

ceph

Если будешь ставить через cephadm, то качай версию pacific, почему-то более новые не работают.

Удобный установщик: <https://git.lulzette.ru/lulzette/ceph-installer>

сервисы

- osd: хранение данных
- mon: условно, controlplane, управляет данными, балансирует данные, управляет кворумом, метаданные тоже тут
- mgr: These include the Ceph Dashboard and the cephadm manager module, фигня на питоне которая дает дашборд, прометеус, restful api и всякую такую некритичную для работы кластера фигню

Как организовано хранение?

1. Хосты с ролью OSD
2. OSDшки (абстракция на уровне Ceph'a): 1 OSD на 1 Диск хоста, т.е. 10 дисков - 10 OSD на одном хосте
3. PG (Placement Group): Группа размещения, т.е. на каких OSD размещать объекты Ceph'a (не путать с объектом на уровне S3/swift/rgw). Также есть **Карта OSD**, которая ассоциирована с PG, в ней указана одна Primary OSD и одна или несколько Replica OSD. Вся работа происходит с Primary OSD, а синк данных на реплики идет асинхронно.

Куда файлы засовывать?

Есть 3 разных хранилища (?):

- cephfs
- RBD (Rados Block Device)
- S3/Swift который предоставляется Rados Gateway

- Rados/librados - библиотека для твоего приложения которая может общаться с радосом минуя промежуточные RBD/S3/Swift

Проверить:

- Рассинхронизация времени на хоста
- See also:

<https://bogachev.biz/2017/08/23/zametki-administratora-ceph-chast-1/>

CephFS

Поднять MDS - сервер метаданных

Вообще достаточно просто

```
# mon
ceph fs volume create cephfs

root@microceph:~# ceph config generate-minimal-conf
# minimal ceph.conf for 56db00e1-912c-4ac1-9d1a-1f4194c55834
[global]
    fsid = 56db00e1-912c-4ac1-9d1a-1f4194c55834
    mon_host = [v2:10.99.99.74:3300/0,v1:10.99.99.74:6789/0]

root@microceph:~# ceph fs authorize cephfs client.foo / rw
[client.foo]
    key = AQCGVs5lyBLmIxAApqSed51BIHOvQlyawvG2Uw==

# client
# может показаться что все что ниже, кроме команды монтирования, не имеет смысла, но не
root@test0:~# mkdir /etc/ceph
root@test0:~# vim /etc/ceph/ceph.conf
root@test0:~# vim /etc/ceph/ceph.client.foo.keyring
root@test0:~# chmod 644 /etc/ceph/ceph.conf
root@test0:~# chmod 600 /etc/ceph/ceph.client.foo.keyring
```

```
root@test0:~# mount -t ceph 10.99.99.74:/ /mnt/mycephfs -o
secret=AQCGVs5lyBLmlxAApqSed51BIHOvQlyawvG2Uw== -o name=foo

# fstab:
10.99.99.74:/ /mnt/cephfs ceph
name=foo,secret=AQCGVs5lyBLmlxAApqSed51BIHOvQlyawvG2Uw==,noatime,_netdev 0 2
```

+ k8s

Нам понадобится ключ для доступа к cephfs (а так же к пулу, здесь я указал админского юзера, но можно самому создать, грамотно выделив права), закинуть в наш куб CSI (Container Storage Interface) с указанными параметрами, storageclass с секретом и хранилкой можно пользоваться.

```
# в этом подтоме будут ФСки кластеров
root@microceph:~# ceph fs subvolumegroup create cephfs csi

root@node1:~/cephfs# snap install helm --classic
helm 3.14.1 from Snapcrafters installed

root@node1:~/cephfs# helm repo add ceph-csi https://ceph.github.io/csi-charts
"ceph-csi" has been added to your repositories

root@node1:~/cephfs# helm inspect values ceph-csi/ceph-csi-cephfs > cephfs.yml
```

