Moodle Quiz Archiver

Plugin Showcase and Development Status Report

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Motivation

Why do we even need a complex solution for archiving Moodle quiz attempts?

⚖ We are legally required to archive exams

📁 Moodle backups are not suited for long-term archiving

🖨 We hate printing every attempt to PDF by hand

Challenges and Existing Solutions

Archiving Moodle quiz attempts can't be that hard, right?

Challenges

- Archives must be **readable** in 10 years
  - › ... while ensuring the archived data is static and displays the same way as before
  - › ... without requiring an ancient Moodle instance and long unmaintained plugins

- Archive tasks must be **complete**, **traceable**, and **correct**

- Data must be stored **tamper-proof** and **digitally signed**

- Support for all used **question types**, including third-party plugins
  - › Not only HTML, but also file submissions, (external) images, ...
  - › Dynamically rendered components: MathJax formulas, GeoGebra applets, ...

- The archiving process must be **simple** to use

- Quiz reports must be **customizable**

Existing Solutions

Various ways to export quiz attempts already exist out there …

Quiz archive report (quiz_archive)

Quizattemptexport (local_quizattemptexport)

QuizExport (quiz_export)

exportresults (quiz_exporttesults)

Moodle attempt review page (manually printing to PDF)

…

Problems with existing solutions

- Dynamic content, such as MathJax formulas, is not supported, or attempts are not rendered as originally shown to the student

- Missing customization options, e.g., to export with(-out) example solutions

- PDFs must be exported manually or require additional technical knowledge

- Systems fail when quizzes have a large number of attempts

- Installation of additional software on the Moodle web server and security problems

- Archiving process is unclear or prone to human error

The Moodle Quiz Archiver

A modern Moodle plugin that archives quiz attempts as PDF files
for long-term storage independent of Moodle

Quiz archive content overview

Created quiz archives contain various data.
Contents are freely configurable.

📋 Attempt exports (`attempts/`)

- PDF export

- HTML source files

- Attachments

🗃 Moodle backups (`backups/`)

- Quiz activity

- Full course

🗒 Attempt metadata (`.csv`)

✅ Checksums for all files (`.sha256`)

Attempt report examples

MM	**[Max Mustermann](#)**
Kurs	Example Moodle Course for Quiz Archiver (Course-ID: 31)
Test	Example Quiz (Quiz-ID: 36)
Begonnen am	Friday, 21. April 2023, 09:06
Status	Beendet
Beendet am	Friday, 21. April 2023, 10:06
Verbrauchte Zeit	1 Stunde
Bewertung	**15,50** von 40,00 (**39**%)
Feedback	Sie haben den Test leider nicht bestanden.
Archiviert	Monday, 13. November 2023, 16:01

Information

⚐ Frage markieren

Hinweise zur Bearbeitung der Aufgaben

Zwischenspeicherung der Eingaben

Beachten Sie: Die Zwischenspeicherung Ihrer Antworten erfolgt stets durch einen Seitenwechsel.

Eingabe der Antworten

- Wie Sie Brüche, mathematische Zeichen und Funktionen eingeben, finden Sie in der Tabelle **„Hinweise zur Formeleingabe"** auf der rechten Seite unterhalb der Test-Navigation.
- Die Eingabe einiger spezieller Zeichen wird in den zugehörigen Aufgaben direkt angegeben.
- In den Antworten sind in der Regel **keine Kommazahlen** erlaubt. Wenn in der Aufgabe nicht anders beschrieben, geben Sie Ihr Ergebnis stattdessen als **Bruch**, ggfs. als **Quadratwurzel** ein.
- Wenn Sie eine Antwort eingeben, wird diese interpretiert und unter oder neben dem Eingabefeld angezeigt. **Überprüfen Sie bitte genau, ob Ihr Ergebnis wie gewünscht und fehlerfrei interpretiert wurde** und korrigieren Sie es gegebenenfalls.
- Das Ausmultiplizieren und Vereinfachen von Ergebnissen ist nur notwendig, wenn explizit darauf hingewiesen wird.

