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# Simplifying Learning Analytics Using SQL Queries

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# History

Moodle is open source.

It was built for learning.

The world's most popular learning platform, with over 153,000,000 users worldwide.

It was built to perform, not to run analytics*

**Analytics have been only a recent addition in later versions of Moodle.**

**Most documentation explains how to use Moodle, not how to understand the internals.**

source: https://moodle.com/

# Database Types supported by Moodle





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(source: https://docs.moodle.org/37/en/Installing_Moodle#Create_an_empty_database)

# All Databases are not same!

# All SQL is not same!

Although core SQL statements seem similar, there are subtle differences between different database types as you write complex queries and start using inbuilt functions

Example: to work with datetime timestamps, **now()** vs **today()** vs **getdate()**

# Have you ever written a SQL Query?

**SELECT** <columns>

**FROM** <table>

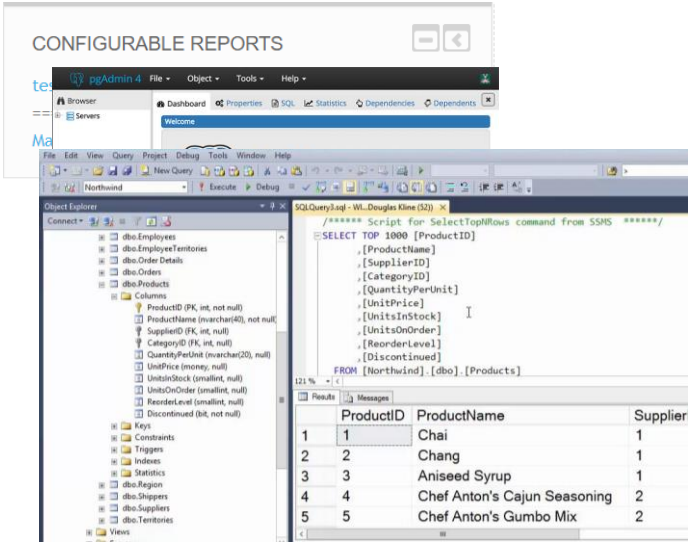
**WHERE** <condition>

# Where to run SQL Queries?

Configurable Reports block (plugin)

PgAdmin (PostgreSQL environment)

SQL Server Management Studio (MS SQL Server Environment)




Note:

1. You may not be allowed to run queries directly on your Production/live site.
2. Make friends with your IT / Business Intelligence / Analytics teams. They might let you use a Data Warehouse.

Source: https://docs.moodle.org/37/en/Configurable_reports

# Writing SQL Queries can feel like ...


Source: http://techgenix.com/data-fabric/

# Moodle Database Overview

- Moodle Database has 100s of tables

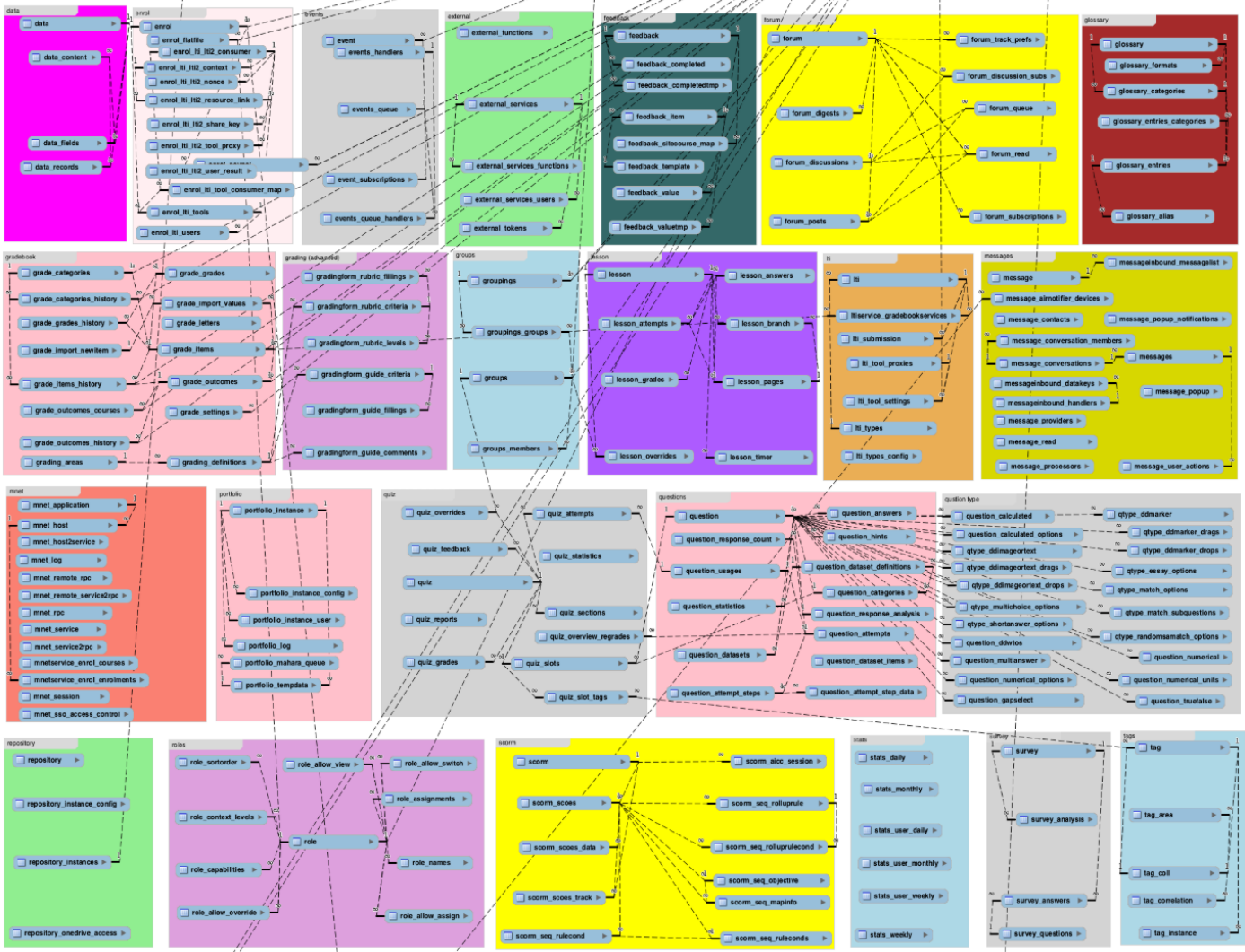
- Main/core entities: **course, user, grade, assignments, quizzes, forums** etc.