valuesы у хельм чарта:

```
---
rbac:
  # Specifies whether RBAC resources should be created
  create: true

serviceAccounts:
  nodeplugin:
    # Specifies whether a ServiceAccount should be created
    create: true
    # The name of the ServiceAccount to use.
```

```
# If not set and create is true, a name is generated using the fullname
name:
provisioner:
  # Specifies whether a ServiceAccount should be created
  create: true
  # The name of the ServiceAccount to use.
  # If not set and create is true, a name is generated using the fullname
  name:

# Configuration for the CSI to connect to the cluster
# Ref: https://github.com/ceph/ceph-csi/blob/devel/examples/README.md
# Example:
csiConfig:
  - clusterID: "56db00e1-912c-4ac1-9d1a-1f4194c55834"
    monitors:
      - "10.99.99.74:6789"
#   cephFS:
#     subvolumeGroup: "csi"
#     netNamespaceFilePath: "{{ .kubeletDir }}/plugins/{{ .driverName }}/net"
#csiConfig: []

# Labels to apply to all resources
commonLabels: {}

# Set logging level for csi containers.
# Supported values from 0 to 5. 0 for general useful logs,
# 5 for trace level verbosity.
# logLevel is the variable for CSI driver containers's log level
logLevel: 5
# sidecarLogLevel is the variable for Kubernetes sidecar container's log level
sidecarLogLevel: 1

nodeplugin:
  name: nodeplugin
  # if you are using ceph-fuse client set this value to OnDelete
  updateStrategy: RollingUpdate
  podSecurityPolicy:
    enabled: true
  # set user created priorityclassName for csi plugin pods. default is
  # system-node-critical which is highest priority
```

priorityClassName: system-node-critical

httpMetrics:

Metrics only available for cephcsi/cephcsi => 1.2.0

Specifies whether http metrics should be exposed

enabled: true

The port of the container to expose the metrics

containerPort: 8091

service:

Specifies whether a service should be created for the metrics

enabled: true

The port to use for the service

servicePort: 8080

type: ClusterIP

Annotations for the service

Example:

annotations:

prometheus.io/scrape: "true"

prometheus.io/port: "9080"

annotations: { }

clusterIP: ""

List of IP addresses at which the stats-exporter service is available

Ref: <https://kubernetes.io/docs/user-guide/services/#external-ips>

##

externalIPs: []

loadBalancerIP: ""

loadBalancerSourceRanges: []

Reference to one or more secrets to be used when pulling images

##

imagePullSecrets: []

- name: "image-pull-secret"

profiling:

enabled: false

registrar:
 image:
 repository: registry.k8s.io/sig-storage/csi-node-driver-registrar
 tag: v2.9.1
 pullPolicy: IfNotPresent
 resources: {}

plugin:
 image:
 repository: quay.io/cephcsi/cephcsi
 tag: v3.10.2
 pullPolicy: IfNotPresent
 resources: {}

nodeSelector: {}

tolerations: []

affinity: {}

Set to true to enable Ceph Kernel clients
on kernel < 4.17 which support quotas
forcecephkernelclient: true

common mount options to apply all mounting
example: kernelmountoptions: "recover_session=clean"
kernelmountoptions: ""
fusemountoptions: ""

provisioner:
 name: provisioner
 replicaCount: 1
 podSecurityPolicy:
 enabled: true
 strategy:
 # RollingUpdate strategy replaces old pods with new ones gradually,
 # without incurring downtime.
 type: RollingUpdate
 rollingUpdate:

```
# maxUnavailable is the maximum number of pods that can be
# unavailable during the update process.
maxUnavailable: 50%

# Timeout for waiting for creation or deletion of a volume
timeout: 60s

# cluster name to set on the subvolume
# clustername: "k8s-cluster-1"

# set user created priorityClassName for csi provisioner pods. default is
# system-cluster-critical which is less priority than system-node-critical
priorityClassName: system-cluster-critical

# enable hostnetwork for provisioner pod. default is false
# useful for deployments where the podNetwork has no access to ceph
enableHostNetwork: false

httpMetrics:
  # Metrics only available for cephcsi/cephcsi => 1.2.0
  # Specifies whether http metrics should be exposed
  enabled: true
  # The port of the container to expose the metrics
  containerPort: 8081

service:
  # Specifies whether a service should be created for the metrics
  enabled: true
  # The port to use for the service
  servicePort: 8080
  type: ClusterIP

  # Annotations for the service
  # Example:
  # annotations:
  #   prometheus.io/scrape: "true"
  #   prometheus.io/port: "9080"
  annotations: {}

clusterIP: ""

## List of IP addresses at which the stats-exporter service is available
```