Generell: **Fragen Sie, wenn Ihnen unklar ist, wie Sie Ihre Antwort eingeben sollen!**

Antworten-Rückblick

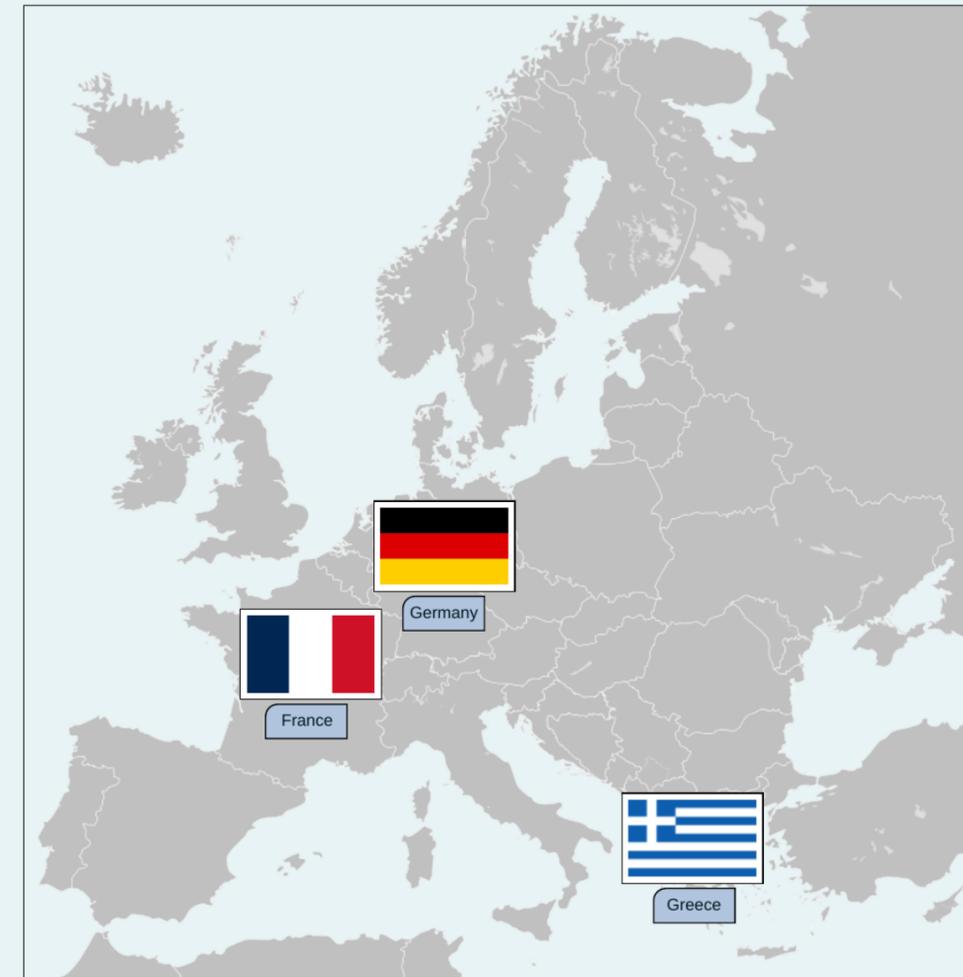| Schritt	Zeit	Aktion	Status
[1](#)	21. April 2023, 09:06:45	Begonnen	
[2](#)	21. April 2023, 09:06:50	Gesehen	
[3](#)	21. April 2023, 10:06:45	Versuch beendet	
4	**25. April 2023, 19:16:58**	**Versuch beendet**	

Question 13

Correct

Mark 1.00 out of 1.00

⚐ Flag question

Please drop the flags and country names into the map.

