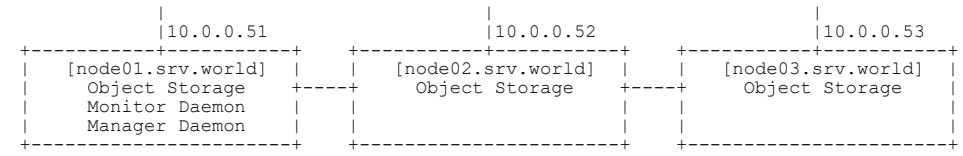

[1] Generate SSH key-pair on [Monitor Daemon] Node (call it Admin Node on here) and set it to each Node.
Configure key-pair with no-passphrase as [root] account on here.
If you use a common account, it also needs to configure Sudo.
If you set passphrase to SSH kay-pair, it also needs to set SSH Agent.

root@node01:~#
ssh-keygen -q -N ""

```
Enter file in which to save the key (/root/.ssh/id_rsa):
```

root@node01:~#
vi ~/.ssh/config
create new (define each Node and SSH user)

```
Host node01
    Hostname node01.srv.world
    User root
Host node02
    Hostname node02.srv.world
    User root
Host node03
    Hostname node03.srv.world
    User root
```

root@node01:~#
chmod 600 ~/.ssh/config
transfer public key

root@node01:~#
ssh-copy-id node01

```
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
The authenticity of host 'node01.srv.world (10.0.0.51)' can't be established.
ED25519 key fingerprint is SHA256:tcBXg2YcJJN2Z3JwMw8/ue9FIURcKJ63OqXFY2ZJmRw.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@node01.srv.world's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'node01'"
and check to make sure that only the key(s) you wanted were added.
```

root@node01:~#
ssh-copy-id node02

root@node01:~#
ssh-copy-id node03

[2] Install Ceph to each Node from Admin Node.

```
root@node01:~# for NODE in node01 node02 node03
do
    ssh $NODE "apt update; apt -y install ceph"
done
```

[3] Configure [Monitor Daemon], [Manager Daemon] on Admin Node.

root@node01:~#
uuidgen

3adf5d85-7d69-455d-82cf-f799e63981e4
create new config
file name ⇒ (any Cluster Name).conf
set Cluster Name [ceph] (default) on this example ⇒ [ceph.conf]

root@node01:~#
vi /etc/ceph/ceph.conf

```
[global]
# specify cluster network for monitoring
cluster network = 10.0.0.0/24
# specify public network
public network = 10.0.0.0/24
# specify UUID genarated above
fsid = 3adf5d85-7d69-455d-82cf-f799e63981e4
# specify IP address of Monitor Daemon
mon host = 10.0.0.51
# specify Hostname of Monitor Daemon
mon initial members = node01
osd pool default crush rule = -1

# mon.(Node name)
[mon.node01]
# specify Hostname of Monitor Daemon
host = node01
# specify IP address of Monitor Daemon
mon addr = 10.0.0.51
# allow to delete pools
mon allow pool delete = true
```

generate secret key for Cluster monitoring

root@node01:~#
ceph-authtool --create-keyring /etc/ceph/ceph.mon.keyring --gen-key -n mon. --cap mon 'allow *'

creating /etc/ceph/ceph.mon.keyring
generate secret key for Cluster admin

root@node01:~#
ceph-authtool --create-keyring /etc/ceph/ceph.client.admin.keyring --gen-key -n client.admin --cap mon 'allow *' --cap osd 'allow *' --cap mds 'allow *' --cap mgr 'allow *'

creating /etc/ceph/ceph.client.admin.keyring
generate key for bootstrap

root@node01:~#
ceph-authtool --create-keyring /var/lib/ceph/bootstrap-osd/ceph.keyring --gen-key -n client.bootstrap-osd --cap mon 'profile bootstrap-osd' --cap mgr 'allow r'

creating /var/lib/ceph/bootstrap-osd/ceph.keyring
import generated key

root@node01:~#
ceph-authtool /etc/ceph/ceph.mon.keyring --import-keyring /etc/ceph/ceph.client.admin.keyring