Ref: <https://kubernetes.io/docs/user-guide/services/#external-ips>

##

externalIPs: []

loadBalancerIP: ""

loadBalancerSourceRanges: []

Reference to one or more secrets to be used when pulling images

##

imagePullSecrets: []

- name: "image-pull-secret"

profiling:

enabled: false

provisioner:

image:

repository: registry.k8s.io/sig-storage/csi-provisioner

tag: v3.6.2

pullPolicy: IfNotPresent

resources: {}

For further options, check

<https://github.com/kubernetes-csi/external-provisioner#command-line-options>

extraArgs: []

set metadata on volume

setmetadata: true

resizer:

name: resizer

enabled: true

image:

repository: registry.k8s.io/sig-storage/csi-resizer

tag: v1.9.2

pullPolicy: IfNotPresent

resources: {}

For further options, check

<https://github.com/kubernetes-csi/external-resizer#recommended-optional-arguments>

extraArgs: []

snapshotter:

image:

repository: registry.k8s.io/sig-storage/csi-snapshotter

tag: v6.3.2

pullPolicy: IfNotPresent

resources: {}

For further options, check

<https://github.com/kubernetes-csi/external-snapshotter#csi-external-snapshotter-sidecar-command-line-options>

extraArgs: []

nodeSelector: {}

tolerations: []

affinity: {}

readAffinity:

Enable read affinity for CephFS subvolumes. Recommended to

set to true if running kernel 5.8 or newer.

enabled: false

Define which node labels to use as CRUSH location.

This should correspond to the values set in the CRUSH map.

NOTE: the value here serves as an example

crushLocationLabels:

- topology.kubernetes.io/region

- topology.kubernetes.io/zone

Mount the host /etc/selinux inside pods to support

selinux-enabled filesystems

selinuxMount: true

storageClass:

Specifies whether the Storage class should be created

create: true

name: csi-cephfs-sc

Annotations for the storage class

Example:

annotations:

storageclass.kubernetes.io/is-default-class: "true"

annotations: {}

```
# String representing a Ceph cluster to provision storage from.
# Should be unique across all Ceph clusters in use for provisioning,
# cannot be greater than 36 bytes in length, and should remain immutable for
# the lifetime of the StorageClass in use.
clusterID: 56db00e1-912c-4ac1-9d1a-1f4194c55834
# (required) CephFS filesystem name into which the volume shall be created
# eg: fsName: myfs
fsName: cephfs
# (optional) Ceph pool into which volume data shall be stored
# pool: <cephfs-data-pool>
# For eg:
# pool: "replicapool"
pool: "cephfs.cephfs.data"
# (optional) Comma separated string of Ceph-fuse mount options.
# For eg:
# fuseMountOptions: debug
fuseMountOptions: ""
# (optional) Comma separated string of Cephfs kernel mount options.
# Check man mount.ceph for mount options. For eg:
# kernelMountOptions: readdir_max_bytes=1048576,norbytes
kernelMountOptions: ""
# (optional) The driver can use either ceph-fuse (fuse) or
# ceph kernelclient (kernel).
# If omitted, default volume mounter will be used - this is
# determined by probing for ceph-fuse and mount.ceph
# mounter: kernel
mounter: ""
# (optional) Prefix to use for naming subvolumes.
# If omitted, defaults to "csi-vol-".
# volumeNamePrefix: "foo-bar-"
volumeNamePrefix: ""
# The secrets have to contain user and/or Ceph admin credentials.
provisionerSecret: csi-cephfs-secret
# If the Namespaces are not specified, the secrets are assumed to
# be in the Release namespace.
provisionerSecretNamespace: ""
controllerExpandSecret: csi-cephfs-secret
controllerExpandSecretNamespace: ""
```

nodeStageSecret: csi-cephfs-secret

nodeStageSecretNamespace: ""

reclaimPolicy: Delete

allowVolumeExpansion: true

mountOptions: []

