Day 2 operations
(aka make friends with your Ceph cluster)
whoami
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cluster:
  id:   b3b83586-5629-4df8-be73-cc129efdea9e
  health: HEALTH_OK

services:
  mon: 5 daemons, quorum ceph-mon-01, ceph-mon-02, ceph-mon-03, ceph-mon-04, ceph-mon-05
  mgr: ceph-mon-01(active), standbys: ceph-mon-04, ceph-mon-02, ceph-mon-03, ceph-mon-05
  osd: 16 osds: 16 up, 16 in

data:
  pools: 3 pools, 512 pgs
  objects: 19.97 k objects, 78 GiB
  usage: 121 GiB used, 679 GiB / 800 GiB avail
  pgs: 512 active+clean
**SSD** : OK
**RAM** : OK
**Network** : OK
<table>
<thead>
<tr>
<th>logging &amp; monitoring</th>
<th>tooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>updates</td>
<td>maintenance &amp; cluster life</td>
</tr>
</tbody>
</table>
logging & monitoring
Tens, hundreds, thousands components on a lot of machines
Precious information scattered across the cluster(s)
Aggregate all the logs
(Okay, but how ?)
1. Collect via (r)syslog, graylog, filebeat, etc...
2. Parse and store with logstash and elasticsearch
3. Consult and alert with kibana
Ceph can be *really* chatty
Adjust ceph logs options

[global]
  debug ms = 1/5
[mon]
  debug mon = 1/5
[osd]
  debug osd = 1/5

Adjust global logs options

[global]
  log to syslog = true
  log to file = false
  log to syslog level = error
[mon]
  mon cluster log to syslog = true
  mon cluster log to syslog level = error
Next step, some monitoring!
monitoring vs metrics
monitor using your tools
zabbix (integrated in mgr), nagios & cie, etc.
metrics : use the **right** tool for you (and Grafana)
mgr: prometheus, influxdb, telegraf
mind major and minor ceph versions, statistics
“But I don’t have Luminous yet!”
Upgrade !
https://github.com/ceph/cephmetrics

ansible + collectd + prometheus + grafana
tooling
please, use a ceph management tool
eases and centralizes configs for all theses services
surely one fits your needs and affinities

ceph-ansible / ceph-deploy / deepsea / puppet
run them regularly
why not gitops?
first step towards CI/CD
updates
“If it works, no need to update.”

Jean-Michel, 1984
2030+ changes, 9750+ commits

from mimic to nautilus
1150+ changes, 5100+ commits

from 12.2.0 to 12.2.12
update, carefully
release notes are your go-to reference
follow them rigorously, up to the last word
test and share your experiences
maintenance & cluster life
Disks will fail
cluster:
  id: b091875b-4331-48ad-877d-73b4c4dfe6a
  health: HEALTH_ERR
    1 scrub errors
    Possible data damage: 1 pg inconsistent

services:
  mon: 3 daemons, quorum ceph-mon-01, ceph-mon-02, ceph-mon-03
  mgr: ceph-mon-01(active), standbys: ceph-mon-02, ceph-mon-03
  osd: 112 osds: 112 up, 112 in

data:
  pools: 2 pools, 2304 pgs
  objects: 42396k objects, 165 TB
  usage: 281 TB used, 135 TB / 417 TB avail
  pgs: 2303 active+clean
        1 active+clean+inconsistent
Run SMART checks

$ smartctl -t long -d megaraid,8 /dev/sdj
[zzzzzzZZZZZZzzzzzzzz]

$ smartctl -a -d megaraid,8 /dev/sdj
Error counter log:

<table>
<thead>
<tr>
<th></th>
<th>ECC</th>
<th>read: 3107387532</th>
<th>rewrites</th>
<th>Total</th>
<th>Correction</th>
<th>Gigabytes</th>
<th>Total uncorrected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>delayed</td>
<td></td>
<td>errors</td>
<td>algorithm</td>
<td>processed</td>
<td>errors</td>
</tr>
<tr>
<td></td>
<td>fast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[10^9 bytes]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>write:</td>
<td>0</td>
<td>647</td>
<td>0</td>
<td>3107388179</td>
<td>1526</td>
<td>274622.764</td>
<td>860</td>
</tr>
<tr>
<td>verify</td>
<td>2087188</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>96613.639</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-medium error count:</td>
<td>3035</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SMART Self-test log

<table>
<thead>
<tr>
<th>Num</th>
<th>Test Description</th>
<th>Status</th>
<th>segment number</th>
<th>LifeTime (hours)</th>
<th>LBA_first_err [SK ASC ASQ]</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td>Background long</td>
<td>Failed in segment</td>
<td>68</td>
<td>8923</td>
<td>- [- - - -]</td>
</tr>
<tr>
<td># 2</td>
<td>Background short</td>
<td>Completed</td>
<td>64</td>
<td>4</td>
<td>- [- - - -]</td>
</tr>
<tr>
<td># 3</td>
<td>Reserved(7)</td>
<td>Completed</td>
<td>64</td>
<td>4</td>
<td>- [- - - -]</td>
</tr>
<tr>
<td># 4</td>
<td>Background short</td>
<td>Completed</td>
<td>64</td>
<td>2</td>
<td>- [- - - -]</td>
</tr>
</tbody>
</table>

Long (extended) Self Test duration: 32700 seconds [545.0 minutes]
Replace the disk (1/2)

```bash
$ ceph osd crush reweight osd.<x> 0
    # wait for the end of the recovery
$ ceph osd out <x>
    # stop OSD service
$ ceph osd crush remove osd.<x>
$ ceph auth del osd.<x>
$ ceph osd rm {osd-num}
    # cluster is HEALTH_OK again
    # replace the physical disk
    # recreate a new OSD with your favorite tool
```

- scrub errors on OSD, but the OSD still works
- or
- no replacement disk immediately available
Replace the disk (2/2)

$ ceph osd set noout
# if OSD not already down, stop OSD service
$ ceph auth del osd.<x>
$ ceph osd rm {osd-num}
# replace the physical disk
# recreate a new OSD with your favorite tool
# OSD should have the same ID as the old one
# if so the cluster will rebalance
$ ceph osd unset noout

replacement disk immediately available
PGs are your most precious resource
~100 PGs / OSD

less : more risks of imbalance
more : overstress the cluster
plan carefully

https://ceph.com/pgcalc/
start low, increase incrementally
understand PG states

http://docs.ceph.com/docs/nautilus/rados/operations/pg-states/
scrubs are you data best friends

but can also be you worst nightmares
essential to data integrity
complementary with bluestore checksums

checksums validate data at read
scrubs checks all the data, including idle data
configure according to your needs

[osd]
# scrub during off-peak hours (e.g. at night)
osd scrub begin hour = 20
osd scrub end hour = 8

# ease the scrub process in favor of client IO
osd scrub sleep = 0.1

# default deep scrub interval is one week
# may be too short with the new scrub window
osd deep scrub interval = 1209600
# if scrub interval is adjusted, also adjust max interval
# or scrubs may occur outside defined window
osd scrub max interval = 2592000
ceph is *hard*

storage + distributed system
but the future is bright!
balancer mgr module
orchestrator mgr module
dashboard
PG decrease and automatic tuning
disk failure prediction
centralized configuration in monitors
thank you!