

Moodle reference to the gradebook performance issue.

<https://tracker.moodle.org/browse/MDL-37676>

<https://tracker.moodle.org/browse/MDL-52002>

<https://tracker.moodle.org/browse/MDL-51149>

<https://tracker.moodle.org/browse/MDL-29877>

<https://github.com/dmonllao/moodle/compare/gradebook-performance~4...gradebook-performance>

https://docs.moodle.org/dev/Grades#grade_update.28.29

The issue consists of corrupted data in the database related to course with id 2

(<https://moodle.example.com/course/view.php?id=2>). How exactly happened is unknown. *Most activities will error out.* Note, they had the same issue before they came to us and they have that issue on their archived site.

AID: 10780 is the archived site URL (<https://moodle-archive.example.com>)

AID: 10781 is production site URL (<https://moodle.example.com>)

Sample of the error output:

Warning: Creating default object from empty value in
/var/www/moodle/lib/grade/grade_category.php on line 1999

Notice: Undefined property: stdClass::\$path in /var/www/moodle/lib/grade/grade_category.php
on line 2033

Notice: Undefined property: stdClass::\$id in /var/www/moodle/lib/grade/grade_category.php on
line 2033

Notice: Undefined property: stdClass::\$id in /var/www/moodle/lib/grade/grade_category.php on
line 2035

Attempt to obtain a grade_category's associated grade_item without the category's ID being set.

line 2148 of /lib/grade/grade_category.php: call to debugging()

line 2134 of /lib/grade/grade_category.php: call to grade_category->get_grade_item()

line 212 of /lib/grade/grade_category.php: call to grade_category->load_grade_item()

line 2037 of /lib/grade/grade_category.php: call to grade_category->update()

line 1477 of /lib/grade/grade_category.php: call to grade_category->get_children()

line 425 of /lib/grade/grade_category.php: call to grade_category->auto_update_weights()

line 1054 of /lib/gradelib.php: call to grade_category->pre_regrade_final_grades()

line 350 of /lib/gradelib.php: call to grade_regrade_final_grades()

line 132 of /mod/quiz/view.php: call to grade_get_grades()

Can not regrade non existing category

line 396 of /lib/grade/grade_category.php: call to debugging()

line 235 of /lib/grade/grade_category.php: call to grade_category->qualifies_for_regrading()

line 2037 of /lib/grade/grade_category.php: call to grade_category->update()

line 1477 of /lib/grade/grade_category.php: call to grade_category->get_children()
line 425 of /lib/grade/grade_category.php: call to grade_category->auto_update_weights()
line 1054 of /lib/gradelib.php: call to grade_category->pre_regrade_final_grades()
line 350 of /lib/gradelib.php: call to grade_regrade_final_grades()
line 132 of /mod/quiz/view.php: call to grade_get_grades()
Can not update grade object, no id!
line 248 of /lib/grade/grade_object.php: call to debugging()
line 241 of /lib/grade/grade_category.php: call to grade_object->update()
line 2037 of /lib/grade/grade_category.php: call to grade_category->update()
line 1477 of /lib/grade/grade_category.php: call to grade_category->get_children()
line 425 of /lib/grade/grade_category.php: call to grade_category->auto_update_weights()
line 1054 of /lib/gradelib.php: call to grade_category->pre_regrade_final_grades()
line 350 of /lib/gradelib.php: call to grade_regrade_final_grades()
line 132 of /mod/quiz/view.php: call to grade_get_grades()

This is what they say they did:

-

FYI here is what the TA did last night in the grades.

"I went to the grades and categories and items.

I clicked add grade item. I added the details.

When I clicked save changes it was slow and then gave me the error page students have been experiencing today, so I refreshed.

It created a duplicate. So I went back (after a while because of slowness) I just renamed it part two and checked the box to hide that one. When I clicked save, it was very slow and give me the error page again.

I think is exactly my moves last night between 8:30 and 9:30."

DB related tables:

show tables like '%quiz%';
show tables like '%ques%';
show tables like '%cat%';

Under table mdl_grade_items id 1 and 191 needsupdate field is set to 1, based on documentation here: https://docs.moodle.org/dev/Grades#grade_update.28.29
Fragments correspond to the following:

GRADE_UPDATE_OK = 0

```
GRADE_UPDATE_FAILED = 1
GRADE_UPDATE_MULTIPLE = 2
GRADE_UPDATE_ITEM_LOCKED = 4
GRADE_UPDATE_ITEM_DELETED = GRADE_UPDATE_ITEM_DELETED
```

What has been tested is the following, changing the value to 0 for both items, result:
It allows you to open the quizzes, it is unknown what happens if you take the quiz.
Change the flag to see result: update mdl_grade_items set needsupdate = 1 where id in (191, 1);

Grade item from: mdl_grade_items table with ids: 165,158,185,176,174,145,144,18 are causing issues:

