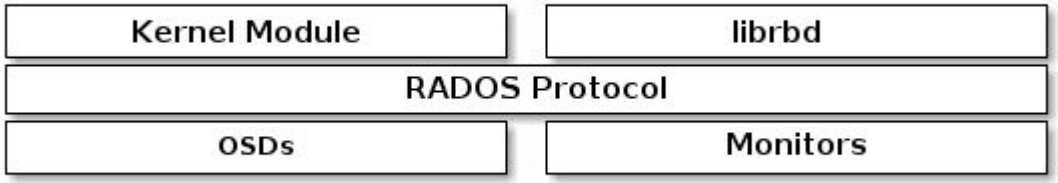
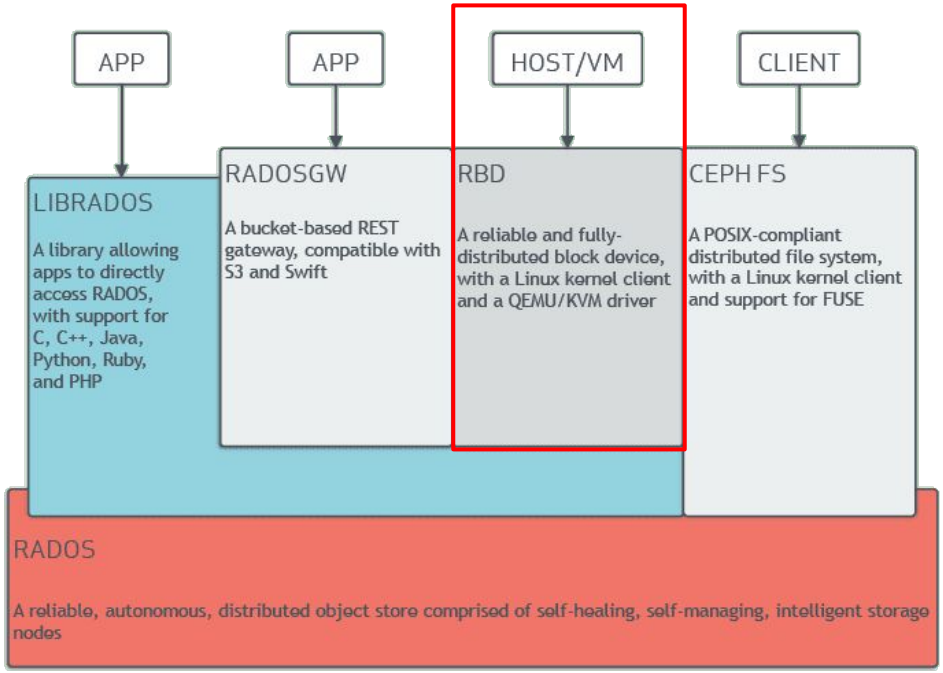
RBD

Ceph block devices are thin-provisioned, resizable, and store data striped over multiple OSDs. Ceph block devices leverage RADOS capabilities including snapshotting, replication and strong consistency.



RBD Architecture
https://docs.ceph.com/en/latest/rbd/

RBD



Ceph Stack
https://docs.ceph.com/en/latest/architecture/

RBD Uses

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- Block Storage Backend for **Cloud Platform** (OpenStack, CloudStack, & Proxmox)
- Attach to Linux Machine using RBD Kernel Module (rbd.ko)
- Attach to Windows Server 2019 Machine using **rbd-wnbd**