Your answer is correct.
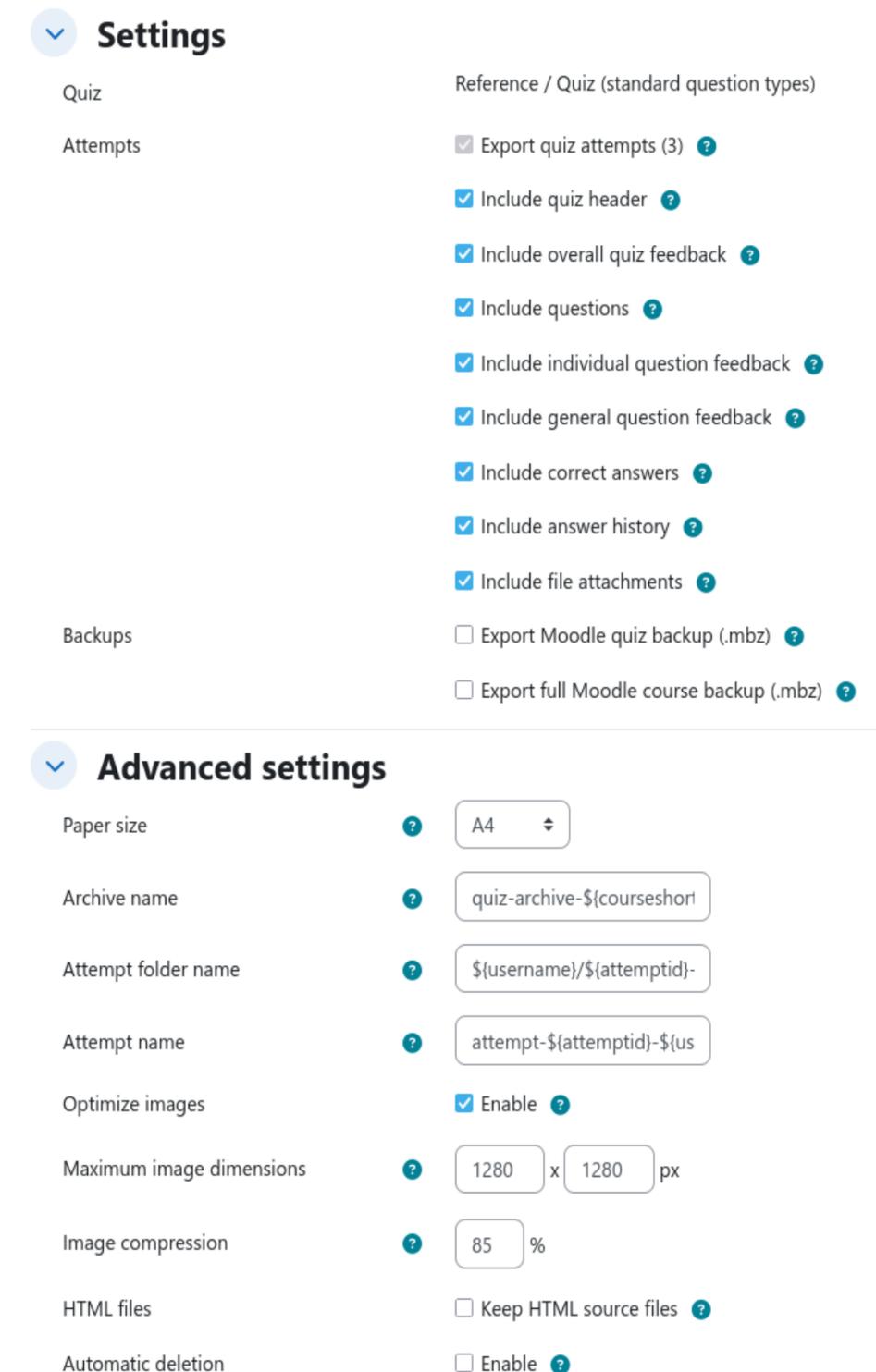
User interface

Creating a new quiz archive

Archive settings and global presets

⚙ Quiz archives can be customized in a variety of ways

- General and individual feedback

- Correct answers / example solutions

- Answer history

- Moodle backups and file attachments

- Paper size

- Variable based filenames

- ...

⚒ Each setting has a preset value that can be configured globally within the plugin admin settings

🔒 Individual settings can be locked to their global preset

Settings

Quiz	Reference / Quiz (standard question types)
Attempts	☑ Export quiz attempts (3) ❓
	☑ Include quiz header ❓
	☑ Include overall quiz feedback ❓
	☑ Include questions ❓
	☑ Include individual question feedback ❓
	☑ Include general question feedback ❓
	☑ Include correct answers ❓
	☑ Include answer history ❓
	☑ Include file attachments ❓
Backups	☐ Export Moodle quiz backup (.mbz) ❓
	☐ Export full Moodle course backup (.mbz) ❓

Advanced settings

Paper size	❓	A4 ⇕
Archive name	❓	quiz-archive-${courseshort
Attempt folder name	❓	${username}/${attemptid}-
Attempt name	❓	attempt-${attemptid}-${us
Optimize images		☑ Enable ❓
Maximum image dimensions	❓	1280 x 1280 px
Image compression	❓	85 %
HTML files		☐ Keep HTML source files ❓
Automatic deletion		☐ Enable ❓

Global archiving presets

Include correct answers
quiz_archiver |
job_preset_export_report_section_rightanswer

☐ Default: Yes

Display the correct answers for each question inside the report.

This setting may be hidden, based on the value of **quiz_archiver/job_preset_export_report_section_question**.

☑ Locked

Include answer history
quiz_archiver | job_preset_export_report_section_history

☑ Default: Yes

Display the answer history for each question inside the report.

This setting may be hidden, based on the value of **quiz_archiver/job_preset_export_report_section_question**.

