

## Ceph - Bug #12673

### cache agent is idle although one object is left in the cache

08/12/2015 08:25 AM - Loic Dachary

<b>Status:</b>	Resolved	<b>Start date:</b>	08/12/2015
<b>Priority:</b>	High	<b>Due date:</b>	
<b>Assignee:</b>	Loic Dachary	<b>% Done:</b>	0%
<b>Category:</b>		<b>Estimated time:</b>	0.00 hour
<b>Target version:</b>		<b>Spent time:</b>	0.00 hour
<b>Source:</b>		<b>Reviewed:</b>	
<b>Tags:</b>		<b>Affected Versions:</b>	
<b>Backport:</b>	firefly,hammer	<b>ceph-qa-suite:</b>	
<b>Regression:</b>	No	<b>Pull request ID:</b>	
<b>Severity:</b>			

#### Description

Steps to reproduce:

```
./stop.sh  
rm -fr out dev ; MON=1 OSD=3 ./vstart.sh -X -d -n -l mon osd
```

```
ceph osd pool create slow 1 1  
ceph osd pool create fast 1 1  
ceph osd tier add slow fast  
ceph osd tier cache-mode fast writeback  
ceph osd tier set-overlay slow fast  
ceph osd pool set fast hit_set_type bloom  
rados -p slow put obj3 /etc/group  
ceph osd pool set fast target_max_objects 1  
ceph osd pool set fast hit_set_count 1  
ceph osd pool set fast hit_set_period 5
```

```
sleep 30  
ceph df
```

```
rados -p slow get obj3 /tmp/obj3  
ceph df
```

```
sleep 30
```

```
ceph df  
ceph health detail
```

The obj3 is not evicted from the fast pool.

```
$ ceph df
```

```
*** DEVELOPER MODE: setting PATH, PYTHONPATH and LD_LIBRARY_PATH ***
```

```
GLOBAL:
```

```
SIZE      AVAIL      RAW USED      %RAW USED  
547G      53735M      494G      90.40
```

```
POOLS:
```

```
NAME      ID      USED      %USED      MAX AVAIL      OBJECTS  
rbd       0        0         0         17909M         0  
slow      1       3834         0         17909M         3  
fast      2       1363         0         17909M         2
```

```
$ rados -p fast ls
```

```
obj3
```

**Related issues:**

Copied to Ceph - Backport #12882: cache agent is idle although one object is ...	<b>Resolved</b>	<b>08/12/2015</b>
Copied to Ceph - Backport #12883: cache agent is idle although one object is ...	<b>Resolved</b>	<b>08/12/2015</b>

**Associated revisions****Revision e1f58feb - 08/14/2015 12:31 PM - Loic Dachary**

osd: trigger the cache agent after a promotion

When a proxy read happens, the object promotion is done in parallel. The agent\_choose\_mode function must be called to reconsider the situation to protect against the following scenario:

- proxy read
- agent\_choose\_mode finds no object exists and the agent goes idle
- object promotion happens
- the agent does not reconsider and eviction does not happen although it should

<http://tracker.ceph.com/issues/12673> Fixes: #12673

Signed-off-by: Loic Dachary <[ldachary@redhat.com](mailto:ldachary@redhat.com)>

**Revision 79242319 - 08/14/2015 12:31 PM - Loic Dachary**

tests: tiering agent and proxy read

Verify that an object promoted to a cache tier because of a proxy read is evicted as expected.

<http://tracker.ceph.com/issues/12673> Refs: #12673

Signed-off-by: Loic Dachary <[ldachary@redhat.com](mailto:ldachary@redhat.com)>

**Revision aa911767 - 09/04/2015 03:13 PM - Loic Dachary**

osd: trigger the cache agent after a promotion

When a proxy read happens, the object promotion is done in parallel. The agent\_choose\_mode function must be called to reconsider the situation to protect against the following scenario:

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- object promotion happens
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<http://tracker.ceph.com/issues/12673> Fixes: #12673

Signed-off-by: Loic Dachary <[ldachary@redhat.com](mailto:ldachary@redhat.com)>  
(cherry picked from commit e1f58feb9b1d20b72f2eb2eefdea5982e0cddccd)

**Revision 2c0d7fee - 09/04/2015 03:17 PM - Loic Dachary**

tests: tiering agent and proxy read

Verify that an object promoted to a cache tier because of a proxy read is evicted as expected.