- Table names are grouped, eg. quiz related information is in tables named mdl_quiz_*

    **- This can help reduce the hundreds of tables to 10s of groups**

- Every Activity (assign, quiz, forum etc.), usually* has a corresponding activity submission or attempt, activity grade. Exception – resources, files etc.

- Grades have grade categories, grade items, grade history


data
data
data_content
data_fields
data_records
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enrol
enrol_flatfile
enrol_lti_lti2_consumer
enrol_lti_lti2_context
enrol_lti_lti2_nonce
enrol_lti_lti2_resource_link
enrol_lti_lti2_share_key
enrol_lti_lti2_tool_proxy
enrol_lti_lti2_user_result
enrol_lti_tool_consumer_map
enrol_lti_tools
enrol_lti_users
events
event
events_handlers
events_queue
event_subscriptions
events_queue_handlers
external
external_functions
external_services
external_services_functions
external_services_users
external_tokens
feedback
feedback
feedback_completed
feedback_completedtmp
feedback_item
feedback_sitecourse_map
feedback_template
feedback_value
feedback_valuetmp
forum
forum
forum_digests
forum_discussions
forum_posts
forum_track_prefs
forum_discussion_subs
forum_queue
forum_read
forum_subscriptions
glossary
glossary
glossary_formats
glossary_categories
glossary_entries_categories
glossary_entries
glossary_alias
gradebook
grade_categories
grade_categories_history
grade_grades_history
grade_import_newitem
grade_items_history
grade_outcomes_courses
grade_outcomes_history
grading_areas
grade_grades
grade_import_values
grade_letters
grade_items
grade_outcomes
grade_settings
grading_definitions
grading (advanced)
gradingform_rubric_fillings
gradingform_rubric_criteria
gradingform_rubric_levels
gradingform_guide_criteria
gradingform_guide_fillings
gradingform_guide_comments
groups
groupings
groupings_groups
groups
groups_members
lesson
lesson
lesson_attempts
lesson_grades
lesson_overrides
lesson_answers
lesson_branch
lesson_pages
lesson_timer
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lti
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lti_submission
lti_tool_proxies
lti_tool_settings
lti_types
lti_types_config
messages
message
message_airnotifier_devices
message_contacts
message_conversation_members
message_conversations
messageinbound_datakeys
messageinbound_handlers
message_providers
message_read
message_processors
messageinbound_messagelist
message_popup_notifications
messages
message_popup
message_user_actions
mnet
mnet_application
mnet_host
mnet_host2service
mnet_log
mnet_remote_rpc
mnet_remote_service2rpc
mnet_rpc
mnet_service
mnet_service2rpc
mnetservice_enrol_courses
mnetservice_enrol_enrolments
mnet_session
mnet_sso_access_control
portfolio
portfolio_instance
portfolio_instance_config
portfolio_instance_user
portfolio_log
portfolio_mahara_queue
portfolio_tempdata
quiz
quiz_overrides
quiz_feedback
quiz
quiz_reports
quiz_grades
quiz_attempts
quiz_statistics
quiz_sections
quiz_overview_regrades
quiz_slots
quiz_slot_tags
questions
question
question_response_count
question_usages
question_statistics
question_datasets
question_attempt_steps
question_answers
question_hints
question_dataset_definitions
question_categories
question_response_analysis
question_attempts
question_dataset_items
question_attempt_step_data
question type
question_calculated
question_calculated_options
qtype_ddimageortext
qtype_ddimageortext_drags
qtype_ddimageortext_drops
qtype_multichoice_options
qtype_shortanswer_options
question_ddwtos
question_multianswer
question_numerical_options
question_gapselect
qtype_ddmarker
qtype_ddmarker_drags
qtype_ddmarker_drops
qtype_essay_options
qtype_match_options
qtype_match_subquestions
qtype_randomsamatch_options
question_numerical
question_numerical_units
question_truefalse
repository
repository
repository_instance_config
repository_instances
repository_onedrive_access
roles
role_sortorder
role_context_levels
role_capabilities
role_allow_override
role
role_allow_view
role_assignments
role_allow_switch
role_names
role_allow_assign
scorm
scorm
scorm_scoes
scorm_scoes_data
scorm_scoes_track
scorm_seq_rulecond
scorm_aicc_session
scorm_seq_rolluprule
scorm_seq_rolluprulecond
scorm_seq_objective
scorm_seq_mapinfo
scorm_seq_ruleconds
stats
stats_daily
stats_monthly
stats_user_daily
stats_user_monthly
stats_user_weekly
stats_weekly
survey
survey
survey_analysis
survey_answers
survey_questions
tags
tag
tag_area
tag_coll
tag_correlation
tag_instance

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## Enrolments
mdl_enrol
mdl_user_enrolments

## Users
mdl_user
mdl_user_lastaccess

## Courses
mdl_course
mdl_course_categories
mdl_course_sections
mdl_course_modules

## Quizzes
mdl_quiz
mdl_quiz_attempts
mdl_quiz_grades

## Grades
mdl_grade_categories
mdl_grade_items
mdl_grade_grades

## Assignments
mdl_assign
mdl_assign_submission
mdl_assign_grades

## Other activity types
mdl_<activitytype>
mdl_<activitytype>_attempts
mdl_<activitytype>_grades

http://www.examulator.com/er/

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# Every interaction by every user is in the log

**mdl_logstore_standard_log**

*id* *component* *action* *objected* *userid* *coursed* *timecreated ...*
1
2
3
.
.
.

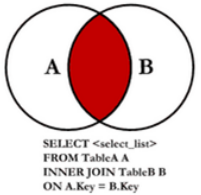
Note: Check your log size, it can impact the query run time significantly!