☐ Locked

Report name
quiz_archiver |
job_preset_export_attempts_filename_pattern

`attempt-${attemptid}-${username}_${date` Default: attempt-${attemptid}-${username}_${date}-${time}

Name of the generated quiz attempt reports (PDF files). Variables **must** follow the `${variablename}` pattern. The file extension will be added automatically.

☑ Locked

Available variables:

- `${courseid}`: Course ID
- `${coursename}`: Course name
- `${courseshortname}`: Course short name
- `${cmid}`: Course module ID
- `${quizid}`: Quiz ID
- `${quizname}`: Quiz name
- `${attemptid}`: Attempt ID
- `${username}`: Student username
- `${firstname}`: Student first name
- `${lastname}`: Student last name
- `${timestart}`: Attempt start unix timestamp
- `${timefinish}`: Attempt finish unix timestamp
- `${date}`: Current date (YYYY-MM-DD)
- `${time}`: Current time (HH-MM-SS)
- `${timestamp}`: Current unix timestamp

Forbidden characters: \/.:;*?!"<>|

Sources

The quiz archiver plugin is available on GitHub
and via the Moodle Plugin directory!

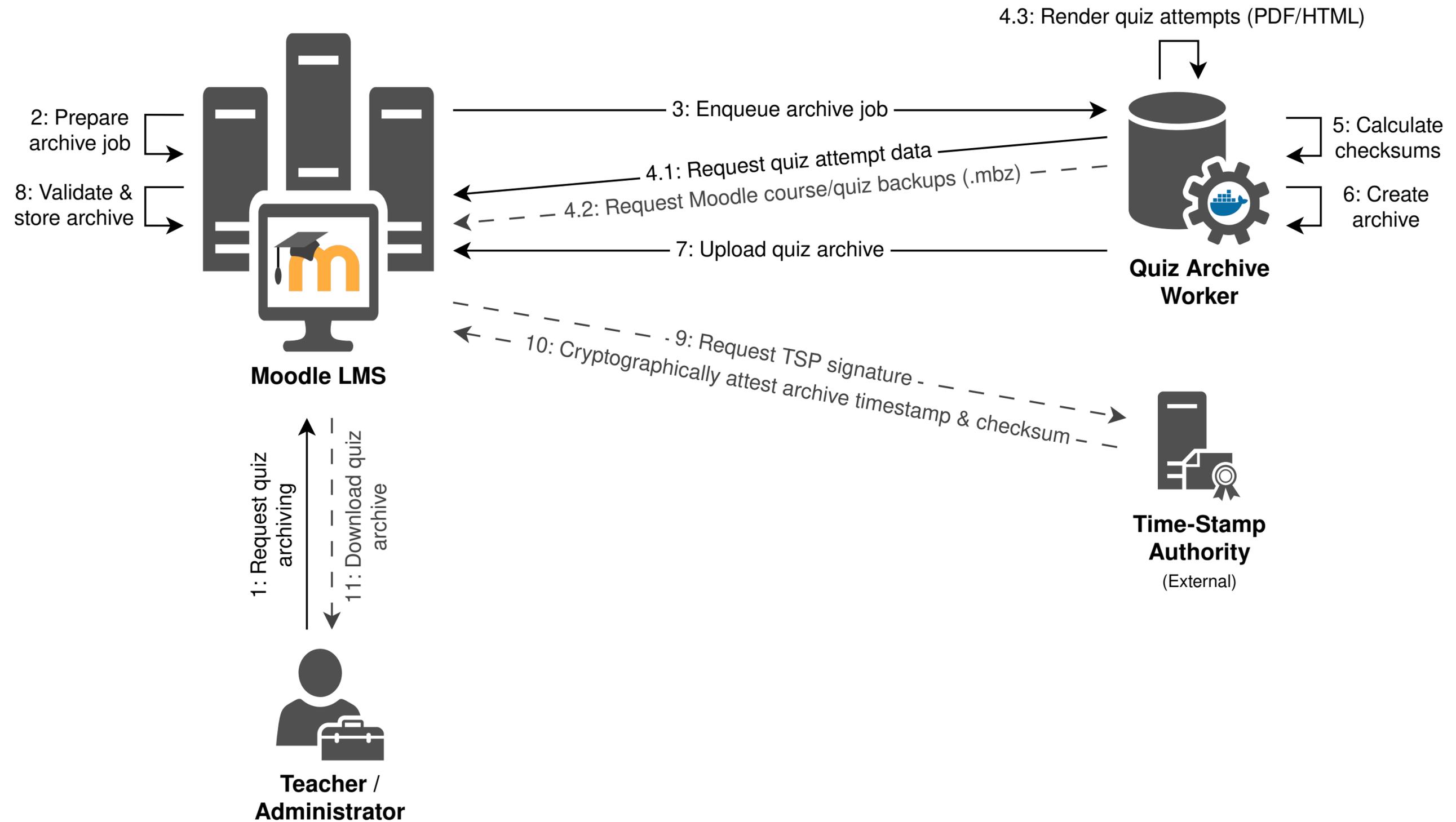https://moodle.org/plugins/quiz_archiver

https://github.com/ngandrass/moodle-quiz_archiver

Plugin Architecture and Process Overview

What happens when I hit the *"Archive quiz"* button?

