

# Grouper automatically delete old data

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This is available in Grouper API 2.3.0 patch 97+.

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## Delete audit entries with no logged in user

Configured in grouper-loader properties

```
#####
## audit entries with no logged in user aren't really all that useful.  There is point in time data still.  So
removing these shouldn't be a big deal
## default is remove these that are 5 years old.
#####

# number of days to retain db rows in grouper_audit_entry with no logged in user (loader, gsh, etc).  -1 is
forever.  suggested is 365 or five years: 1825.  Default is -1
loader.retain.db.audit_entry_no_logged_in_user.days=-1
```

Call from GSH

```
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldAuditEntryNoLoggedInUser
(1825);

// delete records older than the configured amount of days
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldAuditEntryNoLoggedInUser();

// delete records older than the specified amount of days
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldAuditEntryNoLoggedInUser
(int);
```

Example logs in [grouper daemon log](#)

```
2018-02-19 14:54:17,684: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditNotLoggedInDays: -1, threadId: 1, elapsed: 0 ms
2018-02-19 14:54:17,694: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditNotLoggedInDays: 9, deleteOldAuditNotLoggedInCount: 0, threadId: 1, elapsed: 2 ms
2018-02-19 14:54:17,715: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditNotLoggedInDays: 7, deleteOldAuditNotLoggedInCount: 1, threadId: 1, elapsed: 15
ms
2018-02-19 14:54:17,736: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditNotLoggedInDays: 5, deleteOldAuditNotLoggedInCount: 1, threadId: 1, elapsed: 14
ms
```

## Delete audit entries

Configured in grouper-loader properties

```
#####
## Some think its ok to remove all audit entries over 10 (or X) years, but will default this
## to never since even at large institutions there aren't that many records.
## These are audits for things people do on the UI or WS generally (as a different to records with no logged in
## user)
#####

# number of days to retain db rows in grouper_audit_entry. -1 is forever. suggested is -1 or ten years: 3650
loader.retain.db.audit_entry.days=-1
```

#### Call from GSH

```
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldAuditEntry(3650);

// delete records older than the configured amount of days
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldAuditEntry();

// delete records older than the specified amount of days
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldAuditEntry(int);
```

#### Example logs in [grouper daemon log](#)

```
2018-02-19 14:54:25,125: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditDays: -1, threadId: 1, elapsed: 0 ms
2018-02-19 14:54:25,132: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditDays: 9, deleteOldAuditCount: 0, threadId: 1, elapsed: 2 ms
2018-02-19 14:54:25,143: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditDays: 7, deleteOldAuditCount: 2, threadId: 1, elapsed: 5 ms
2018-02-19 14:54:25,154: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteOldAuditDays: 5, deleteOldAuditCount: 2, threadId: 1, elapsed: 5 ms
```

## Delete old deleted point in time data

#### Configured in grouper-loader.properties

```
#####
## After you delete an object in grouper, it is still in point in time. So if you want to know who
## was in a group a year ago, you need this info
## However, after some time it might be ok to let it go. So the default is 5 years
#####

# number of days to retain db rows for point in time deleted objects. -1 is forever. suggested is 365 or five
# years: 1825. Default is -1
loader.retain.db.point_in_time_deleted_objects.days=-1
```

#### Call from GSH

```
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldDeletedPointInTimeObjects
(1825);

// delete records older than the configured amount of days
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldDeletedPointInTimeObjects();

// delete records older than the specified amount of days
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.deleteOldDeletedPointInTimeObjects
(int);
```

#### Example logs in [grouper daemon log](#)

```
2018-02-19 14:54:39,461: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteDeletedPointInTimeObjectsDays: -1, threadId: 1, elapsed: 0 ms
2018-02-19 14:54:39,491: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteDeletedPointInTimeObjectsDays: 9, deleteDeletedPointInTimeObjectsCount: 0, threadId: 1,
elapsed: 25 ms
2018-02-19 14:54:39,520: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteDeletedPointInTimeObjectsDays: 7, deleteDeletedPointInTimeObjectsCount: 3, threadId: 1,
elapsed: 24 ms
2018-02-19 14:54:39,601: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, deleteDeletedPointInTimeObjectsDays: 5, deleteDeletedPointInTimeObjectsCount: 3, threadId: 1,
elapsed: 76 ms
```