# SQL Join is your friend

- Don’t be afraid to join multiple tables – think like chains/links
- Start small – who are the students in my course/unit/subject?
- Find anchors or reference values to start. Eg- pick a courseid (the number or key in the url when you open your course main page) such as

<your moodlesite>/course/view.php?id=<number>

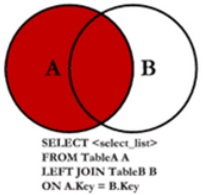
**Table A = Employees ( EmployeeID, LastName, ... ) ^ Table B = Orders (OrderID, EmployeeID, ... )**




SELECT <select_list>
FROM TableA A
INNER JOIN TableB B
ON A.Key = B.Key

**Employees who have registered orders**

```
SELECT Employees.LastName,
       Count(Orders.OrderID) AS NumberOfOrders
FROM Employees
INNER JOIN Orders
ON Employees.EmployeeID=Orders.EmployeeID
GROUP BY Employees.LastName
```

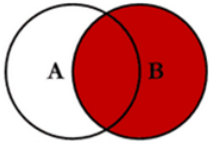



SELECT <select_list>
FROM TableA A
LEFT JOIN TableB B
ON A.Key = B.Key

**All employees and orders they have registered**

(*There are employees who have not registered any orders*)

```
SELECT Employees.LastName,
       Count(Orders.OrderID) AS NumberOfOrders
FROM Employees
LEFT JOIN Orders
ON Employees.EmployeeID=Orders.EmployeeID
GROUP BY Employees.LastName
```




SELECT <select_list>
FROM TableA A
RIGHT JOIN TableB B
ON A.Key = B.Key

**All orders and employees who registered them**

(*There are orders that have not been registered by any employee*)

```
SELECT Employees.LastName, Orders.OrderID
FROM Employees
RIGHT JOIN Orders
ON Employees.EmployeeID=Orders.EmployeeID
```

Source: Quora

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# Query Optimisation is a science

Problem of size/scale with some tables, queries can take time

**Thumb rule: any query that takes longer than 2 minutes to run/complete should be improved**.

Queries on the log are slowest (mdl_logstore_standard_log)

**My log table has 120 million rows! A select query joining the log table with the user table for a particular course can take ~10 min**

Indexing can speed things up

**Hint: Moodle database schema already uses indexing on many tables. Re-use it if needed.**

If your query requires you to join particular combination of tables again and again, try creating a temporary table or a result-set

**Eg – WITH JOINEDTEMPTABLE AS (SELECT * FROM A JOIN B JOIN C) SELECT… FROM JOINEDTEMPTABLE**

# Learning Analytics != Predictive Models

Learning Analytics is more than just predictive data models

“Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs.”
(George Siemens, LAK2011)

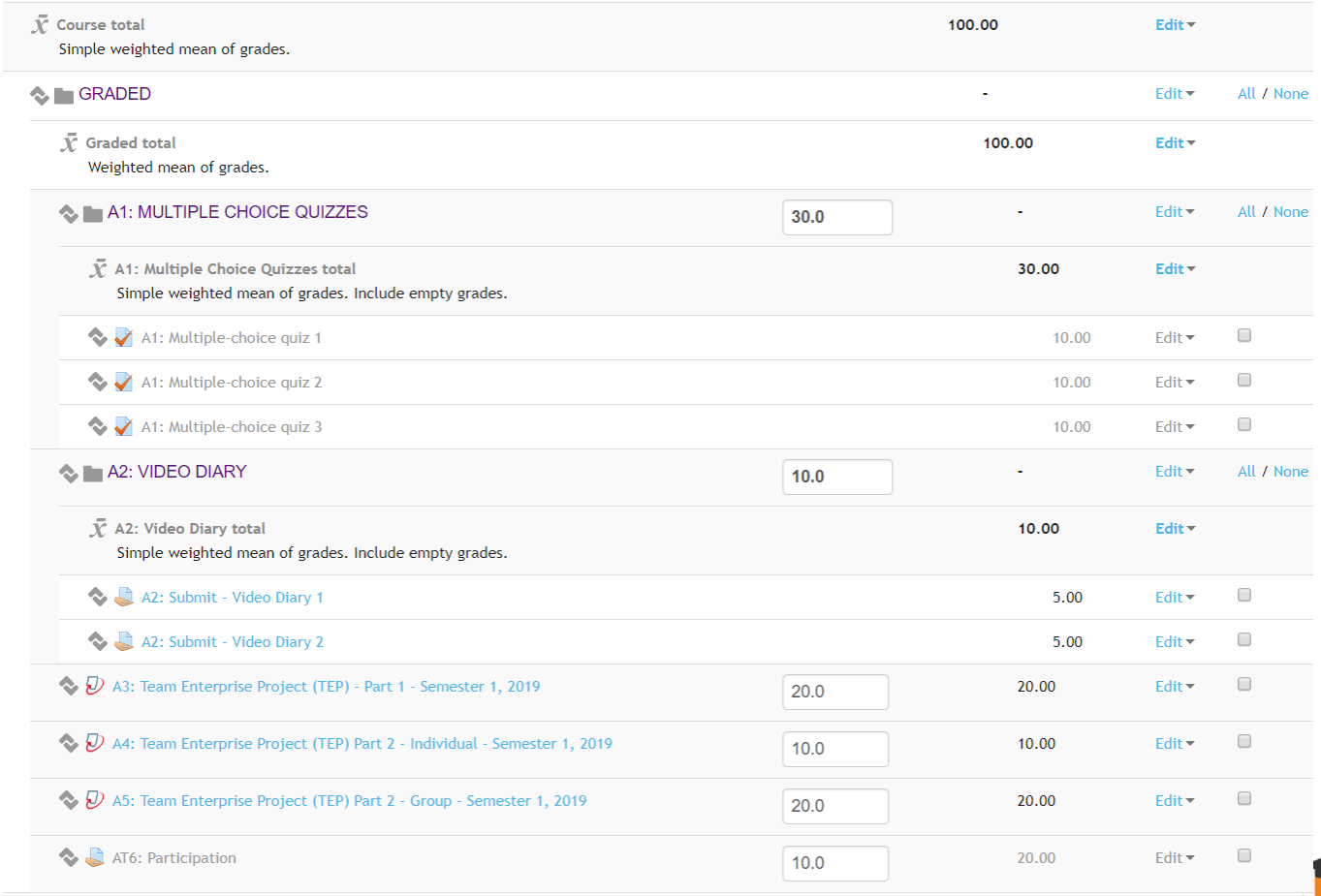
The data can tell anything. You have to ask the right question.
(unknown?)

