Bilkent University

Department of Computer Engineering

CS 319 Term Project

Spring 2025

Section 1

Group 1

Deliverable 1

Final Submission

Group Members:

Emre Algür - 22202673

Irmak İmdat - 22201570

Ömer Yaslıtaş - 21902874

Alper Yıldırım - 22102033

Melih Rıza Yıldız - 21902958

Aykhan Ahmadzada - 21903609

Instructor: Eray Tüzün

Teaching Assistant: Yahya Elnouby

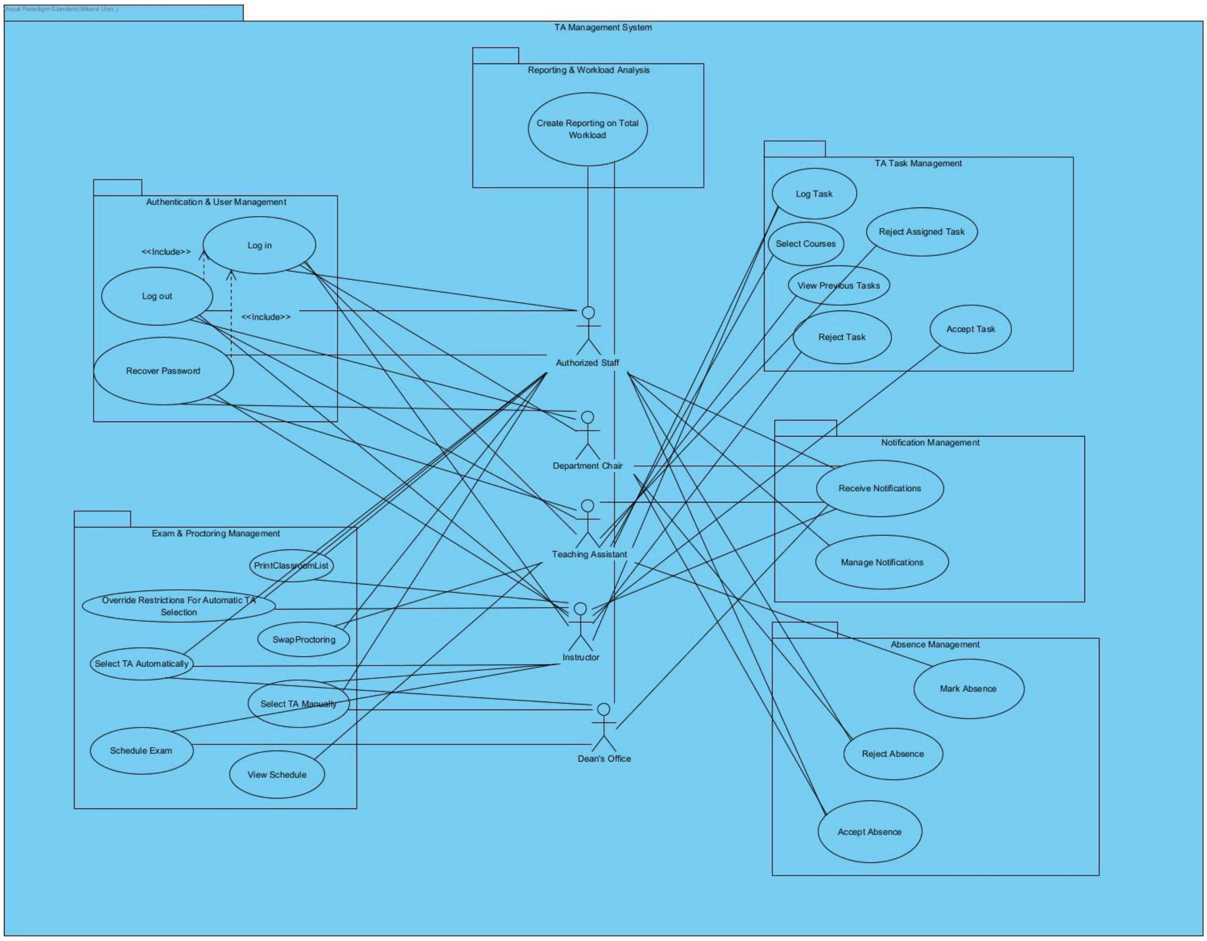
1. Introduction

The Teaching Assistant (TA) Management System is a web-based application designed to facilitate the management of TA responsibilities, workload tracking, proctoring assignments, and leave requests in a university setting. The system aims to provide an efficient, automated, and fair method for distributing tasks among TAs while reducing the administrative workload for faculty and staff.

