UPGRADING CEPH

You can upgrade daemons in your Ceph cluster one-by-one while the cluster is online and in service! The upgrade process is relatively simple:

1. Login to a host and upgrade the Ceph package.
2. Restart the daemon.
3. Ensure your cluster is healthy.

Important: Once you upgrade a daemon, you cannot downgrade it.

Certain types of daemons depend upon others. For example, metadata servers and RADOS gateways depend upon Ceph monitors and OSDs. We recommend upgrading daemons in this order:

1. Monitors (or OSDs)
2. OSDs (or Monitors)
3. Metadata Servers
4. RADOS Gateway

As a general rule, we recommend upgrading all the daemons of a specific type (e.g., all `ceph-osd` daemons, all `ceph-mon` daemons, etc.) to ensure that they are all on the same release. We also recommend that you upgrade all the daemons in your cluster before you try to exercise new functionality in a release.

Each release of Ceph may have some additional steps. Refer to the following sections to identify release-specific procedures for your cluster before using the upgrade procedures.

ARGONAUT TO BOBTAIL

When upgrading from Argonaut to Bobtail, you need to be aware of several things:

1. Authentication now defaults to **ON**, but used to default to **OFF**.
2. Monitors use a new internal on-wire protocol.
3. RBD `format2` images require upgrading all OSDs before using it.

Ensure that you update package repository paths. For example:

```
sudo rm /etc/apt/sources.sources.list.d/ceph.list
echo deb http://ceph.com/debian-bobtail/ $(lsb_release -sc) main | sudo tee /etc/apt/sources.
```

See the following sections for additional details.

AUTHENTICATION

The Ceph Bobtail release enables authentication by default. Bobtail also has finer-grained authentication configuration settings. In previous versions of Ceph (i.e., actually v 0.55 and earlier), you could simply specify:

```
auth supported = [cephx | none]
```

This option still works, but is deprecated. New releases support `cluster`, `service` and `client` authentication settings as follows:

```
auth cluster required = [cephx | none]  # default cephx
auth service required = [cephx | none] # default cephx
auth client required = [cephx | none] # default cephx,none
```

Important: If your cluster does not currently have an `auth supported` line that enables authentication, you must explicitly turn it off in Bobtail using the settings below.:

```
auth cluster required = none
auth service required = none
```

This will disable authentication on the cluster, but still leave clients with the default configuration where they can talk to a cluster that does enable it, but do not require it.

Important: If your cluster already has an `auth supported` option defined in the configuration file, no changes are necessary.

See Ceph Authentication - Backward Compatibility for details.

MONITOR ON-WIRE PROTOCOL

We recommend upgrading all monitors to Bobtail. A mixture of Bobtail and Argonaut monitors will not be able to use the new on-wire protocol, as the protocol requires all monitors to be Bobtail or greater. Upgrading only a majority of the nodes (e.g., two out of three) may expose the cluster to a situation where a single additional failure may compromise availability (because the non-upgraded daemon cannot participate in the new protocol). We recommend not waiting for an extended period of time between `ceph-mon` upgrades.

RBD IMAGES

The Bobtail release supports `format 2` images! However, you should not create or use `format 2` RBD images until after all `ceph-osd` daemons have been upgraded. Note that `format 1` is still the default. You can use the new `ceph osd ls` and `ceph tell osd.N version` commands to doublecheck your cluster. `ceph osd ls` will give a list of all OSD IDs that are part of the cluster, and you can use that to write a simple shell loop to display all the OSD version strings:

```
for i in $(ceph osd ls); do
    ceph tell osd.${i} version
done
```

ARGONAUT TO CUTTLEFISH

To upgrade your cluster from Argonaut to Cuttlefish, please read this section, and the sections on upgrading from Argonaut to Bobtail and upgrading from Bobtail to Cuttlefish carefully. When upgrading from Argonaut to Cuttlefish, **YOU MUST UPGRADE YOUR MONITORS FROM ARGONAUT TO BOBTAIL FIRST!!!**. All other Ceph daemons can upgrade from Argonaut to Cuttlefish without the intermediate upgrade to Bobtail.

Important: Ensure that the repository specified points to Bobtail, not Cuttlefish.

For example:

```
sudo rm /etc/apt/sources.sources.list.d/ceph.list
echo deb http://ceph.com/debian-bobtail/ $(lsb_release -sc) main | sudo tee /etc/apt/sources.
```

We recommend upgrading all monitors to Bobtail before proceeding with the upgrade of the monitors to Cuttlefish. A mixture of Bobtail and Argonaut monitors will not be able to use the new on-wire protocol, as the protocol requires all monitors to be Bobtail or greater. Upgrading only a majority of the nodes (e.g., two out of three) may expose the cluster to a situation where a single additional failure may compromise availability (because the non-upgraded daemon cannot participate in the new protocol). We recommend not waiting for an extended period of time between `ceph-mon` upgrades. See Upgrading a Monitor for details.