<http://tracker.ceph.com/issues/12673> Refs: #12673

Signed-off-by: Loic Dachary <[ldachary@redhat.com](mailto:ldachary@redhat.com)>  
(cherry picked from commit 7924231930732bd297d3bd034c8295e96cb81088)

Conflicts:  
qa/workunits/cephtool/test.sh  
resolved by manually adding the new test to TESTS

**Revision 5656eec0 - 09/06/2015 09:28 PM - Loic Dachary**

osd: trigger the cache agent after a promotion

When a proxy read happens, the object promotion is done in parallel. The agent\_choose\_mode function must be called to reconsider the situation to protect against the following scenario:

- proxy read
- agent\_choose\_mode finds no object exists and the agent goes idle
- object promotion happens
- the agent does not reconsider and eviction does not happen although it should

<http://tracker.ceph.com/issues/12673> Fixes: #12673

Signed-off-by: Loic Dachary <[ldachary@redhat.com](mailto:ldachary@redhat.com)>  
(cherry picked from commit e1f58feb9b1d20b72f2eb2eefdea5982e0cddccd)

**Revision 9f696601 - 09/06/2015 09:28 PM - Loic Dachary**

tests: tiering agent and proxy read

Verify that an object promoted to a cache tier because of a proxy read is evicted as expected.

<http://tracker.ceph.com/issues/12673> Refs: #12673

Signed-off-by: Loic Dachary <[ldachary@redhat.com](mailto:ldachary@redhat.com)>  
(cherry picked from commit 7924231930732bd297d3bd034c8295e96cb81088)

## History

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### #1 - 08/12/2015 08:25 AM - Loic Dachary

- Assignee set to Loic Dachary
- Affected Versions v0.94.2 added

### #2 - 08/12/2015 02:24 PM - Loic Dachary

Confirmed on master as well.

### #3 - 08/12/2015 04:13 PM - Loic Dachary

The cache agent does not wake up when a proxy read happens and promotes the object in ReplicatedPG::maybe\_handle\_cache. The last manifestation of the agent is when OSDService::agent\_entry found an empty queue and started waiting on agent\_cond.

```
2015-08-12 18:03:26.195127 7f2e7f7ae700 20 osd.2 17 agent_entry empty queue
```

After the rados get, agent\_choose\_mode is called

```
2015-08-12 18:03:52.175635 7f2e959ab700 10 osd.2 pg_epoch: 17 pg[2.0( v 17'5 (0'0,17'5] local-les=11 n=1 ec=10
les/c 11/11 10/10/10) [2,1,0] r=0 lpr=10 luod=17'4 lua=17'4 crt=16'3 lcod 16'3 mlcod 16'3 active+clean] agent
_choose_mode flush_mode: idle evict_mode: idle num_objects: 1 num_bytes: 83 num_objects_dirty: 0 num_objects_o
map: 0 num_dirty: 0 num_user_objects: 0 num_user_bytes: 0 pool.info.target_max_bytes: 0 pool.info.target_max_o
bjects: 1
2015-08-12 18:03:52.175641 7f2e959ab700 20 osd.2 pg_epoch: 17 pg[2.0( v 17'5 (0'0,17'5] local-les=11 n=1 ec=10
les/c 11/11 10/10/10) [2,1,0] r=0 lpr=10 luod=17'4 lua=17'4 crt=16'3 lcod 16'3 mlcod 16'3 active+clean] agent
_choose_mode dirty 0 full 0
```

and it could call agent\_enable\_pg or agent\_adjust\_pg which could call \_enqueue which could signal agent\_cond. But that apparently does not happen.

#### #4 - 08/12/2015 04:14 PM - Loic Dachary

- Description updated

#### #5 - 08/12/2015 05:20 PM - Sage Weil

The `hit_set_period` value of 5 is super low.. you probably want 600 at a minimum (10 minutes). But I'm not sure that's your problem.

Another possibility is that there are so few user objects in the pool vs the `hit_set` objects (1 + 1?), and there's an off-by-one or rounding error in the code that prevents the agent from busy looping trying to flush/evict. Or that a histogram of 1 object isn't behaving (e.g., showing that 1 object as 100th instead of 0th percentile vs the configured threshold).

Try putting more objects in the pool and see if the effect is still there? And increase the `hit_set_period`?

#### #6 - 08/12/2015 08:59 PM - Loic Dachary

- Status changed from Verified to Won't Fix

When using 50 objects instead of just one as in the tracker description, the cache eviction happens as expected.

```
./stop.sh
rm -fr out dev ; MON=1 OSD=3 ./vstart.sh -X -d -n -l mon osd
```

```
ceph osd pool create slow 1 1
ceph osd pool create fast 1 1
ceph osd tier add slow fast
ceph osd tier cache-mode fast writeback
ceph osd tier set-overlay slow fast
ceph osd pool set fast hit_set_type bloom
for i in $(seq 1 50) ; do
    rados -p slow put obj$i /etc/group
done
ceph osd pool set fast target_max_objects 1
ceph osd pool set fast hit_set_count 1
ceph osd pool set fast hit_set_period 5
```

```
sleep 30
ceph df
```

```
for i in $(seq 1 5) ; do
    rados -p slow get obj$i /tmp/obj$i
done
ceph df
```

```
sleep 30
```

```
ceph df
ceph health detail
```

The cache eviction mode determined by `ReplicatedPG::agent_choose_mode` does not count the objects, it relies on ratios. As Sage explains, that can lead to rounding / off by one errors when there are few objects. In other words, a single object may be stuck in the cache pool because the cache agent is not running.