Quiz archiving process overview

4.3: Render quiz attempts (PDF/HTML)

2: Prepare archive job

3: Enqueue archive job

4.1: Request quiz attempt data

4.2: Request Moodle course/quiz backups (.mbz)

8: Validate & store archive

7: Upload quiz archive

Quiz Archive Worker

5: Calculate checksums

6: Create archive

Moodle LMS

9: Request TSP signature

10: Cryptographically attest archive timestamp & checksum

1: Request quiz archiving

11: Download quiz archive

Time-Stamp Authority

(External)

Teacher / Administrator

User and administrator documentation

An extensive online documentation helps in configuring all features of the plugin and can guides users through the archive creation process.

https://quizarchiver.gandrass.de/
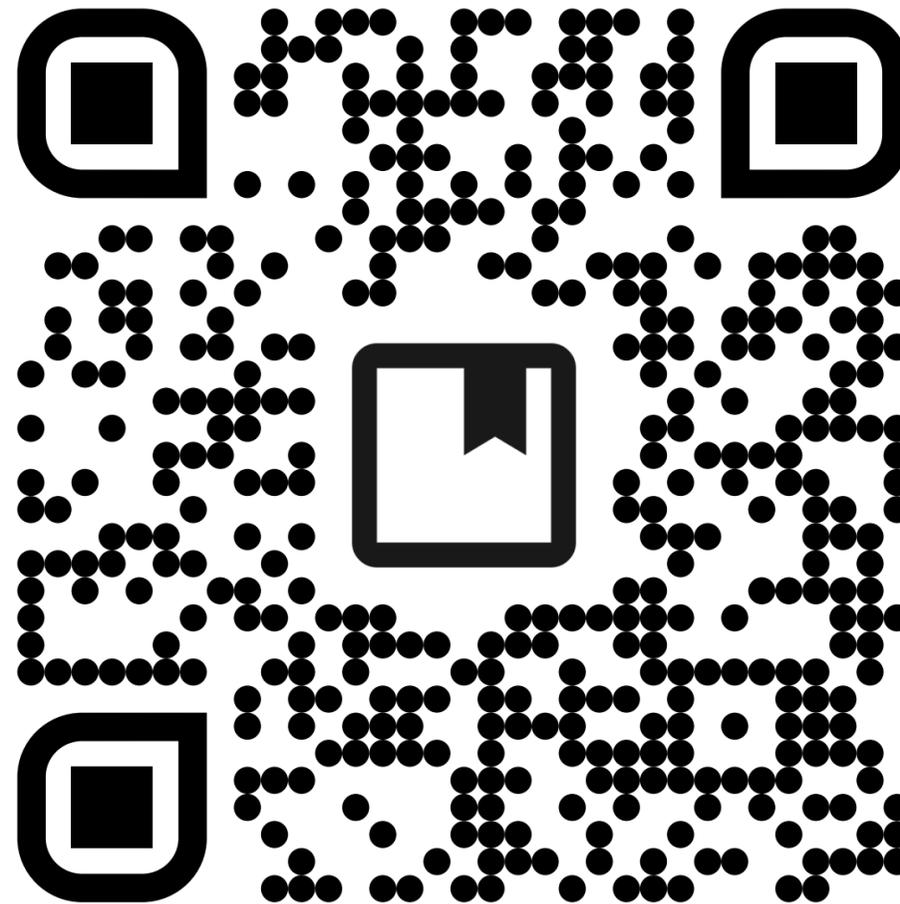
Upcoming Features

What we are currently working on!

PDF/A-3b compliance

PDF/A is an ISO-standardized version of the PDF format that is designed for
long-term archiving and preservation of electronic documents

- Required by many organizations for exam documents and theses

- Ensures that PDF files are **displayed equally** among different PDF viewers

- Guarantees that PDF files can still be **read in 10 years**, even if software environments change

- **Includes everything** needed for displaying a PDF (e.g., fonts) inside the PDF file itself

- PDF output format can be **configured** within the archive worker

Parallel archive job processing

Until now, only a single quiz archive job could be processed at a time.
This can lead to long waiting times when multiple archives are created at the same time.

