

Concept, design, and implementation of a planning tool for students' own studies

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June 2024

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3 Introduction

Objective:

Development of a planning tool for students to organize their studies efficiently

Motivation:

Addressing the challenges students face in managing their academic schedules

Background and Motivation

- Variety of factors influence a student's academic success
- Effective study planning a crucial determinant of a student's academic achievement
- No concrete, comprehensive study tool available at TU Graz

Study Research Questions



Which platforms do students find most useful while learning?



Which features should be prioritized in the Study Planner?

Research Methods And Findings

Research Methods:

- **Online Survey**
- **In-Person Workshop**

Key Findings:

- **Most Useful Platform:** Studo, Notion, due to its modifiable calendar view
- **Desired Features:**
 - Integrated calendar with exam dates, course schedules, and personal events
 - To-do lists and assignment deadlines
 - Overview of passed/failed courses to boost motivation

Moodle Introduction

- The TU Graz TeachCenter main learning management system of TU Graz
- Free, open-source LMS developed
- Comprehensive educational tools for both technology and pedagogy
- Widely used in educational institutions globally
- Supports a variety of learning activities and administrative tasks

DEVELOPMENT OF STUDY PLANNER

Goals and Architecture of the Study Planner

Main Goals:

- Develop a student planning tool to maximize academic performance
- Integrate a Moodle calendar view with events from TU Graz, potential exam dates, and Moodle events

Architecture:

- **Frontend:** Asynchronous Module Definition (AMD) and TOAST UI open-source library
- **Backend:** data from TUGRAZonline web service
- **User Interface:** toggle between different calendar types, view detailed event descriptions, customize calendar views

Development Phases

1. Phase I:

- Obtain events from TUGRAZonline as iCalendar link for students
- Extract and save events using Moodle Calendar API

2. Phase II:

- Retrieve potential exam dates and save them to Moodle database

3. Phase III:

- Display events in Moodle integrated view using TOAST UI Calendar
- Address database limitations by caching events instead of storing them

Phase I

Purpose:

- Retrieve events from iCalendar links, TUGRAZonline
- Save events in the Moodle database

Process:

- Events from iCalendar links dynamically processed and added to Moodle

Tools Used:

- Moodle Calendar API for data manipulation
- Scheduled task in Moodle plugin



Figure 4.2: Example of event imported via iCalendar in the calendar plugin.

Phase II - Gathering Exam Dates

- Collect potential exam dates for students.
- Data received from TU Graz web service saved in Moodle
- Large volumes of data impacts Moodle's performance
- Over 15,000 database entries reduces system efficiency

Potential exam: Machine learning 373.386
×

🕒 Saturday, 16 September, 9:00 AM

☰ **Wintersemester 2022/23**
Lecturers: Maximilian Muster
Registration: 10-07-2023 10:00 - 06-11-2023 23:59
Exam mode: Schriftlich
[Click here to register for the exam](#)

📍 BMTEG138 H13

Phase III

Initial Setup:

Initially: a Moodle plugin with scheduled tasks for iCalendar synchronization and potential exam dates

Performance and responsiveness issues identified in the Moodle database



Revised Approach:

Introduction of Moodle Caching to save current user events instead of direct database storage.

ETL (Extract, Transform, Load) methodology employed for data processing

Evaluation of Open Source Libraries

Open-Source Calendar Libraries

- Open-Source libraries: reliable, secure, transparent
- Evaluation done per requirements:

Requirement	Full Calendar	Toast UI	Event	Evo	Calendar.js
List view	Y	N	N	N	Y
Description view	Y	Y	N	Y	Y
Different event types supported	Y	Y	Y	Y	Y
Toggle for each calendar	Y	Y	Y	N	Y
User friendly	Y	Y	Y	Y	Y
Modern view	Y	Y	Y	Y	N
Free of charge	N	Y	Y	Y	Y

TESTING

Study Planner Testing

- Unit testing used
- PHPUnit as a tool
- 90% code coverage

Implementation in Study Planner:

- **Phase I:** Tests data retrieval and storage from web services
- **Phase II:** Tests retrieval and parsing of potential exam dates
- **Phase III:** Tests the combination of iCal events and Moodle events, stored in cache and displayed using Toast Calendar API

RESULTS

Results

- Various calendar events integrated into a single Moodle view using TUI open-source software
- Consolidates potential exam dates, iCalendar events, and all Moodle events for easy student access.