Although these border cases are common when engineering a test case, they do not matter when there is a real workload because the agent will act properly if

- there are a few more objects
- a read or a write happen

If a test case needs to validate the eviction behavior, adding more objects as above is a workaround to avoid this rounding error.

Although it would be possible to fix this behavior so that it always do the right thing regardless, it probably is not worth the effort. It would slightly help someone crafting tests for the eviction logic. But this same someone would need to know about the eviction logic and understand why this situation should be avoided.

If someone feels differently, please re-open this issue.

**#7 - 08/12/2015 09:00 PM - Loic Dachary**

- *Subject changed from object is not evicted to cache agent is idle although one object is left in the cache*

**#8 - 08/12/2015 09:01 PM - Loic Dachary**

- *Affected Versions deleted (v0.94.2)*

**#9 - 08/13/2015 05:44 AM - Kefu Chai**

Loïc, just want to rectify some points here.

```
agent_choose_mode flush_mode: idle evict_mode: idle num_objects: 1 num_bytes: 83 num_objects_dirty: 0 num_objects_omap: 0 num_dirty: 0 num_user_objects: 0 num_user_bytes: 0 pool.info.target_max_bytes: 0 pool.info.target_max_objects: 1
```

so there was 1 hit\_set\_archive object which took 83 bytes. and this sort of objects is not taken into the consideration of cache eviction. as what we care about is only the number/size of user objects. that's the root cause why we failed to evict this non-user object in your test.

The cache eviction mode determined by ReplicatedPG::agent\_choose\_mode does not count the objects, it relies on ratios.

yes, so we need to take following things into consideration

- the target\_max\_bytes/target\_max\_objects are per-pool settings, but we are doing the evict at the PG level. so we normalize the number using pg\_num. but your pool's pg\_num is 1. so we are fine.
- even if the number of **user** object is just 1, we can still have it evicted. as long as it is a genuine object.

probably we should update the section of "ceph df" section in manpage of "ceph" to clarify that there could be some objects are non-user object, for example, are used by hit\_set archiving and/or objects-omap.

**#10 - 08/13/2015 06:50 AM - Loic Dachary**

- *Tracker changed from Bug to Documentation*

- *Status changed from Won't Fix to Verified*

- *Assignee deleted (Loic Dachary)*

Even if this is not fixed, it should be documented in a place where the developer / tester / user facing this situation will find it when looking for an explanation.

**#11 - 08/13/2015 10:25 AM - Loic Dachary**

- *Tracker changed from Documentation to Bug*
- *Assignee set to Loic Dachary*
- *Regression set to No*

**#12 - 08/13/2015 10:33 AM - Loic Dachary**

Running the script in the description, here is what I find in the logs: when the `agent_choose_mode` function runs at 2015-08-13 11:47:33.129187 it finds there are `num_user_objects: 0`. Later on at 2015-08-13 11:47:33.131668 `finish_promote 2/6cf8deff/obj1/head` happens and if `agent_choose_mode` was to be run again, it would find that there is one `user_objects`. But it does not run and does not get a chance to reconsider.

**#13 - 08/13/2015 10:34 AM - Loic Dachary**

- *File `osd.2.log.gz` added*

**#14 - 08/13/2015 11:55 AM - Loic Dachary**

- *Status changed from Verified to Need Review*

<https://github.com/ceph/ceph/pull/5570>

**#15 - 08/13/2015 01:42 PM - Kefu Chai**

- *Backport set to `firefly,hammer`*

**#16 - 08/19/2015 02:47 PM - Loic Dachary**

- *Priority changed from Normal to High*

**#17 - 08/24/2015 10:52 AM - Kefu Chai**

- *Status changed from Need Review to Testing*

**#18 - 08/31/2015 04:05 AM - Kefu Chai**

- *Status changed from Testing to Pending Backport*

**#19 - 10/20/2015 07:40 PM - Loic Dachary**

- *Status changed from Pending Backport to Resolved*

**Files**

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osd.2.log.gz	727 KB	08/13/2015	Loic Dachary
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