# Scenarios

1. Student Grades
2. Quiz Submissions
3. Weekly Clicks
4. Clicks per Week per Resource
5. Submissions per Week

# Student Grades

```
SELECT U.IDNUMBER, U.FIRSTNAME, U.LASTNAME, EMAIL, GG.USERID, GC.COURSEID, DEPTH, GC.FULLNAME, AGGREGATION
, FINALGRADE AS GRADE_FINALGRADE, GI.GRADEMAX AS ITEMMAXGRADE, GI.ITEMNAME, GG.AGGREGATIONWEIGHT, GG.AGGREGATIONSTATUS
, GI.AGGREGATIONCOEF
FROM MDL_GRADE_CATEGORIES GC
JOIN MDL_GRADE_ITEMS GI ON (GC.ID=GI.CATEGORYID AND (GC.COURSEID='1234') AND (GI.COURSEID='1234'))
JOIN MDL_GRADE_GRADES GG ON GI.ID=GG.ITEMID
JOIN MDL_USER U ON GG.USERID=U.ID;
```



| | | | | |
|---|---|---|---|---|
| Course total<br>Simple weighted mean of grades. | | 100.00 | Edit | |
| GRADED | | - | Edit | All / None |
| Graded total<br>Weighted mean of grades. | | 100.00 | Edit | |
| A1: MULTIPLE CHOICE QUIZZES | 30.0 | - | Edit | All / None |
| A1: Multiple Choice Quizzes total<br>Simple weighted mean of grades. Include empty grades. | | 30.00 | Edit | |
| A1: Multiple-choice quiz 1 | | 10.00 | Edit | |
| A1: Multiple-choice quiz 2 | | 10.00 | Edit | |
| A1: Multiple-choice quiz 3 | | 10.00 | Edit | |
| A2: VIDEO DIARY | 10.0 | - | Edit | All / None |
| A2: Video Diary total<br>Simple weighted mean of grades. Include empty grades. | | 10.00 | Edit | |
| A2: Submit - Video Diary 1 | | 5.00 | Edit | |
| A2: Submit - Video Diary 2 | | 5.00 | Edit | |
| A3: Team Enterprise Project (TEP) - Part 1 - Semester 1, 2019 | 20.0 | 20.00 | Edit | |
| A4: Team Enterprise Project (TEP) Part 2 - Individual - Semester 1, 2019 | 10.0 | 10.00 | Edit | |
| A5: Team Enterprise Project (TEP) Part 2 - Group - Semester 1, 2019 | 20.0 | 20.00 | Edit | |
| AT6: Participation | 10.0 | 20.00 | Edit | |

# Sample Gradebook Setup Page

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# Sample Output

| IDNUMBER | FIRST NAME | LAST NAME | EMAIL | USERID | COURSE ID | DEPTH | FULLNAME | AGGREGATION | GRADE_FINALGRADE | ITEMMAX GRADE | ITEMNAME | AGGREGATION WEIGHT | AGGREGATION STATUS | AGGREGATION COEF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 283668 | Z | J | 1@student | 474042 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 8 | 10 | A1: Multiple-choice quiz 1 | 0.33333 | used | 0 |
| 291615 | Y | X | 2@student | 509580 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 9 | 10 | A1: Multiple-choice quiz 1 | 0.33333 | used | 0 |
| 284380 | L | M | 3@student | 517451 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 1 | 10 | A1: Multiple-choice quiz 2 | 0.33333 | used | 0 |
| 290509 | X | H | 4@student | 518874 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 3 | 10 | A1: Multiple-choice quiz 2 | 0.33333 | used | 0 |
| 293976 | Y | S | 5@student | 526381 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 8 | 10 | A1: Multiple-choice quiz 3 | 0.33333 | used | 0 |
| 291936 | B | Q | 6@student | 537021 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 10 | 10 | A1: Multiple-choice quiz 3 | 0.33333 | used | 0 |
| 297655 | F | S | 7@student | 541420 | 1234 | 3 | A2: Video Diary | 11 | 3 | 5 | A2: Submit - Video Diary 1 | 0.5 | used | 0 |
| 295564 | Y | Z | 8@student | 543987 | 1234 | 3 | A2: Video Diary | 11 | 3 | 5 | A2: Submit - Video Diary 1 | 0.5 | used | 0 |
| 296302 | X | W | 9@student | 545474 | 1234 | 2 | Graded | 10 | 12 | 20 | A3: Team Enterprise Project (TEP) - Part 1 - Semester 1, 2019 | 0.2 | used | 20 |
| 297546 | S | Z | 10@student | 545811 | 1234 | 2 | Graded | 10 | 5 | 10 | A4: Team Enterprise Project (TEP) Part 2 - Individual - Semester 1, 2019 | 0.1 | used | 10 |
| 294658 | F | Z | 11@student | 548877 | 1234 | 2 | Graded | 10 | 12 | 20 | A5: Team Enterprise Project (TEP) Part 2 - Group - Semester 1, 2019 | 0.2 | used | 20 |
| 301424 | H | P | 12@student | 558624 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 8 | 10 | A1: Multiple-choice quiz 1 | 0.33333 | used | 0 |
| 299666 | C | X | 13@student | 562080 | 1234 | 3 | A1: Multiple Choice Quizzes | 11 | 10 | 10 | A1: Multiple-choice quiz 1 | 0.33333 | used | 0 |
| 299898 | T | S | 14@student | 562706 | 1234 | 2 | Graded | 10 | 14 | 20 | AT6: Participation | 0.1 | used | 10 |
| 301766 | M | S | 15@student | 562960 | 1234 | 2 | Graded | 10 | 17 | 20 | AT6: Participation | 0.1 | used | 10 |
| 296318 | M | T | 16@student | 563058 | 1234 | 2 | Graded | 10 | 13 | 20 | AT6: Participation | 0.1 | used | 10 |