Study calendar

Overview of possible exam dates, university and personal moodle events.

<input checked="" type="checkbox"/> View all					
Monthly ▾ Today Show weekends < > 2024-01					
<div> <div>Ical events</div> <div>Pexams</div> <div>Moodle user</div> <div>Moodle category</div> <div>Moodle site</div> </div>					
Mon	Tue	Wed	Thu	Fri	
1	2	3	4	5	
8	9	10	11	12	
<div>13:00 Evaluati...</div> <div>15:15 Data An...</div> <div>16:15 Science,...</div>	<div>11:00 Betrieb...</div> <div>20:16 Moodle ...</div>	<div>16:00 Data An...</div>	<div>08:00 Betrieb...</div> <div>15:00 Verifica...</div> <div>16:00 Englisch...</div>	<div>09:00 Betrieb...</div> <div>14:00 Networ...</div>	
15	16	17	18	19	
<div>09:00 Englisch...</div> <div>13:00 Evaluati...</div> <div>15:15 Data An...</div> <div>16:15 Science,...</div>	<div>11:00 Betrieb...</div> <div>22:10 TESTIC ...</div>	<div>13:00 Informa...</div> <div>16:00 Data An...</div>	<div>15:00 Verifica...</div> <div>16:00 Englisch...</div>	<div>14:00 Networ...</div>	
22	23	24	25	26	
<div>13:00 Evaluati...</div> <div>15:15 Data An...</div> <div>16:15 Science,...</div>	<div>11:30 Betrieb...</div>	<div>13:00 Informa...</div> <div>16:00 Data An...</div>	<div>15:00 Verifica...</div> <div>16:00 Potenti...</div> <div>16:00 Englisch...</div>	<div>14:00 Networ...</div>	
29	30	31	1	2	
<div>13:00 Evaluati...</div> <div>15:15 Data An...</div> <div>16:15 Science,...</div>	<div>08:00 Betrieb...</div> <div>10:00 Networ...</div>	<div>10:00 Betrieb...</div> <div>16:00 Data An...</div>			
5	6	7	8	9	
			<div>20:42 TESTING</div>		

Results

Main Features

1. Monthly View, Weekly and Daily Views

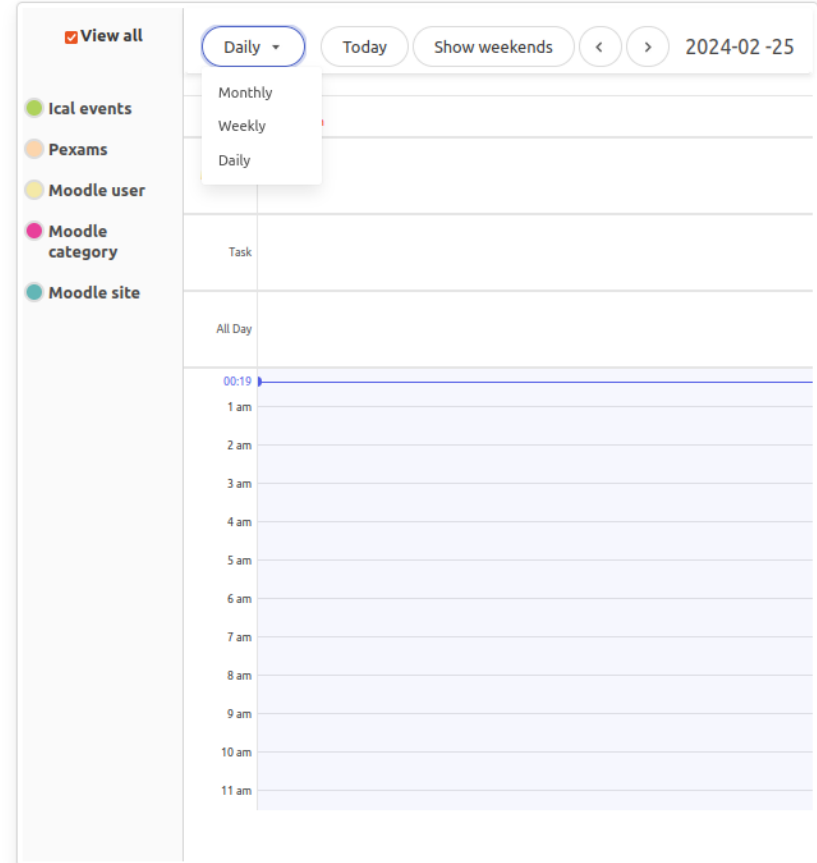
2. Navigation and Toggle Options

- “Today” button navigates to the current date in any view
- Toggle options for hiding/showing weekends and specific calendar events