Mount Options

Example:

mountOptions:

- discard

secret:

Specifies whether the secret should be created

create: true

name: csi-cephfs-secret

annotations: {}

Key values correspond to a user name and its key, as defined in the

ceph cluster. User ID should have required access to the 'pool'

specified in the storage class

adminID: admin

adminKey: AQDpPctI9T9ZHhAAktyT6vNIGkSE3/rfqnkxKA==

This is a sample configmap that helps define a Ceph configuration as required

by the CSI plugins.

Sample ceph.conf available at

<https://github.com/ceph/ceph/blob/master/src/sample.ceph.conf> Detailed

documentation is available at

<https://docs.ceph.com/en/latest/rados/configuration/ceph-conf/>

cephconf: |

[global]

auth_cluster_required = cephx

auth_service_required = cephx

auth_client_required = cephx

ceph-fuse which uses libfuse2 by default has write buffer size of 2KiB

adding 'fuse_big_writes = true' option by default to override this limit

see <https://github.com/ceph/ceph-csi/issues/1928>

fuse_big_writes = true

Array of extra objects to deploy with the release

extraDeploy: []

```
#####
# Variables for 'internal' use please use with caution! #
#####

# The filename of the provisioner socket
provisionerSocketFile: csi-provisioner.sock
# The filename of the plugin socket
pluginSocketFile: csi.sock
# kubelet working directory, can be set using `--root-dir` when starting kubelet.
kubeletDir: /var/lib/kubelet
# Name of the csi-driver
driverName: cephfs.csi.ceph.com
# Name of the configmap used for state
configMapName: ceph-csi-config
# Key to use in the Configmap if not config.json
# configMapKey:
# Use an externally provided configmap
externallyManagedConfigmap: false
# Name of the configmap used for ceph.conf
cephConfConfigMapName: ceph-config
```

применяем-проверяем

```
root@node1:~/cephfs# helm upgrade -i ceph-csi-cephfs ceph-csi/ceph-csi-cephfs -f cephfs.yml -n ceph-csi-
cephfs --create-namespace
Release "ceph-csi-cephfs" does not exist. Installing it now.
NAME: ceph-csi-cephfs
LAST DEPLOYED: Thu Feb 15 18:58:51 2024
NAMESPACE: ceph-csi-cephfs
STATUS: deployed
REVISION: 1
TEST SUITE: None
NOTES:
Examples on how to configure a storage class and start using the driver are here:
https://github.com/ceph/ceph-csi/tree/v3.10.2/examples/cephfs
```

```
#### test
```

```
root@node1:~/cephfs# kubectl apply -f cephfs-claim.yml
persistentvolumeclaim/gimme-pvc created
```

```
# ypa!
```

```
root@node1:~/cephfs# kubectl get pvc
```

NAME	STATUS	VOLUME	CAPACITY	ACCESS MODES	STORAGECLASS	VOLUMEATTRIBUTESCLASS	AGE
gimme-pvc	Bound	pvc-5d0a4e00-1ace-4b1f-83b8-900340e63999	1Gi	RWX	csi-cephfs-sc	<unset>	2s

```
root@node1:~/cephfs# cat cephfs-claim.yml
```

```
---
```

```
apiVersion: v1
```

```
kind: PersistentVolumeClaim
```

```
metadata:
```

```
  name: gimme-pvc
```

```
spec:
```

```
  accessModes:
```

```
    - ReadWriteMany
```

```
  resources:
```

```
    requests:
```

```
      storage: 1Gi
```

```
  storageClassName: csi-cephfs-sc
```

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