Currently, TA duties such as grading, conducting recitations, assisting in labs, and exam proctoring are managed manually, leading to inefficiencies, workload imbalances, and tracking difficulties. This system seeks to address these challenges by providing a centralized platform that allows for task submissions, workload balancing, automated proctoring assignments, and reporting features.

The system is developed to benefit Teaching Assistants, Instructors, Department Staff, and System Administrators, each with different privileges and functionalities within the platform.

2. Use-Case Diagram



3. Use Case Textual Descriptions

3.1. Authentication & Account Settings

3.1.1. Login

Actors: TA, Instructor, Department Chair, Authorized Stuff, Dean's Office

Entry Conditions:

- The user accesses the login page.

Exit Conditions:

- The user is successfully logged into the system.

Flow of Events:

1. The user navigates to the login page.
2. The user enters their academic ID and password.
3. The user clicks the "Login" button.
4. The system verifies the user's credentials.
5. If the credentials are correct, the system logs the user in and redirects them to the home page.
6. If the credentials are incorrect, the system displays an error message and prompts the user to try again.

3.1.2. Logout

Actors: TA, Instructor, Department Chair, Authorized Stuff, Dean's Office

Entry Conditions:

- The user is logged into the system and accesses the dashboard.

Exit Conditions:

- The user is successfully logged out into the system.

Flow of Events:

1. The user clicks the "Logout" button.
2. The system logs the user out.
3. The system redirects the user to the login page.

3.1.3. Change Password

Actors: TA, Instructor, Department Chair, Authorized Stuff, Dean's Office

Entry Conditions:

- The user is on the login page and has forgotten password, can not recall password.
- The user is logged into the system and accesses account settings on the dashboard, and chooses the Change password option.

Exit Conditions:

- The user received instructions to change their password and completed successfully, the user's password is updated in the system.

Flow of Events:

1. Change password from login page
   - 1.1. The user clicks the "Forgot Password" link.
   - 1.2. The system prompts the user to enter their registered email address.
   - 1.3. The user enters their email address and clicks the "Submit" button.
   - 1.4. The system verifies the email address.
   - 1.5. If the email address is registered, the system sends a password reset link to the user's email.
   - 1.6. The user receives the email and clicks the password reset link.
   - 1.7. The system prompts the user to enter a new password.
   - 1.8. The user enters a new password and confirms it.
   - 1.9. The user clicks the "Reset Password" button.
   - 1.10. If the password is valid (i.e., it meets the character requirements, differs from the previous password, etc.)
     - The system updates the user's password and displays a confirmation message.
     - The system sends a message to the inbox of the user about action.
     - The user can now log in with the new password.
   - 1.11. If the password is not valid, the system displays a warning message stating the issue and redirects the user back to the change password tab.
2. Change password from dashboard
   - 2.1. The user logs into account.
   - 2.2. The user clicks on the account settings option on the dashboard and chooses the Change Password option.
   - 2.3. The user gets into the Change Password interface.
   - 2.4. The system prompts the user to enter their registered email address.
   - 2.5. The user enters their email address and clicks the "Submit" button.
   - 2.6. The system verifies the email address.
   - 2.7. If the email address is registered, the system sends a password reset link to the user's email.
   - 2.8. The user receives the email and clicks the password reset link.

2.9. The system prompts the user to enter a new password.
2.10. The user enters a new password and confirms it.
2.11. The user clicks the "Reset Password" button.
2.12. If the password is valid (i.e., it meets the character requirements, differs from the previous password, etc.)
  - The system updates the user's password and displays a confirmation message.
  - The system sends a message to the inbox of the user about action.
  - The user can now log in with the new password.

2.13. If the password is not valid, the system displays a warning message stating the issue and redirects the user back to the change password tab.

3.1.4. Change Profile Photo

Actors: TA, Instructor, Department Chair, Authorized Stuff, Dean's Office

Entry Conditions:

- The user has logged into the system and is on the homepage where the profile photo is displayed.

Exit Conditions:

- The user has changed their profile photo successfully, got notification verifying it, and photo is updated in the database..