⏱ Archive jobs can be **run in parallel** to increase the throughput

⚙ Amount of parallel jobs is **configurable** within the archive worker
and can thereby be adapted to the institutional needs

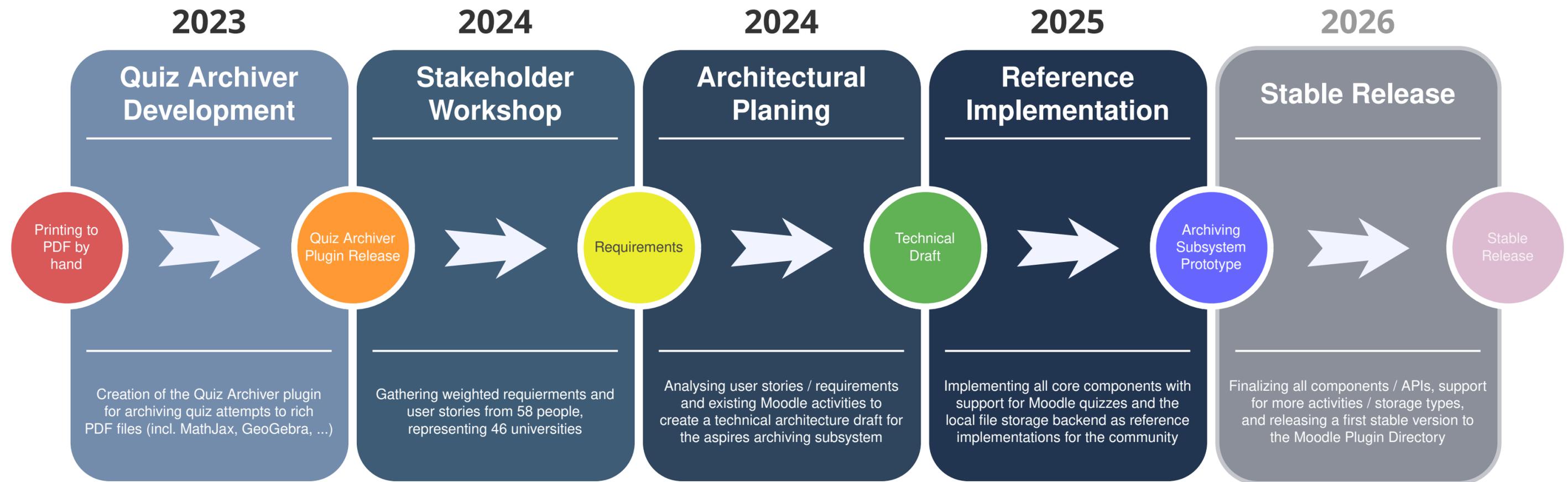⚡ Resource **usage guidelines** will be available upon release