After setting the needsupdate to 1 in mdl_grade_items table it will show you more details of the error since only then it gets to that point of code appears to be the case. More details are only seen when using the var_dump on the correct line inside:

/var/www/moodle/lib/grade/grade_category.php

Note: restarting fpm is required to make changes. This has been tested on one of the Utility VMs with host overriding. Adding this on line #2036 var_dump(\$cat);

Example:

```
                if ($cat->path !== '/' . $cat->id . '/') {
                    $grade_category = new grade_category($cat, false);
                    $grade_category->path = '/' . $cat->id . '/';
var_dump($cat);
                    $grade_category->depth = 1;
                    $grade_category->update('system');
                    return $this->get_children($include_category_items);
                }
            } else {
```

Output sample when Grades are opened to review:

Grader report

Warning: Creating default object from empty value in
/var/www/moodle/lib/grade/grade_category.php on line 1999

Notice: Undefined property: stdClass::\$children in
/var/www/moodle/lib/grade/grade_category.php on line 2017

Warning: array_key_exists() expects parameter 2 to be array, null given in
/var/www/moodle/lib/grade/grade_category.php on line 2017

Notice: Undefined property: stdClass::\$path in
/var/www/moodle/lib/grade/grade_category.php on line 2033

Notice: Undefined property: stdClass::\$id in **/var/www/moodle/lib/grade/grade_category.php** on line **2033**

Notice: Undefined property: stdClass::\$id in **/var/www/moodle/lib/grade/grade_category.php** on line **2035**

```
object(stdClass)#1975 (2) { ["sortorder"]=> string(3) "156" ["children"]=> array(1) { [156]=>
object(stdClass)#2059 (31) { ["id"]=> string(3) "191" ["courseid"]=> string(1) "2" ["categoryid"]=>
NULL ["itemname"]=> string(0) "" ["itemtype"]=> string(8) "category" ["itemmodule"]=> NULL
["iteminstance"]=> string(2) "17" ["itemnumber"]=> NULL ["iteminfo"]=> NULL ["idnumber"]=>
NULL ["calculation"]=> NULL ["gradetype"]=> string(1) "1" ["grademax"]=> string(7) "0.00000"
["grademin"]=> string(7) "0.00000" ["scaleid"]=> NULL ["outcomeid"]=> NULL ["gradeepass"]=>
string(7) "0.00000" ["multfactor"]=> string(7) "1.00000" ["plusfactor"]=> string(7) "0.00000"
["aggregationcoef"]=> string(7) "0.00000" ["aggregationcoef2"]=> string(7) "0.00000"
["sortorder"]=> string(3) "156" ["display"]=> string(1) "0" ["decimals"]=> NULL ["hidden"]=>
string(1) "0" ["locked"]=> string(1) "0" ["locktime"]=> string(1) "0" ["needsupdate"]=> string(1) "0"
["weightoverride"]=> string(1) "0" ["timecreated"]=> string(10) "1458696158" ["timemodified"]=>
string(10) "1458696158" } } }
```

Attempt to obtain a grade_category's associated grade_item without the category's ID being set.

- line 2149 of /lib/grade/grade_category.php: call to debugging()
- line 2135 of /lib/grade/grade_category.php: call to grade_category->get_grade_item()
- line 212 of /lib/grade/grade_category.php: call to grade_category->load_grade_item()
- line 2038 of /lib/grade/grade_category.php: call to grade_category->update()
- line 1909 of /lib/grade/grade_category.php: call to grade_category->get_children()
- line 2218 of /grade/lib.php: call to grade_category::fetch_course_tree()
- line 134 of /grade/report/grader/lib.php: call to grade_tree->grade_tree()
- line 133 of /grade/report/grader/index.php: call to grade_report_grader->__construct()

Can not regrade non existing category

- line 396 of /lib/grade/grade_category.php: call to debugging()
- line 235 of /lib/grade/grade_category.php: call to grade_category->qualifies_for_regrading()
- line 2038 of /lib/grade/grade_category.php: call to grade_category->update()
- line 1909 of /lib/grade/grade_category.php: call to grade_category->get_children()
- line 2218 of /grade/lib.php: call to grade_category::fetch_course_tree()
- line 134 of /grade/report/grader/lib.php: call to grade_tree->grade_tree()
- line 133 of /grade/report/grader/index.php: call to grade_report_grader->__construct()

Can not update grade object, no id!