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Object Storage - RGW

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RADOS Gateway

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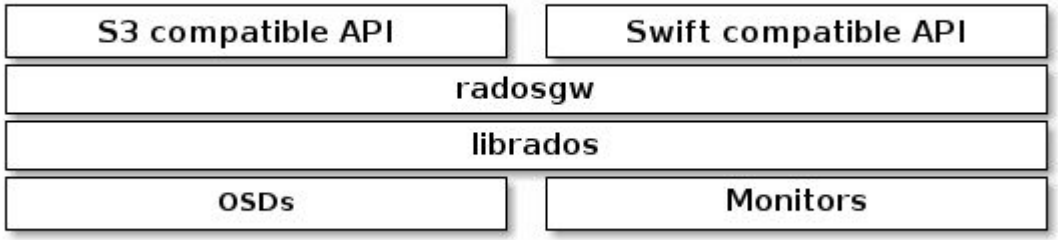
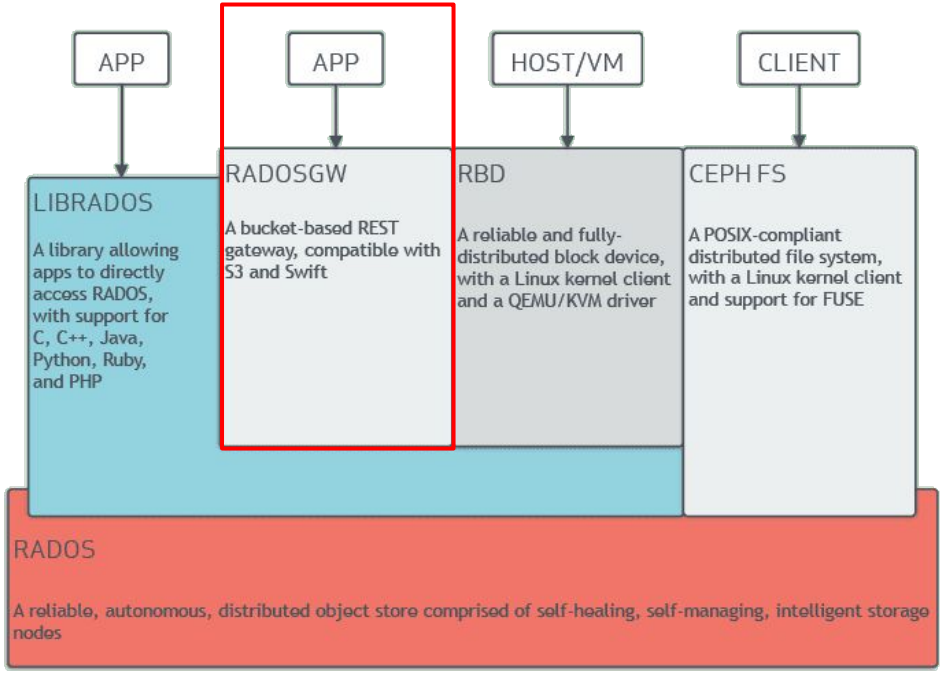
RADOS Gateway is HTTP server for interacting with a Ceph Storage Cluster. Since it provides interfaces compatible with OpenStack Swift and Amazon S3, the Ceph Object Gateway has its own user management.



RADOSGW Architecture
https://docs.ceph.com/en/latest/radosgw/

RADOS Gateway

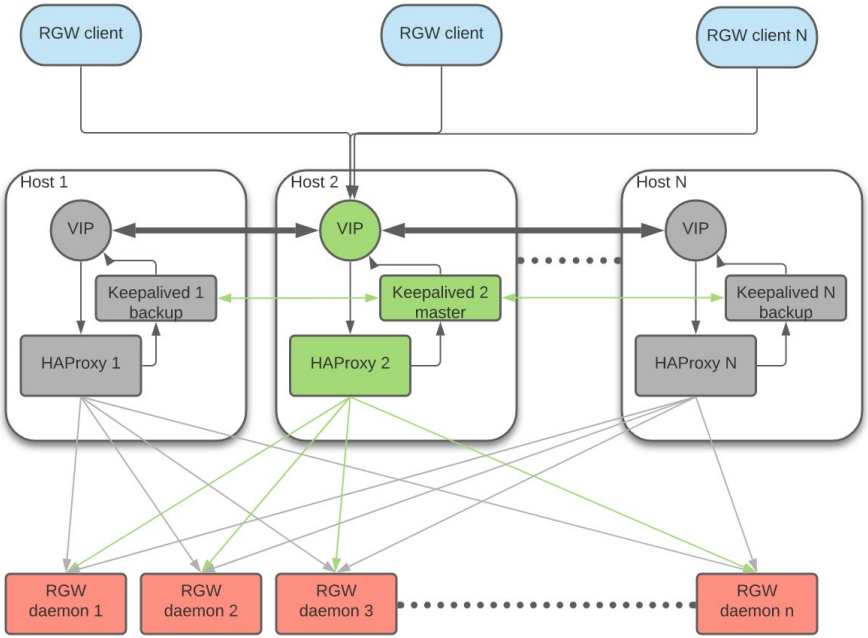


Ceph Stack
https://docs.ceph.com/en/latest/architecture/

High Availability (1)