# Quiz Submissions

```
SELECT U.ID AS USERID, U.IDNUMBER, U.FIRSTNAME, U.LASTNAME, U.EMAIL, C.ID AS COURSEID,
(
SELECT COUNT(*) FROM
MDL_GRADE_ITEMS GI
JOIN MDL_GRADE_GRADES GG ON GG.ITEMID=GI.ID
JOIN MDL_USER MU ON MU.ID=GG.USERID
JOIN MDL_COURSE MC ON MC.ID=GI.COURSEID
WHERE MC.ID='1234' AND U.ID=MU.ID AND GI.ITEMMODULE LIKE '%quiz%' AND GG.FINALGRADE IS NOT NULL
GROUP BY MU.ID, MC.ID) AS QUIZZES_SUBMITTED,
(
       SELECT COUNT(*) FROM MDL_COURSE MC JOIN MDL_QUIZ MA ON MA.COURSE = MC.ID
       WHERE MC.ID = '1234'
) AS TOTAL_QUIZZES,
(
       SELECT COUNT(*) FROM MDL_COURSE MC JOIN MDL_QUIZ MA ON MA.COURSE = MC.ID
       WHERE MC.ID ='1234' AND TIMEOPEN<=GETDATE()
) AS OPEN_QUIZZES
FROM MDL_USER U
JOIN MDL_USER_ENROLMENTS UE ON (UE.USERID=U.ID)
JOIN MDL_ENROL E ON (E.ID=UE.ENROLID AND E.ENROL='database' AND E.COURSEID='1234')
JOIN MDL_COURSE C ON (C.ID=E.COURSEID AND C.ID='1234');
```

# Sample Output

| IDNUMBER | USERID | FIRSTNAME | LASTNAME | EMAIL | COURSEID | QUIZZES_SUBMITTED | TOTAL_QUIZZES | OPEN_QUIZZES |
|---|---|---|---|---|---|---|---|---|
| 474042 | 283668 | Z | J | 1@student | 1234 | 3 | 5 | 5 |
| 509580 | 291615 | Y | X | 2@student | 1234 | 3 | 5 | 5 |
| 517451 | 284380 | L | M | 3@student | 1234 | 3 | 5 | 5 |
| 518874 | 290509 | X | H | 4@student | 1234 | 3 | 5 | 5 |
| 526381 | 293976 | Y | S | 5@student | 1234 | 3 | 5 | 5 |
| 537021 | 291936 | B | Q | 6@student | 1234 | 3 | 5 | 5 |
| 541420 | 297655 | F | S | 7@student | 1234 | 3 | 5 | 5 |
| 543987 | 295564 | Y | Z | 8@student | 1234 | 3 | 5 | 5 |
| 545474 | 296302 | X | W | 9@student | 1234 | 3 | 5 | 5 |
| 545811 | 297546 | S | Z | 10@student | 1234 | 3 | 5 | 5 |
| 548877 | 294658 | F | Z | 11@student | 1234 | 4 | 5 | 5 |
| 558624 | 301424 | H | P | 12@student | 1234 | 4 | 5 | 5 |
| 562080 | 299666 | C | X | 13@student | 1234 | 2 | 5 | 5 |
| 562706 | 299898 | T | S | 14@student | 1234 | 2 | 5 | 5 |
| 562960 | 301766 | M | S | 15@student | 1234 | 1 | 5 | 5 |
| 563058 | 296318 | M | T | 16@student | 1234 | 0 | 5 | 5 |

# Weekly Clicks

```
WITH NEWTABLENAME AS (
       SELECT L.USERID, U.IDNUMBER, U.EMAIL, U.FIRSTNAME AS FIRSTNAME,
       U.LASTNAME AS LASTNAME, L.COURSEID, L.TIMECREATED,
       (DATEDIFF(DAY, CONVERT(DATE,'25/02/2019',103), L.TIMECREATED)/7) AS WEEKS
       --// YOUR TERM STARTDATE
       FROM MDL_LOGSTORE_STANDARD_LOG L
       JOIN MDL_USER U ON (U.ID=L.USERID AND L.COURSEID='1234') --// YOUR MOODLE COURSEID
       WHERE L.COURSEID='1234' and EMAIL like '%student%'
       )
SELECT USERID, IDNUMBER, EMAIL, COURSEID, FIRSTNAME, LASTNAME, ALTERNATENAME
, (SELECT COUNT(*) FROM NEWTABLENAME B WHERE WEEKS=-1 AND B.USERID=A.USERID) AS WEEK0
, (SELECT COUNT(*) FROM NEWTABLENAME C WHERE WEEKS=0  AND C.USERID=A.USERID) AS WEEK1
, (SELECT COUNT(*) FROM NEWTABLENAME D WHERE WEEKS=1  AND D.USERID=A.USERID) AS WEEK2
, (SELECT COUNT(*) FROM NEWTABLENAME E WHERE WEEKS=2  AND E.USERID=A.USERID) AS WEEK3
, (SELECT COUNT(*) FROM NEWTABLENAME F WHERE WEEKS=3  AND F.USERID=A.USERID) AS WEEK4
, (SELECT COUNT(*) FROM NEWTABLENAME G WHERE WEEKS=4  AND G.USERID=A.USERID) AS WEEK5
, (SELECT COUNT(*) FROM NEWTABLENAME H WHERE WEEKS=5  AND H.USERID=A.USERID) AS WEEK6
, (SELECT COUNT(*) FROM NEWTABLENAME I WHERE WEEKS=6  AND I.USERID=A.USERID) AS WEEK7
, (SELECT COUNT(*) FROM NEWTABLENAME J WHERE WEEKS=7  AND J.USERID=A.USERID) AS WEEK8
, (SELECT COUNT(*) FROM NEWTABLENAME K WHERE WEEKS=8  AND K.USERID=A.USERID) AS WEEK9
, (SELECT COUNT(*) FROM NEWTABLENAME L WHERE WEEKS=9  AND L.USERID=A.USERID) AS WEEK10
, (SELECT COUNT(*) FROM NEWTABLENAME M WHERE WEEKS=10 AND M.USERID=A.USERID) AS WEEK11
, (SELECT COUNT(*) FROM NEWTABLENAME N WHERE WEEKS=11 AND N.USERID=A.USERID) AS WEEK12
, (SELECT COUNT(*) FROM NEWTABLENAME O WHERE WEEKS=12 AND O.USERID=A.USERID) AS WEEK13
, (SELECT COUNT(*) FROM NEWTABLENAME P WHERE WEEKS=13 AND P.USERID=A.USERID) AS WEEK14
FROM NEWTABLENAME A
GROUP BY USERID, IDNUMBER, EMAIL, COURSEID, FIRSTNAME, LASTNAME, ALTERNATENAME;
```