- line 248 of /lib/grade/grade_object.php: call to debugging()
- line 241 of /lib/grade/grade_category.php: call to grade_object->update()
- line 2038 of /lib/grade/grade_category.php: call to grade_category->update()
- line 1909 of /lib/grade/grade_category.php: call to grade_category->get_children()
- line 2218 of /grade/lib.php: call to grade_category::fetch_course_tree()
- line 134 of /grade/report/grader/lib.php: call to grade_tree->grade_tree()
- line 133 of /grade/report/grader/index.php: call to grade_report_grader->__construct()

Tables involved mainly:

- mdl_grade_categories
- mdl_grade_items

The queries I have used in my analysis if needed, only for reference, some values have been changing for testing purposes. They may or may not produce the expected values. **Whoever uses those, be careful to execute the update queries without noticing.**

```
show tables like '%quiz%';
show tables like '%ques%';
show tables like '%cat%';
select * from mdl_course limit 2;
select * from mdl_quiz;
select *, from_unixtime(timemodified) from mdl_question order by timemodified desc limit 1000;
select *, from_unixtime(timemodified) from mdl_question limit 1000;
select *, from_unixtime(timemodified), char_length(questiontext) as length from mdl_question
order by length desc limit 2000;
select * from mdl_question_dataset_items limit 10;
select * from mdl_quiz_sections;
select *, from_unixtime(timemodified) from mdl_quiz where course = 2;
select *, from_unixtime(added) from mdl_course_modules where course = 2 and module = 16;
-- quiz
select *, from_unixtime(added) from mdl_course_modules where course = 2 and module = 16;
-- quiz
select * from mdl_question_categories qc inner join mdl_question q on qc.id = q.category where
qc.id = 1237;
select * from mdl_question_categories;

select * from mdl_quiz q inner join mdl_course c on q.course and c.id where q.course = 2;
select * from mdl_question where id = 1122;

select *, from_unixtime(timemodified) from mdl_quiz where course = 2;
select * from mdl_quiz where course = 2;
select * from mdl_grade_categories where courseid = 13;
select * from mdl_grade_grades where courseid;

select * from mdl_grade_items where courseid = 2 limit 1;
-- update mdl_grade_items set categoryid=46 where courseid=13 and id = 702;
-- UPDATE mdl_grade_items g SET categoryid = (SELECT id FROM mdl_grade_categories
WHERE `courseid` = 13 LIMIT 1) WHERE categoryid IS NULL;
```

```
SELECT *, from_unixtime(timemodified) FROM mdl_grade_categories WHERE `courseid` in (13,14);
```

```
select * from mdl_grade_items gi inner join mdl_grade_grades gg on gi.id = gg.itemid where gi.courseid = 2 and gi.itemtype not in ('course', 'category') and gi.itemname like "%Au%";
```

```
select * from mdl_grade_grades limit 10;  
select * from mdl_grade_items where courseid in (11,13,14) order by courseid;  
select * from mdl_grade_items where courseid = 13 and sortorder = '278';  
select * from mdl_grade_items where courseid = 2 and categoryid is null;  
select * from mdl_grade_categories where courseid = 3;
```

```
select * from mdl_question_categories where name = 'Book questions';
```

```
select * from mdl_grade_items where needsupdate = 1 and courseid = 2;  
select * from mdl_grade_items where courseid = 2;  
-- update mdl_grade_items set needsupdate = 0 where id in (664,723,724);  
-- update mdl_grade_items set needsupdate = 0 where id in (191, 1);  
select * from mdl_grade_items where courseid = 2;
```

```
-- update mdl_grade_items set needsupdate = 1 where id in (726,727,728,729,730,731,732);
```

```
select * from mdl_grade_items where courseid in (13,14) and itemtype in ('course', 'category')  
and id in(672,715);  
select * from mdl_grade_items where courseid in (2) and itemtype in ('course', 'category');  
select * from mdl_grade_categories where courseid in (2);  
select * from mdl_grade_items where courseid in (2);  
-- 46,47,49,50  
-- to update 715,716,723,680 -- was 51, 52, 53, 48
```

```
update mdl_grade_items set iteminstance = 49 where id in (715,716,723,680);  
update mdl_grade_items set iteminstance = 51 where id = 715;  
update mdl_grade_items set iteminstance = 52 where id = 716;  
update mdl_grade_items set iteminstance = 53 where id = 723;  
update mdl_grade_items set iteminstance = 48 where id = 680;  
select * from mdl_user;
```

```
select * from mdl_groups_members;  
select * from mdl_groups;  
select * from mdl_logstore_standard_log limit 10;
```

```
select * from mdl_quiz_attempts where id = 512879;
```

```
select * from mdl_quiz where id = 166;  
select * from mdl_course where id = 14;
```

```
select count(*) from mdl_question_attempt_steps;
```

```
select * from mdl_grade_items where courseid in (2,3) and itemtype = 'manual';
```

```
select *, from_unixtime(timecreated) from mdl_grade_items where courseid = 2 and itemtype =  
'manual';
```

```
select * from mdl_grade_categories where courseid = 2;
```

```
select * from mdl_grade_items where courseid = 2;
```

```
-- Done
```

```
update mdl_grade_items set needsupdate = 1 where id in (191, 1);
```

```
-- update mdl_grade_items set itemname = " where id = 191;
```

```
-- update mdl_grade_items set categoryid = 1 where id in(144,145); -- they were 1
```

```
-- update mdl_grade_items set categoryid = null where id = 191; -- it was null
```

```
-- update mdl_grade_items set categoryid = 13 where id = 185; -- was 1
```

```
-- update mdl_grade_items set categoryid = 13 where id = 176;
```

```
-- update mdl_grade_items set categoryid = 13 where id = 174;
```

```
-- update mdl_grade_items set categoryid = 13 where id in (165, 158,185,176,174,145,144,18);
```

```
-- update mdl_grade_items set categoryid = 13 where id = 145;
```

```
-- update mdl_grade_items set categoryid = 13 where id = 144;
```

```
-- update mdl_grade_items set categoryid = 13 where id = 18;
```

```
-- update mdl_grade_items set categoryid = 1 where id in (165, 158,185,176,174,145,144,18); --  
was 1
```

```
select * from mdl_grade_items where courseid in (2,3) and itemtype = 'manual';
```

```
select * from mdl_grade_categories where courseid in (2);
```

```
select * from mdl_grade_items where courseid in (2,3) and itemtype = 'course';
```

```
select * from mdl_grade_categories gc inner join mdl_grade_items gi on gc.id = gi.categoryid  
where gi.courseid = 2;
```

```
select * from mdl_course_categories;
```

```
select * from mdl_grade_items;
```

```
select * from mdl_grade_grades limit 10;
```