Improved file upload

Working with very large quizzes can induce challenges during the file upload process.
We are currently working on improving this process to make the quiz archiver even easier to use.
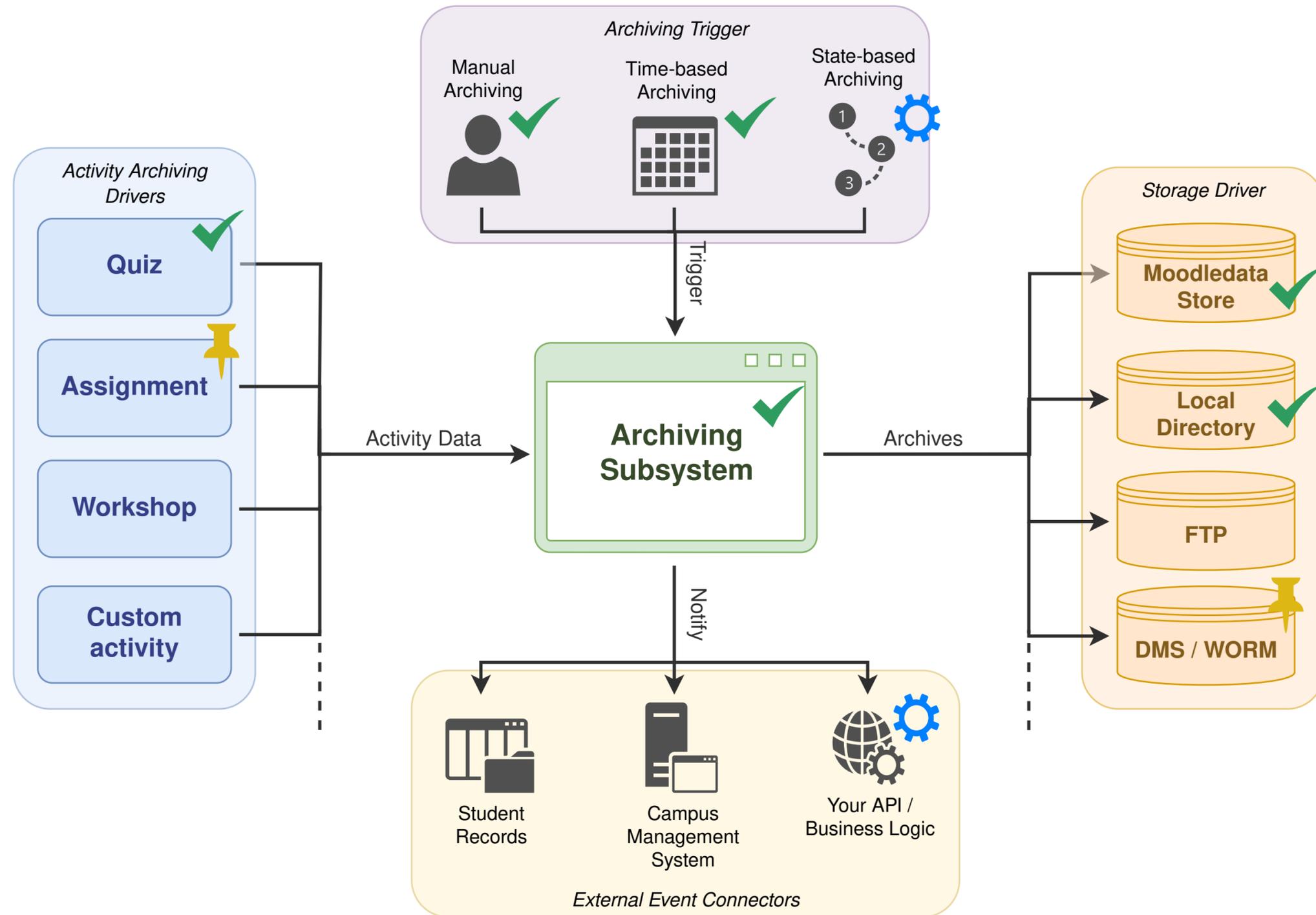
The Bigger Picture

Automation, Connection to CMS / DMS, Support for additional activities, Flexibility, ...
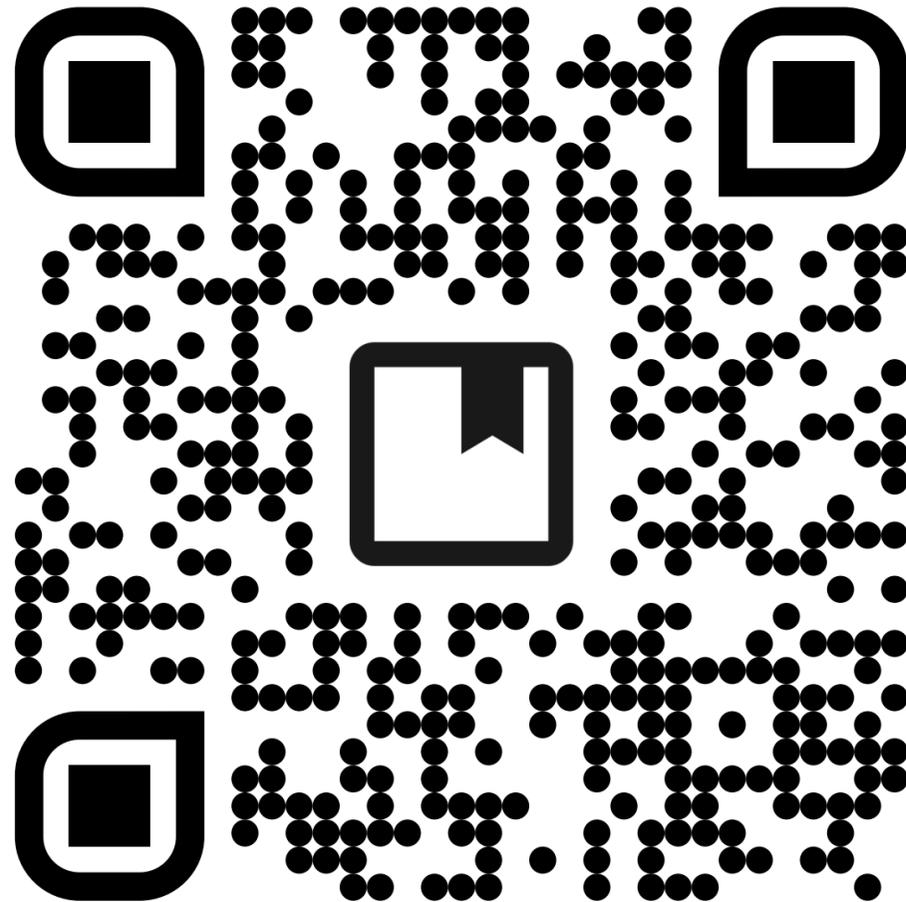
What we did so far …