# Sample Output

| USERID | IDNUMBER | EMAIL | COURSEID | FIRSTNAME | LASTNAME | WEEK0 | WEEK1 | WEEK2 | WEEK3 | WEEK4 | WEEK5 | WEEK6 | WEEK7 | WEEK8 | WEEK9 | WEEK10 | WEEK11 | WEEK12 | WEEK13 | WEEK14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 474042 | 283668 | 1@student | 5273 | Z | J | 0 | 43 | 44 | 1 | 17 | 3 | 22 | 12 | | | | | | | |
| 509580 | 291615 | 2@student | 5273 | Y | X | 0 | 4 | 4 | 19 | 25 | 14 | 20 | 7 | | | | | | | |
| 517451 | 284380 | 3@student | 5273 | L | M | 0 | 110 | 10 | 153 | 24 | 48 | 84 | 4 | | | | | | | |
| 518874 | 290509 | 4@student | 5273 | X | H | 0 | 13 | 6 | 174 | 18 | 28 | 12 | 10 | | | | | | | |
| 526381 | 293976 | 5@student | 5273 | Y | S | 0 | | 50 | 22 | 10 | 13 | 8 | 9 | | | | | | | |
| 537021 | 291936 | 6@student | 5273 | B | Q | 0 | 9 | 20 | | 34 | | | 23 | | | | | | | |
| 541420 | 297655 | 7@student | 5273 | F | S | 0 | 47 | 16 | 13 | 11 | 27 | 11 | 13 | | | | | | | |
| 543987 | 295564 | 8@student | 5273 | Y | Z | 0 | 91 | 17 | 8 | 12 | | 11 | 4 | | | | | | | |
| 545474 | 296302 | 9@student | 5273 | X | W | 0 | 149 | 21 | 91 | 60 | 5 | 29 | 7 | | | | | | | |
| 545811 | 297546 | 10@student | 5273 | S | Z | 0 | 7 | 2 | 27 | 17 | 17 | | | | | | | | | |
| 548877 | 294658 | 11@student | 5273 | F | Z | 0 | 54 | 15 | 3 | 21 | 6 | 9 | | | | | | | | |
| 558624 | 301424 | 12@student | 5273 | H | P | 0 | 91 | 98 | 66 | 17 | 29 | 20 | 21 | | | | | | | |
| 562080 | 299666 | 13@student | 5273 | C | X | 0 | 203 | 310 | 140 | 7 | 94 | 59 | 14 | | | | | | | |
| 562706 | 299898 | 14@student | 5273 | T | S | 0 | 6 | 16 | 1 | 26 | 9 | 2 | 38 | | | | | | | |
| 562960 | 301766 | 15@student | 5273 | M | S | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | | | | | | | |
| 563058 | 296318 | 16@student | 5273 | M | T | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 0 | | | | | | | |

# Clicks per Week per Resource

```
WITH NEWTABLENAME AS (
       SELECT L.USERID, U.IDNUMBER, U.EMAIL, U.FIRSTNAME AS FIRSTNAME, U.LASTNAME AS LASTNAME, L.COURSEID, L.TIMECREATED
       , (DATEDIFF(DAY, CONVERT(DATE,'25/02/2019',103), L.TIMECREATED)/7) AS WEEKS, R.NAME AS RESOURCENAME
       FROM MDL_LOGSTORE_STANDARD_LOG L
       LEFT JOIN MDL_USER U ON U.ID=L.USERID
       LEFT JOIN MDL_COURSE_MODULES CM ON CM.ID=L.CONTEXTINSTANCEID
       LEFT JOIN MDL_RESOURCE R ON R.ID=CM.INSTANCE
       WHERE COURSEID='1234' and COMPONENT='mod_resource' and EMAIL like '%student%'
       )
SELECT resourcename as RESOURCENAME
, (SELECT COUNT(*) FROM NEWTABLENAME B WHERE WEEKS=-1 AND B.resourcename=A.resourcename) AS WEEK0
, (SELECT COUNT(*) FROM NEWTABLENAME C WHERE WEEKS=0  AND C.resourcename=A.resourcename) AS WEEK1
, (SELECT COUNT(*) FROM NEWTABLENAME D WHERE WEEKS=1  AND D.resourcename=A.resourcename) AS WEEK2
, (SELECT COUNT(*) FROM NEWTABLENAME E WHERE WEEKS=2  AND E.resourcename=A.resourcename) AS WEEK3
, (SELECT COUNT(*) FROM NEWTABLENAME F WHERE WEEKS=3  AND F.resourcename=A.resourcename) AS WEEK4
, (SELECT COUNT(*) FROM NEWTABLENAME G WHERE WEEKS=4  AND G.resourcename=A.resourcename) AS WEEK5
, (SELECT COUNT(*) FROM NEWTABLENAME H WHERE WEEKS=5  AND H.resourcename=A.resourcename) AS WEEK6
, (SELECT COUNT(*) FROM NEWTABLENAME I WHERE WEEKS=6  AND I.resourcename=A.resourcename) AS WEEK7
, (SELECT COUNT(*) FROM NEWTABLENAME J WHERE WEEKS=7  AND J.resourcename=A.resourcename) AS WEEK8
, (SELECT COUNT(*) FROM NEWTABLENAME K WHERE WEEKS=8  AND K.resourcename=A.resourcename) AS WEEK9
, (SELECT COUNT(*) FROM NEWTABLENAME L WHERE WEEKS=9  AND L.resourcename=A.resourcename) AS WEEK10
, (SELECT COUNT(*) FROM NEWTABLENAME M WHERE WEEKS=10 AND M.resourcename=A.resourcename) AS WEEK11
, (SELECT COUNT(*) FROM NEWTABLENAME N WHERE WEEKS=11 AND N.resourcename=A.resourcename) AS WEEK12
, (SELECT COUNT(*) FROM NEWTABLENAME O WHERE WEEKS=12 AND O.resourcename=A.resourcename) AS WEEK13
, (SELECT COUNT(*) FROM NEWTABLENAME P WHERE WEEKS=13 AND P.resourcename=A.resourcename) AS WEEK14
, (SELECT COUNT(*) FROM NEWTABLENAME Q WHERE WEEKS=14 AND Q.resourcename=A.resourcename) AS WEEK15
, (SELECT COUNT(*) FROM NEWTABLENAME R WHERE WEEKS=15 AND R.resourcename=A.resourcename) AS WEEK16
, (SELECT COUNT(*) FROM NEWTABLENAME S WHERE WEEKS=16 AND S.resourcename=A.resourcename) AS WEEK17
, (SELECT COUNT(*) FROM NEWTABLENAME T WHERE WEEKS=17 AND T.resourcename=A.resourcename) AS WEEK18
FROM NEWTABLENAME A
GROUP BY resourcename;
```