## Delete old folders

Configured in grouper-loader.properties

```
#####
## This is optional. You can just automatically obliterate folders *directly in a parent folder* that are a
certain age old e.g. courses.
## so you could delete a term of courses 4 years old if you like. Note, make sure the loader isn't going to
recreate or you will get churn
## Note this will also delete the point in time data as well.
#####

# number of days after a subfolder (directly in a parent folder) is created that it will be obliterated
(deleted)
# and point in time will be deleted too.
# "courses" or "anotherLabel" are variables you make up in these examples
#loader.retain.db.folder.courses.days=1825
#loader.retain.db.folder.courses.parentFolderName=my:folder:for:courses
#loader.retain.db.folder.courses.deletePointInTime=true

#loader.retain.db.folder.anotherLabel.days=1825
#loader.retain.db.folder.anotherLabel.parentFolderName=my:folder:for:something
#loader.retain.db.folder.anotherLabel.deletePointInTime=false
```

Call from GSH

```
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.obliterateOldStemsDirectlyInStem
(Set<DeleteOldStem>);

// delete records older than the configured amount of days
edu.internet2.middleware.grouper.app.loader.GrouperDaemonDeleteOldRecords.obliterateOldStemsDirectlyInStem();
```

Example logs in [grouper daemon log](#)

```

2018-02-19 14:51:57,161: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, obliterateOldStemsCount: 0, threadId: 1, elapsed: 0 ms
2018-02-19 14:51:57,168: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, obliterateOldStemsCount: 1, obliterateOldStems.0.stem: test, obliterateOldStems.0.days: 9,
obliterateOldStems.0.deletePointInTime: true, obliterateOldStems.0.stem.subFolderCount: 2, obliterateOldStems.0.
stem.test1.notOldEnoughToDelete: true, obliterateOldStems.0.stem.test2.notOldEnoughToDelete: true, threadId: 1,
elapsed: 6 ms
2018-02-19 14:53:06,383: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, obliterateOldStemsCount: 1, obliterateOldStems.0.stem: test, obliterateOldStems.0.days: 7,
obliterateOldStems.0.deletePointInTime: true, obliterateOldStems.0.stem.subFolderCount: 2, obliterateOldStems.0.
stem.test1.notOldEnoughToDelete: true, obliterateOldStems.0.stem.test2.deleting: true, obliterateOldStems.0.
stem.test2.folderCreatedOn: 2018-02-11 14:51:57.096, threadId: 1, elapsed: 60744 ms
2018-02-19 14:54:06,941: [main] DEBUG GrouperLoaderLog.logDebug(33) - - logType: maintenanceDeleteOldRecords,
overallId: null, obliterateOldStemsCount: 1, obliterateOldStems.0.stem: test, obliterateOldStems.0.days: 5,
obliterateOldStems.0.deletePointInTime: true, obliterateOldStems.0.stem.subFolderCount: 1, obliterateOldStems.0.
stem.test1.deleting: true, obliterateOldStems.0.stem.test1.folderCreatedOn: 2018-02-13 14:51:57.096, threadId:
1, elapsed: 60538 ms

```

## Experience at Grouper Demo

### Pre-patch

```

-- Audit entries: 137210
select count(1) from grouper_audit_entry_v;

-- Audit entries no logged in user: 128204
select count(1) from grouper_audit_entry_v where logged_in_subject_id is null;

-- Audit entries no logged in user older than a month old: 82201
select count(1) from grouper_audit_entry_v where logged_in_subject_id is null and created_on < 1516338000000;

-- PIT entries: 148907
SELECT (SELECT COUNT(1) FROM grouper_pit_attribute_assign)
+ (SELECT COUNT(1) FROM grouper_pit_attribute_def)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn_set)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_value)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name_set)
+ (SELECT COUNT(1) FROM grouper_pit_fields)
+ (SELECT COUNT(1) FROM grouper_pit_groups)
+ (SELECT COUNT(1) FROM grouper_pit_group_set)
+ (SELECT COUNT(1) FROM grouper_pit_members)
+ (SELECT COUNT(1) FROM grouper_pit_memberships)
+ (SELECT COUNT(1) FROM grouper_pit_role_set)
+ (SELECT COUNT(1) FROM grouper_pit_stems) AS pit_count FROM DUAL;

-- PIT entries of deleted objects: 126095
SELECT (SELECT COUNT(1) FROM grouper_pit_attribute_assign WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attribute_def WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_value WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_fields WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_groups WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_group_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_members WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_memberships WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_role_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_stems WHERE end_time IS NOT NULL) AS pit_count FROM DUAL;

-- PIT entries of deleted objects older than a month: 80342
SELECT (SELECT COUNT(1) FROM grouper_pit_attribute_assign WHERE end_time IS NOT NULL and end_time <