importing contents of /etc/ceph/ceph.client.admin.keyring into /etc/ceph/ceph.mon.keyring
root@node01:~#
ceph-authtool /etc/ceph/ceph.mon.keyring --import-keyring /var/lib/ceph/bootstrap-osd/ceph.keyring

importing contents of /var/lib/ceph/bootstrap-osd/ceph.keyring into /etc/ceph/ceph.mon.keyring
generate monitor map

root@node01:~#
FSID=$(grep "^fsid" /etc/ceph/ceph.conf | awk {'print $NF'})

root@node01:~#
NODENAME=$(grep "^mon initial" /etc/ceph/ceph.conf | awk {'print $NF'})

root@node01:~#
NODEIP=$(grep "^mon host" /etc/ceph/ceph.conf | awk {'print $NF'})

root@node01:~#
monmaptool --create --add $NODENAME $NODEIP --fsid $FSID /etc/ceph/monmap

monmaptool: monmap file /etc/ceph/monmap
setting min_mon_release = octopus
monmaptool: set fsid to 3adf5d85-7d69-455d-82cf-f799e63981e4
monmaptool: writing epoch 0 to /etc/ceph/monmap (1 monitors)
create a directory for Monitor Daemon
directory name ⇒ (Cluster Name)-(Node Name)

root@node01:~#
mkdir /var/lib/ceph/mon/ceph-node01
associate key and monmap to Monitor Daemon
--cluster (Cluster Name)

root@node01:~#
ceph-mon --cluster ceph --mkfs -i $NODENAME --monmap /etc/ceph/monmap --keyring /etc/ceph/ceph.mon.keyring

root@node01:~#
chown ceph. /etc/ceph/ceph.*

root@node01:~#

chown -R ceph. /var/lib/ceph/mon/ceph-node01 /var/lib/ceph/bootstrap-osd

root@node01:~#
systemctl enable --now ceph-mon@$NODENAME
enable Messenger v2 Protocol

root@node01:~#
ceph mon enable-msgr2
root@node01:~#
ceph config set mon auth_allow_insecure_global_id_reclaim false
enable Placement Groups auto scale module

root@node01:~#
ceph mgr module enable pg_autoscaler
create a directory for Manager Daemon
directory name ⇒ (Cluster Name)-(Node Name)

root@node01:~#
mkdir /var/lib/ceph/mgr/ceph-node01
create auth key

root@node01:~#
ceph auth get-or-create mgr.$NODENAME mon 'allow profile mgr' osd 'allow *' mds 'allow *'

```
[mgr.node01]
        key = AQD69Q5jtGMHEBAAIC5m4s/QVmw2Xw7JggeDiA==
```

root@node01:~#
ceph auth get-or-create mgr.node01 | tee /etc/ceph/ceph.mgr.admin.keyring

root@node01:~#
cp /etc/ceph/ceph.mgr.admin.keyring /var/lib/ceph/mgr/ceph-node01/keyring

root@node01:~#
chown ceph. /etc/ceph/ceph.mgr.admin.keyring

root@node01:~#
chown -R ceph. /var/lib/ceph/mgr/ceph-node01

root@node01:~#
systemctl enable --now ceph-mgr@$NODENAME

[4] Confirm Cluster status. That's OK if [Monitor Daemon] and [Manager Daemon] are enabled like follows.
For OSD (Object Storage Device), Configure them on next section, so it's no problem if [HEALTH_WARN] at this point.

root@node01:~#
ceph -s

```
  cluster:
    id:     3adf5d85-7d69-455d-82cf-f799e63981e4
    health: HEALTH_WARN
            OSD count 0 < osd_pool_default_size 3

  services:
    mon: 1 daemons, quorum node01 (age 3m)
    mgr: node01(active, since 2m)
    osd: 0 osds: 0 up, 0 in

  data:
    pools:   0 pools, 0 pgs
    objects: 0 objects, 0 B
    usage:   0 B used, 0 B / 0 B avail
    pgs:
```