# Sample Output

| RESOURCENAME | WEEK0 | WEEK1 | WEEK2 | WEEK3 | WEEK4 | WEEK5 | WEEK6 | WEEK7 | WEEK8 | WEEK9 | WEEK10 | WEEK11 | WEEK12 | WEEK13 | WEEK14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (Read) Week 4 Lesson 2: Case Study on Location | 0 | 0 | 0 | 2 | 48 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12.1 Reflective Writing from English to Business | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 |
| 5.1 Product Design Template | 0 | 0 | 0 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6.1 SWOT Case Study- IKEA PPT | 0 | 0 | 0 | 0 | 0 | 1 | 61 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6.1 SWOT Case Study- IKEA QB | 0 | 0 | 0 | 0 | 0 | 1 | 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6.1 SWOT Case Study- IKEA SB | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Assessment Dates - S1-2019 | 0 | 97 | 1 | 4 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| Business plan - writing guide | 0 | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0 | 0 |
| RT2: Business Functions Case Study | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TEP Part 1 - Business Plan Template | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 |
| 5.3- RT2: Business Functions Case Study | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Assessment tasks details | 0 | 19 | 2 | 6 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 2 | 1 | 1 | 2 |
| Assessment Policy | 0 | 11 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| PDF from Canny Creatives - Logo Design Checklist | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Product launch - information | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 5 | 0 | 0 | 0 |
| TEP - Individual Reflection | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| Unit Guide | 0 | 20 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Video diary - tips and hints | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 27 | 0 | 0 |

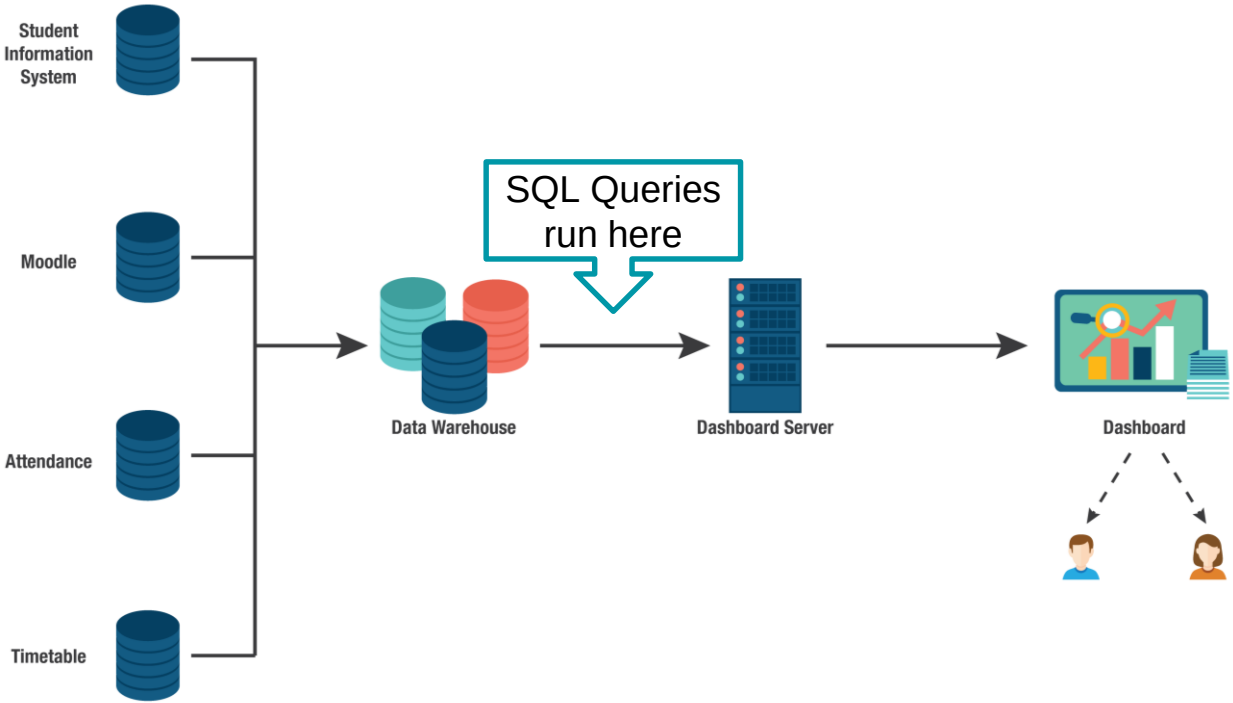
# Submissions per Week

```
WITH NEWTABLENAME AS (
       SELECT l.ID, l.EDULEVEL, l.EVENTNAME, l.COMPONENT, l.ACTION, l.TARGET, l.OBJECTTABLE, l.OBJECTID, l.CRUD
       , l.CONTEXTID, l.CONTEXTLEVEL, l.CONTEXTINSTANCEID, l.USERID, l.COURSEID, l.RELATEDUSERID, l.ANONYMOUS
       , iif(l.COMPONENT='assignsubmission_onlinetext', substring(REPLACE(l.OTHER,';','@'),0,1), REPLACE(l.OTHER,';','@'))
       as OTHER
       , l.TIMECREATED, l.ORIGIN, l.IP, l.REALUSERID
       , SUBSTRING(cast(L.timecreated as nvarchar),0,14) as DATETIME
       , SUBSTRING(cast(L.timecreated as nvarchar),0,12) as DATE
       , U.FIRSTNAME, U.LASTNAME, U.EMAIL, U.IDNUMBER, (DATEDIFF(DAY, '26/02/2019', L.TIMECREATED)/7) AS WEEKS
       FROM MDL_LOGSTORE_STANDARD_LOG L
       LEFT JOIN MDL_USER U ON U.ID=L.USERID
       WHERE COURSEID='1234' and email like '%student%'  and (COMPONENT='mod_assign' or COMPONENT='mod_forum' or
       COMPONENT='mod_hsuforum' or COMPONENT='mod_quiz' or COMPONENT='mod_scorm') and ( TARGET='assignment' or TARGET='post'
       or TARGET='attempt' or TARGET='status' or TARGET='add' or TARGET='assessable')
       )
SELECT DISTINCT IDNUMBER, USERID AS USERID, EMAIL AS EMAIL, COURSEID AS COURSEID, FIRSTNAME, LASTNAME
, (SELECT COUNT(*) FROM NEWTABLENAME B WHERE WEEKS=-1 AND B.USERID=A.USERID) AS WEEK0
, (SELECT COUNT(*) FROM NEWTABLENAME C WHERE WEEKS=0  AND C.USERID=A.USERID) AS WEEK1
, (SELECT COUNT(*) FROM NEWTABLENAME D WHERE WEEKS=1  AND D.USERID=A.USERID) AS WEEK2
, (SELECT COUNT(*) FROM NEWTABLENAME E WHERE WEEKS=2  AND E.USERID=A.USERID) AS WEEK3
, (SELECT COUNT(*) FROM NEWTABLENAME F WHERE WEEKS=3  AND F.USERID=A.USERID) AS WEEK4
, (SELECT COUNT(*) FROM NEWTABLENAME G WHERE WEEKS=4  AND G.USERID=A.USERID) AS WEEK5
, (SELECT COUNT(*) FROM NEWTABLENAME H WHERE WEEKS=5  AND H.USERID=A.USERID) AS WEEK6
, (SELECT COUNT(*) FROM NEWTABLENAME I WHERE WEEKS=6  AND I.USERID=A.USERID) AS WEEK7
, (SELECT COUNT(*) FROM NEWTABLENAME J WHERE WEEKS=7  AND J.USERID=A.USERID) AS WEEK8
, (SELECT COUNT(*) FROM NEWTABLENAME K WHERE WEEKS=8  AND K.USERID=A.USERID) AS WEEK9
, (SELECT COUNT(*) FROM NEWTABLENAME L WHERE WEEKS=9  AND L.USERID=A.USERID) AS WEEK10
, (SELECT COUNT(*) FROM NEWTABLENAME M WHERE WEEKS=10 AND M.USERID=A.USERID) AS WEEK11
, (SELECT COUNT(*) FROM NEWTABLENAME N WHERE WEEKS=11 AND N.USERID=A.USERID) AS WEEK12
, (SELECT COUNT(*) FROM NEWTABLENAME O WHERE WEEKS=12 AND O.USERID=A.USERID) AS WEEK13
, (SELECT COUNT(*) FROM NEWTABLENAME P WHERE WEEKS=13 AND P.USERID=A.USERID) AS WEEK14
FROM  NEWTABLENAME a
```