3. Filtering: toggle to show/hide calendars

Study calendar

Overview of possible exam dates, university and personal moodle events.



The screenshot displays the 'Study calendar' interface. On the left, a sidebar contains a 'View all' toggle and a list of filters: 'Ical events' (green dot), 'Pexams' (orange dot), 'Moodle user' (yellow dot), 'Moodle category' (pink dot), and 'Moodle site' (teal dot). The top navigation bar features a 'Daily' dropdown menu (with options for Monthly, Weekly, and Daily), a 'Today' button, a 'Show weekends' toggle, and date navigation buttons (left arrow, right arrow) next to the date '2024-02-25'. The main calendar area shows a task list with 'Task' and 'All Day' entries, and a time slot grid starting at '00:19' and ending at '11 am'.

Results

Event Descriptions and Overflows

- Detailed event descriptions include name, time, location, semester, and registration details
- Overflow of events managed by showing a summary with a "More events" option for detailed pop-ups.

Potential exam: Logik und Berechenbarkeit IND.04033UF

2024.01.25 04:00 pm - 06:00 pm

📍 HS G (NT03128)

👤

📅 Busy

● Potential exam: Logik und Berechenbarkeit IND.04033UF

Sommersemester 2023

Examiner: Könighofer Bettina

Registration: 05.07.2023 00:00 - 04.10.2023 23:55

Exam mode: Schriftlich

[Click here to register for the exam \(only logged in\)](#)

25

● 15:00 Verifica...

● 16:00 Potenti...

● 16:00 Englisch...

1

8

Results

Exporting Calendars

- Users can export calendars in .ics format via three links:
 - TUGRAZOnline export link.
 - Potential exam dates link
 - Moodle export events
- Export URLs secure, user-specific, and straightforward

[Calendar](#) / [Import or export calendars](#) / [Export calendar](#)

Calendar

Export calendar

The calendar URL provides a dynamic link for importing events into other calendars. Any new, changed or deleted events in the source calendar **will** be reflected in the other calendars.

The calendar export allows you to create a backup copy of events, which may be imported into other calendars. Updates made in the source calendar **will not** be reflected in the other calendars.

Events to export

- ☒ All events
- ☐ Events related to categories
- ☐ Events related to courses
- ☐ Events related to groups
- ☐ My personal events

Time period

- ☐ This week
- ☒ This month
- ☐ Recent and next 60 days
- ☐ Custom range (16/03/24 - 21/03/25)

Get calendar URL

Export

 Required

Calendar URL

http://localhost/moodle/calendar/export_execute.php?userid=2&authToken=2a7770d3062b48

Copy URL

FUTURE WORK AND CONCLUSION

Conclusion

- **Main Questions:**

- RQ1: Which platforms do students find most useful while learning?
 - Notion, Studo, TeachCenter
- RQ2: Which feature should be prioritized in the Study Planner?
 - a tool consolidating exams, lectures, and events in one place

- Integration with TUGRAZOnline and Moodle systems for a comprehensive calendar view

- Three phases of development:

1. Retrieval of exam dates and iCalendar events.
2. Storage of events in the Moodle database.
3. Presentation of events in the Moodle integrated view via calendar

Future Work

Identified Limitations:

- Moodle database performance issues with large data volumes
- Temporary data storage via Moodle Cache API leading to potential inefficiencies

Proposed Improvements:

- Develop a permanent storage solution to enhance performance and user experience
- Implement two-way interaction with the calendar for better usability

Expansion Plans:

- Extend the Study Planner to other universities, starting with NAWI students in Graz
- Adapt the planner for integration with other university systems, ensuring a customizable and expandable tool

THANK YOU FOR THE ATTENTION!