2023

Quiz Archiver Development

Printing to PDF by hand

Quiz Archiver Plugin Release

Creation of the Quiz Archiver plugin for archiving quiz attempts to rich PDF files (incl. MathJax, GeoGebra, ...)

2024

Stakeholder Workshop

Requirements

Gathering weighted requierments and user stories from 58 people, representing 46 universities

2024

Architectural Planing

Technical Draft

Analysing user stories / requirements and existing Moodle activities to create a technical architecture draft for the aspires archiving subsystem

2025

Reference Implementation

Archiving Subsystem Prototype

Implementing all core components with support for Moodle quizzes and the local file storage backend as reference implementations for the community

2026

Stable Release

Stable Release

Finalizing all components / APIs, support for more activities / storage types, and releasing a first stable version to the Moodle Plugin Directory

The new archiving subsystem for Moodle

Dive in and keep updated

The whole archiving subsystem, including its components and features, is well documented in our online docs. Developers moreover find extensive technical documentation.

https://archiving.gandrass.de/

Q&A Session

Now it's time for your questions!
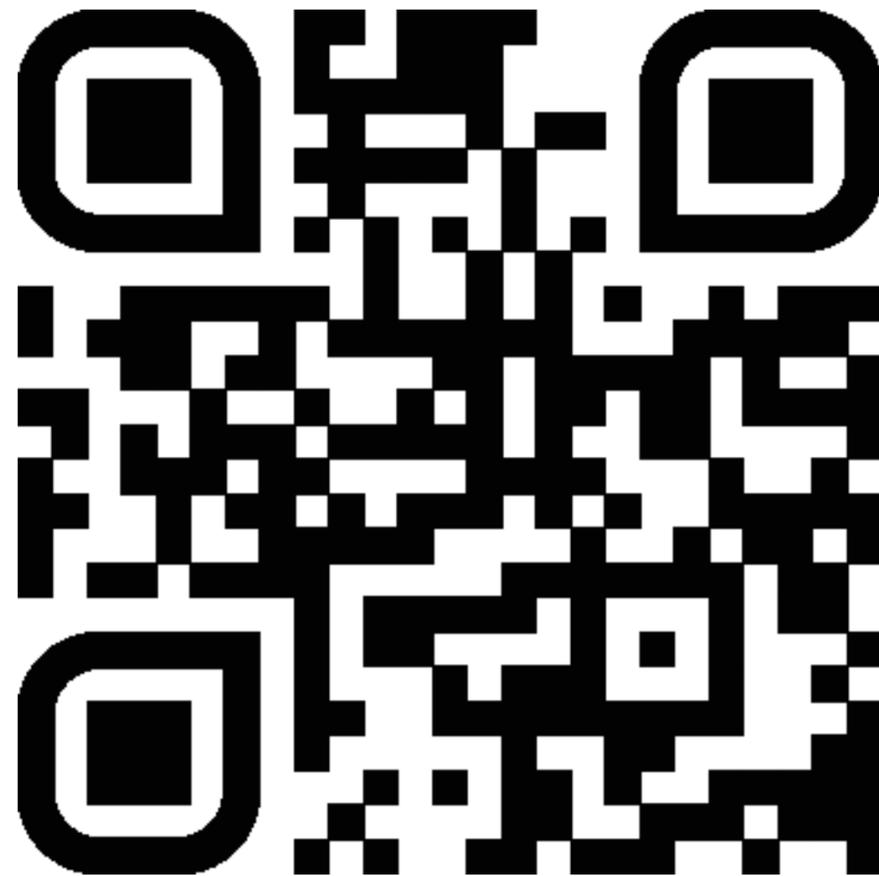
You can find all slides of this talk at
🌐 https://gandrass.de