# Sample Output

| IDNUMBER | USERID | EMAIL | COURSEID | FIRSTNAME | LASTNAME | WEEK0 | WEEK1 | WEEK2 | WEEK3 | WEEK4 | WEEK5 | WEEK6 | WEEK7 | WEEK8 | WEEK9 | WEEK10 | WEEK11 | WEEK12 | WEEK13 | WEEK14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 474042 | 283668 | 1@student | 5273 | Z | J | 0 | 43 | 44 | 1 | 17 | 3 | 22 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 509580 | 291615 | 2@student | 5273 | Y | X | 0 | 4 | 4 | 19 | 25 | 14 | 20 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 517451 | 284380 | 3@student | 5273 | L | M | 0 | 32 | 19 | 0 | 0 | 0 | 5 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 518874 | 290509 | 4@student | 5273 | X | H | 0 | 37 | 24 | 28 | 25 | 38 | 12 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 526381 | 293976 | 5@student | 5273 | Y | S | 0 | 12 | 0 | 0 | 0 | 0 | 8 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 537021 | 291936 | 6@student | 5273 | B | Q | 0 | 39 | 21 | 19 | 19 | 21 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 541420 | 297655 | 7@student | 5273 | F | S | 0 | 32 | 19 | 0 | 0 | 0 | 11 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 543987 | 295564 | 8@student | 5273 | Y | Z | 0 | 37 | 24 | 28 | 25 | 38 | 11 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 545474 | 296302 | 9@student | 5273 | X | W | 0 | 12 | 0 | 0 | 0 | 0 | 29 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 545811 | 297546 | 10@student | 5273 | S | Z | 0 | 39 | 21 | 19 | 19 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 548877 | 294658 | 11@student | 5273 | F | Z | 0 | 30 | 40 | 24 | 34 | 29 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 558624 | 301424 | 12@student | 5273 | H | P | 0 | 32 | 20 | 22 | 23 | 0 | 20 | 21 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 562080 | 299666 | 13@student | 5273 | C | X | 0 | 54 | 33 | 28 | 42 | 46 | 59 | 14 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 562706 | 299898 | 14@student | 5273 | T | S | 0 | 34 | 0 | 0 | 31 | 0 | 2 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 562960 | 301766 | 15@student | 5273 | M | S | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 563058 | 296318 | 16@student | 5273 | M | T | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Solution Architecture



# QnA and References

https://docs.moodle.org/37/en/Analytics
https://docs.moodle.org/29/en/Learning_analytics
https://docs.moodle.org/37/en/Configurable_reports (configurable reports plugin)
https://docs.moodle.org/29/en/ad-hoc_contributed_reports (includes newer versions)
http://www.examulator.com/er/ (ER diagram)
https://docs.moodle.org/dev/Database_schema_introduction (quite old)
https://docs.moodle.org/37/en/Installing_Moodle#Create_an_empty_database
Quora (SQL Joins)

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