```

```

1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_attribute_def WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn_set WHERE end_time IS NOT NULL and end_time <
1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_value WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name_set WHERE end_time IS NOT NULL and end_time <
1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_fields WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_groups WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_group_set WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_members WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_memberships WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_role_set WHERE end_time IS NOT NULL and end_time < 1516338000000000)
+ (SELECT COUNT(1) FROM grouper_pit_stems WHERE end_time IS NOT NULL and end_time < 1516338000000000) AS
pit_count FROM DUAL;

-- Folders in delete folder 'users:penn' newer than 5 years: 5
SELECT COUNT(1) FROM grouper_stems WHERE NAME LIKE 'users:penn:%' AND create_time > 1361250000000;

-- Folders in delete folder 'users:penn' older than 5 years: 39
SELECT COUNT(1) FROM grouper_stems WHERE NAME LIKE 'users:penn:%' AND create_time < 1361250000000;

```

Post-patch: (dont configure anything)

Run the clean logs job

```

gsh 0% grouperSession = GrouperSession.startRootSession();
edu.internet2.middleware.grouper.GrouperSession: 7f8474d2914a4cecac143be77768a34b,'GrouperSystem','application'
gsh 1% loaderRunOneJob("MAINTENANCE_cleanLogs");

loader ran successfully: Deleted 3872 records from grouper_loader_log older than 7 days old. Deleted 2038
records from grouper_change_log_entry older than 14 days old. (1517867128940000) Deleted 0 instrumentation
records older than 30 days old. (1516484734612) Configured to not delete records from audit_entry table with
null logged in member idConfigured to not delete records from audit_entry tableConfigured to not delete records
from DeletedPointInTimeObjects

```

Do counts

```

Audit entries: 137214
Audit entries no logged in user: 128207
Audit entries no logged in user older than a month old: 82201
PIT entries: 148913
PIT entries of deleted objects: 126096
PIT entries of deleted objects older than a month: 80342
Folders in delete folder 'users:penn' newer than 5 years: 5
Folders in delete folder 'users:penn' older than 5 years: 39

```

Configure deletes in grouper-loader.properties

```
#####
## audit entries with no logged in user aren't really all that useful. There is point in time data still.
## So removing these shouldn't be a big deal
## default is remove these that are 5 years old.
#####

# number of days to retain db rows in grouper_audit_entry with no logged in user (loader, gsh, etc). -1 is
forever.
# suggested is 365 or five years: 1825. Default is -1
loader.retain.db.audit_entry_no_logged_in_user.days=31

#####
## Some think its ok to remove all audit entries over 10 (or X) years, but will default this
## to never since even at large institutions there aren't that many records.
## These are audits for things people do on the UI or WS generally (as a different to records with no logged in
user)
#####
# number of days to retain db rows in grouper_audit_entry. -1 is forever. suggested is -1 or ten years: 3650
loader.retain.db.audit_entry.days=365

#####
## After you delete an object in grouper, it is still in point in time. So if you want to know who
## was in a group a year ago, you need this info
## However, after some time it might be ok to let it go. So the default is 5 years
#####

# number of days to retain db rows for point in time deleted objects. -1 is forever. suggested is 365 or five
years: 1825.
# Default is -1
loader.retain.db.point_in_time_deleted_objects.days=31

#####
## This is optional. You can just automatically obliterate folders *directly in a parent folder*
## that are a certain age old e.g. courses.
## so you could delete a term of courses 4 years old if you like. Note, make sure the loader isn't going to
recreate
## or you will get churn
## Note this will also delete the point in time data as well.
#####

# number of days after a subfolder (directly in a parent folder) is created that it will be obliterated
(deleted)
# and point in time will be deleted too.
# "courses" or "anotherLabel" are variables you make up in these examples
loader.retain.db.folder.test.days=1825
loader.retain.db.folder.test.parentFolderName=users:penn
loader.retain.db.folder.test.deletePointInTime=true
```