<https://tracker.moodle.org/browse/MDL-52002>

Part of description:

From what I can tell, regrading is very liberal in choosing which grade items to include, and for each included grade item, a grade_grades entry's alteredaggregationweight and

alteredaggregationstatus will be written out to the DB at least twice for each user. Once to reset it, and another time to update it. So a gradebook regrade is linear in the amount of grade_grades items present in the gradebook.

Comment from: Jason Touw added a comment - 21/Jan/16 12:34 AM

I agree completely with what the instructor told Sam Anderson. We recently moved our courses from Moodle 2.8 to Moodle 3.0. The courses that have 50+ students or over 200+ grade items take up to 14 minutes to save changes and refresh the page. While the large courses would take slightly longer to load than small courses, it was never this long. In order to get around this, I have to open an incognito browser window and work in another area (stay away from the gradebook!) until the changes are saved. Performance info at the bottom of the page looks something like this:

Time to Load: 1000+ Seconds

Memory used: 7.0 MB

Stacks: 280

DB Read/Write: 3142/16988

Definitely a critical bug. Impossible for me to finish up my midyear grades here!

I say:

It is clear that there are things that can be improved in the gradebook regrade/grade algorithm, despite that, there is so much it can be done. It is obvious that this is not a lack of resources situation based on what we have allocated for them. As Jason Touw says in his comment, he has 50+ students, I assume it is less than 60 with 200+ grade items, I assume 200+ quizzes he is talking about. That equals to 12,000 records that you see in the gradebook. Now, that, represented in the database is a whole different story. Our case: _CLIENT_ has 74 quizzes in that course with 2212 enrolled users that is: 163,688 gradebook records. Loading that gradebook has the same effect as loading a report with that many records, "sort of". The slowness is not lack of resources as we have all agreed, rather, by design, php will start building the gradebook in sequential order, (once the database returns the records), until ready to be presented and passed to the client's browser to render and show it to the user. What is interesting is the following: When a grade is changed in the gradebook, even only 1 grade for 1 learner and saved, it starts analyzing all grades for changes, that process is very slow. Making the whole system slow for everyone on the site. They tend to do all that while learners are taking a quiz. Since it becomes so slow, all AJAX autosave calls become slower to complete and respond with an OK. This is an issue because it will eventually, at some point in time, for someone with bad luck do a race condition and deadlock that session.

How did the issue happen? They were adding grade items to the gradebook while learners were taking quizzes. Gradebooks grow exponentially since adding more grade items means adding more records to the database for 2212 learners in that course, making it even slower and slower over time. When they do that at some point something went wrong because of the slowness, timing outs, who knows what else is in play here, only analyzing the code completely will give

the exact details I guess. Unfortunately, something did not complete to update/insert in the database effectively corrupting the data for the course. All that concludes one thing: The course is poorly designed despite the performance issues the gradebook grade/regrade has. Even making the gradebook - grade/regrade faster it will be fast until the time comes where there are too many records to handle and it will become slow once again. The root cause is: Too many quizzes + learners in one course is not a good idea. The slowness causes too many FPM processes to launch at the same time and take too long to complete making scalability practically impossible. Currently they have 140 fpm children available, which is way too much and they still "almost" reach the limit.