Note: See the Authentication section and the Ceph Authentication - Backward Compatibility for additional information on authentication backward compatibility settings for Bobtail.

Once you complete the upgrade of your monitors from Argonaut to Bobtail, you must upgrade the monitors from Bobtail to Cuttlefish. Ensure that you have a quorum before beginning this upgrade procedure. Before upgrading, remember to replace the reference to the Bobtail repository with a reference to the Cuttlefish repository. For example:

```
sudo rm /etc/apt/sources.sources.list.d/ceph.list
echo deb http://ceph.com/debian-cuttlefish/ $(lsb_release -sc) main | sudo tee /etc/apt/sourc
```

See Upgrading a Monitor for details.

The architecture of the monitors changed significantly from Argonaut to Cuttlefish. See Monitor Config Reference and Joao's blog post for details. Once you complete the monitor upgrade, you can upgrade the OSD daemons and the MDS daemons using the generic procedures. See Upgrading an OSD and Upgrading a Metadata Server for details.

BOBTAIL TO CUTTLEFISH

Upgrading your cluster from Bobtail to Cuttlefish has a few important considerations. First, the monitor uses a new architecture, so you should upgrade the full set of monitors to use Cuttlefish. Second, if you run multiple metadata servers in a cluster, ensure the metadata servers have unique names. See the following sections for details.

Replace any `apt` reference to older repositories with a reference to the Cuttlefish repository. For example:

```
sudo rm /etc/apt/sources.sources.list.d/ceph.list
echo deb http://ceph.com/debian-cuttlefish/ $(lsb_release -sc) main | sudo tee /etc/apt/sourc
```

MONITOR

The architecture of the monitors changed significantly from Bobtail to Cuttlefish. See Monitor Config Reference and Joao's blog post for details. This means that v0.59 and pre-v0.59 monitors do not talk to each other (Cuttlefish is v.0.61). When you upgrade each monitor, it will convert its local data store to the new format. Once you upgrade a majority of monitors, the monitors form a quorum using the new protocol and the old monitors will be blocked until they get upgraded. For this reason, we recommend upgrading the monitors in immediate succession.

Important: Do not run a mixed-version cluster for an extended period.

MDS UNIQUE NAMES

The monitor now enforces that MDS names be unique. If you have multiple metadata server daemons that start with with the same ID (e.g., mds.a) the second metadata server will implicitly mark the first metadata server as `failed`. Multi-MDS configurations with identical names must be adjusted accordingly to give daemons unique names. If you run your cluster with one metadata server, you can disregard this notice for now.

UPGRADE PROCEDURES

The following sections describe the upgrade process.

Important: Each release of Ceph may have some additional steps. Refer to release-specific sections for details **BEFORE** you begin upgrading daemons.

UPGRADING A MONITOR

To upgrade a monitor, perform the following steps:

1. Upgrade the ceph package:

   ```
   ssh {mon-host}
   sudo apt-get update && sudo apt-get install ceph
   ```

2. Restart the monitor:

   ```
   service ceph restart mon.{name}
   ```

3. Ensure the monitor has rejoined the quorum.

```
ceph mon stat
```

Once you have successfully upgraded a monitor, you may upgrade another monitor until you have completed the upgrade cycle for all of your monitors.

UPGRADING AN OSD

To upgrade an OSD peform the following steps:

1. Upgrade the OSD package:

```
ssh {osd-host}
sudo apt-get update && sudo apt-get install ceph
```

2. Restart the OSD, where `N` is the OSD number:

```
service ceph restart osd.N
```

3. Ensure the upgraded OSD has rejoined the cluster:

```
ceph osd stat
```

Once you have successfully upgraded an OSD, you may upgrade another OSD until you have completed the upgrade cycle for all of your OSDs.

UPGRADING A METADATA SERVER

To upgrade an MDS, perform the following steps:

1. Upgrade the ceph package:

```
ssh {mds-host}
sudo apt-get update && sudo apt-get install ceph-mds
```

2. Restart the metadata server:

```
service ceph restart mds.{name}
```

3. Ensure the metadata server is up and running:

```
ceph mds stat
```

Once you have successfully upgraded a metadata, you may upgrade another metadata server until you have completed the upgrade cycle for all of your metadata servers.

UPGRADING A CLIENT

Once you have upgraded the packages and restarted daemons on your Ceph cluster, we recommend upgrading `ceph-common` and client libraries (`librbd1` and `librados2`) on your client nodes too.

1. Upgrade the package:

```
ssh {client-host}
apt-get update && sudo apt-get install ceph-common librados2 librbd1 python-ceph
```

2. Ensure that you have the latest version:

```
ceph --version
```