#### Run the daemon with GSH

```
[appadmin@i2mdev6 tomcats]$ cd tomcat_f_gsh/webapps/grouper_v2_3/WEB-INF/bin/
gsh 0% grouperSession = GrouperSession.startRootSession();
edu.internet2.middleware.grouper.GrouperSession: 7f8474d2914a4cecac143be77768a34b,'GrouperSystem','application'
gsh 1% loaderRunOneJob("MAINTENANCE_cleanLogs");

loader ran successfully: Deleted 3872 records from grouper_loader_log older than 7 days old. Deleted 2038
records from grouper_change_log_entry older than 14 days old. (1517867128940000) Deleted 0 instrumentation
records older than 30 days old. (1516484734612) Configured to not delete records from audit_entry table with
null logged in member idConfigured to not delete records from audit_entry tableConfigured to not delete records
from DeletedPointInTimeObjects
```

#### Counts afterwards

```
-- Audit entries: 3727
-- Audit entries no logged in user: 275
-- Audit entries no logged in user older than a month old: 0
-- PIT entries: 19859
-- PIT entries of deleted objects: 46
-- PIT entries of deleted objects older than a month: 0
-- Folders in delete folder 'users:penn' newer than 5 years: 5
-- Folders in delete folder 'users:penn' older than 5 years: 5
```

## Experience at Penn test env

Pre-patch counts

```

-- Audit entries: 12538020
SELECT COUNT(1) FROM grouper_audit_entry_v;

-- Audit entries no logged in user: 12234228
SELECT COUNT(1) FROM grouper_audit_entry_v WHERE logged_in_subject_id IS NULL;

-- Audit entries no logged in user older than 1 year old: 8804148
SELECT COUNT(1) FROM grouper_audit_entry_v WHERE logged_in_subject_id IS NULL AND created_on < 14908398860000;

-- PIT entries: 16644841
SELECT (SELECT COUNT(1) FROM grouper_pit_attribute_assign)
+ (SELECT COUNT(1) FROM grouper_pit_attribute_def)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn_set)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_value)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name_set)
+ (SELECT COUNT(1) FROM grouper_pit_fields)
+ (SELECT COUNT(1) FROM grouper_pit_groups)
+ (SELECT COUNT(1) FROM grouper_pit_group_set)
+ (SELECT COUNT(1) FROM grouper_pit_members)
+ (SELECT COUNT(1) FROM grouper_pit_memberships)
+ (SELECT COUNT(1) FROM grouper_pit_role_set)
+ (SELECT COUNT(1) FROM grouper_pit_stems) AS pit_count FROM DUAL;

-- PIT entries of deleted objects: 6954271
SELECT (SELECT COUNT(1) FROM grouper_pit_attribute_assign WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attribute_def WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_value WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_fields WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_groups WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_group_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_members WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_memberships WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_role_set WHERE end_time IS NOT NULL)
+ (SELECT COUNT(1) FROM grouper_pit_stems WHERE end_time IS NOT NULL) AS pit_count FROM DUAL;

-- PIT entries of deleted objects older than 3 years: 0
SELECT (SELECT COUNT(1) FROM grouper_pit_attribute_assign WHERE end_time IS NOT NULL AND end_time <
1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_attribute_def WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_actn_set WHERE end_time IS NOT NULL AND end_time <
1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_assn_value WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_attr_def_name_set WHERE end_time IS NOT NULL AND end_time <
1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_fields WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_groups WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_group_set WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_members WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_memberships WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_role_set WHERE end_time IS NOT NULL AND end_time < 1490839886000000)
+ (SELECT COUNT(1) FROM grouper_pit_stems WHERE end_time IS NOT NULL AND end_time < 1490839886000000) AS
pit_count FROM DUAL;

-- Folders in delete folder 'users:penn' newer than 5 years: 13097
SELECT COUNT(1) FROM grouper_stems WHERE NAME LIKE 'penn:community:student:course:%' AND create_time >
1364609486000;

-- Folders in delete folder 'users:penn' older than 5 years: 3095
SELECT COUNT(1) FROM grouper_stems WHERE NAME LIKE 'penn:community:student:course:%' AND create_time <
1364609486000;

```