- HAProxy
- Keepalived
- Multiple RGW Daemon

High Availability (2)



HA RADOS Gateway
https://docs.ceph.com/en/latest/_images/HAProxy_for_RGW.svg

RGW Uses

- S3 Object Storage for App (Thanos, NextCloud, OwnCloud, etc)
- Integrate with OpenStack Keystone for Enable Swift

OpenStack + Ceph

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Category	OpenStack Service	Ceph Solution
Object Storage	Swift	RGW Swift Interface
Ephemeral Storage	Nova	RBD
Persistent Storage	Cinder	RBD
Image Storage	Glance	RBD, RGW S3 Interface
Shared Filesystems	Manila	CephFS

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Dashboard & Monitoring

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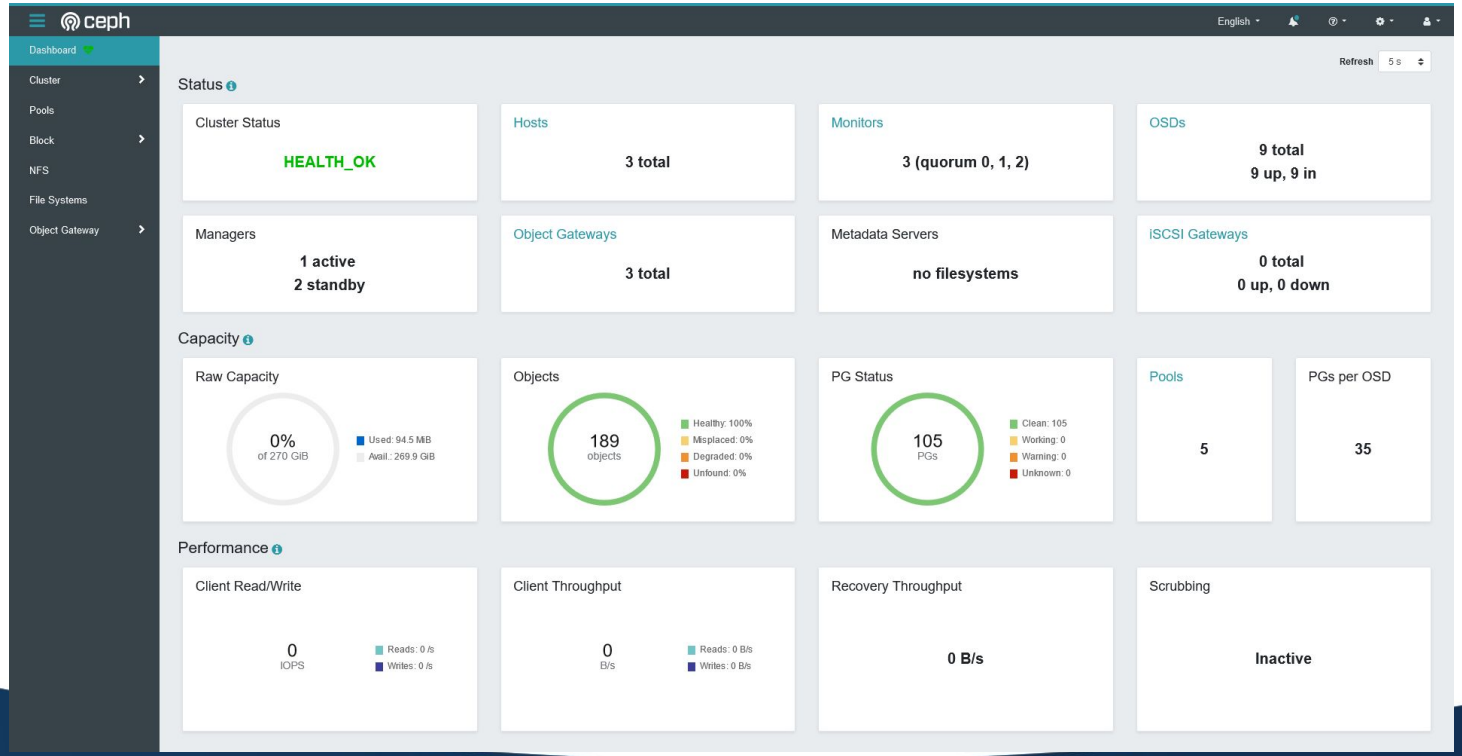
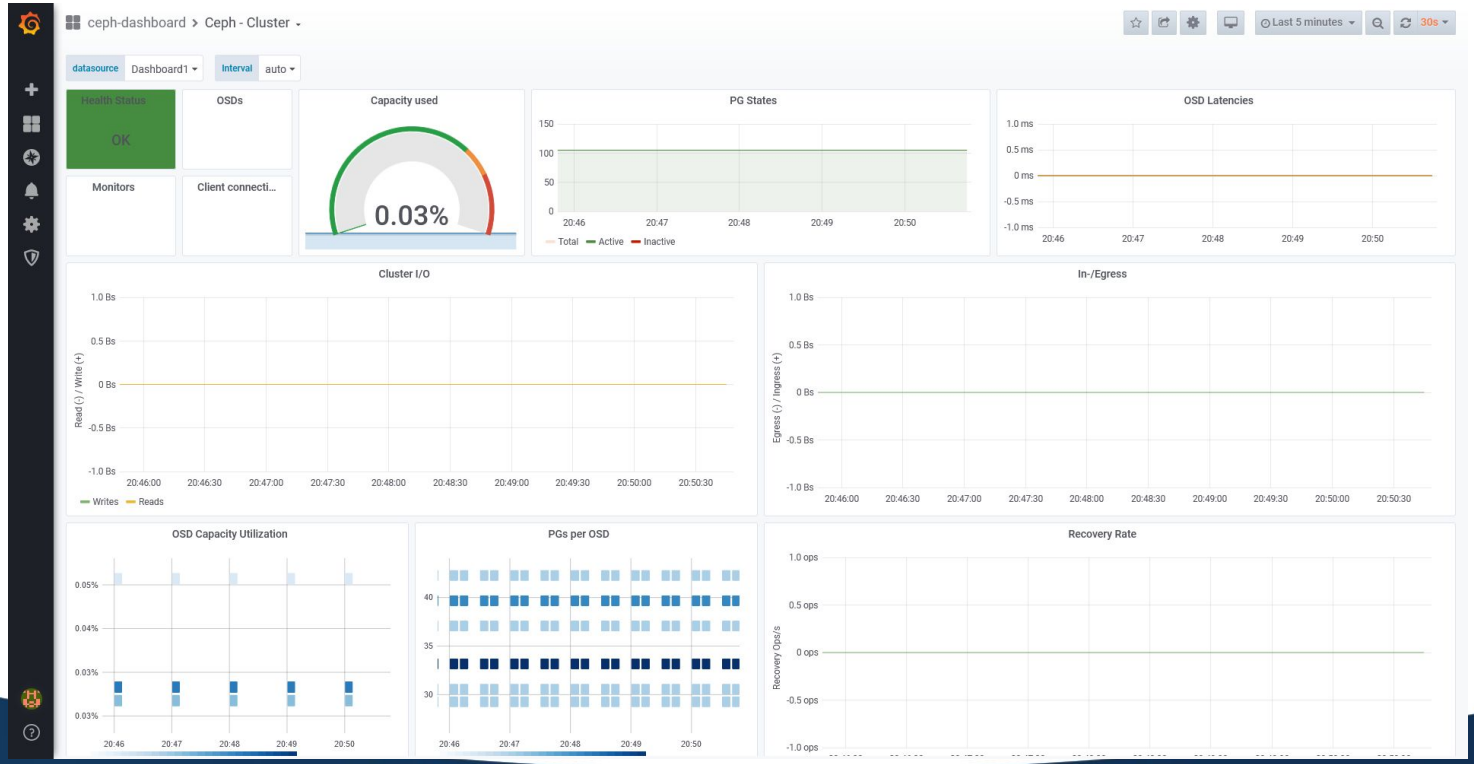
Ceph Dashboard



Grafana Dashboard



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Thanks!

Do you have any questions?
Need experts?

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