Flow of Events:

1. The user clicks on the “Change Profile Photo” option on the main page near the current profile photo.
2. The system provides an option to upload a new photo from the device.
3. The user selects an image from their device.
4. The system checks the file format, size, and other restrictions (e.g., PNG, JPG, max file size).
5. If the image does not meet the criteria, an error message is displayed, and the user is asked to select another file with a prompt that displays available formats.
6. If the image passes validation, the system processes the image and previews the selected image before finalizing upload.
7. The system asks for approval for the selected image.
8. The user grants the approval.
9. The system updates the user's profile photo.
10. If successful, the new profile photo is displayed, and a confirmation message appears.
11. The system sends a message to the inbox of the user about action.

12. If the upload fails (due to network issues, format errors, etc.), an error message is displayed, and the user is prompted to retry.

Quality Requirements

- The system should support JPEG, PNG, and WEBP file formats.
- The maximum file size should not exceed 5 MB.
- The minimum resolution should be 200 × 200 pixels, with a recommended size of 500 × 500 pixels or higher.
- The system should crop non-square images automatically or provide a manual cropping tool.
- The profile photo update process should be completed within 5 seconds under normal network conditions.

3.2. TA Task Management

3.2.1. Log Task

Actors: TA

Entry Conditions:

- The TA is logged into the system and has performed a task related to their assigned course.

Exit Conditions:

- The task details are submitted for approval by the course instructor and recorded in the system.

Flow of Events:

1. The TA navigates to the task management option in the dashboard.
2. The TA chooses the log task option.
3. The TA selects the course from the list of assigned courses.
4. The TA enters the date and time of the task.
5. The TA selects the task type (e.g., Lab, Lab Preparation, Grading).
6. The TA enters the duration spent on the task.
7. The TA clicks the "Submit" button to log the task.
8. The system securely transmits the task details to the backend.
9. The course instructor receives a notification about the logged task.

Task Approval Outcome:

- If the course instructor approves the task, the system adds the task duration to the TA's total workload for the semester
- If the course instructor rejects the task, the system notifies the TA and prompts them to review and resubmit the task details if necessary.

3.2.2. Task Requests

Actors: TA

Entry Conditions:

- The TA is logged into the system and accesses the dashboard to check if his/her Logged task was approved or rejected.

Exit Conditions:

- The TA can leave the interface anytime s/he wishes to change the menu from the dashboard.

Flow of events:

1. The TA navigates to the task management option in the dashboard.
2. The TA chooses the task requests option.
3. In the task requests tab, the TA can observe his pending logged tasks, and his past approved or rejected logged tasks as a list.

3.2.3. Absence Request

Actors: TA

Entry Conditions:

- The TA is logged into the system and needs to request absence for a future date to avoid proctoring assignments, and has a document verifying the reason for his absence.

Exit Conditions:

- The absence request is recorded in the system and was sent to the instructor for approval.

Flow of Events:

1. The TA navigates to the task management option on the dashboard.
2. The TA chooses the "Absence Request" option.
3. The system displays an absence request form.
4. The TA selects the date(s) and provides a reason for the absence.
5. The system validates the input and allows submission.
6. The TA submits the request.
7. The system records the request and updates the absence list.
8. The system notifies the department chair or authorized staff for review.
9. The TA exits the section.

3.2.4. Task approval

3.2.4.1. Accept task

Actors: Instructor

Entry Conditions:

- The TA has logged a task and the instructor of the course is logged into the system.

Exit Conditions:

- The TA’s task log is accepted and recorded in the system.

Flow of Events:

1. The instructor navigates to the "Task Requests" section.
2. The system displays a list of pending task requests.
3. The instructor selects a task request to review.
4. The system presents details of the task request, including TA’s name, their rejection/approval rate from the previous tasks, date, duration of the task and task type.
5. The instructor selects the "Accept" option.
6. The system updates the request status to "Approved".
7. The system notifies the TA about the approval.

3.2.4.2. Reject Task

Actors: Instructor

Entry Conditions:

- The TA has logged a task and the instructor of the course is logged into the system..

Exit Conditions:

- The TA’s task log is rejected and recorded in the system.

Flow of Events:

1. The instructor navigates to the "Task Requests" section.
2. The system displays a list of pending task requests.
3. The instructor selects a task request to review.
4. The system presents details of the task request, including TA’s name, date, duration of the task and task type.
5. The instructor selects the "Reject" option and provides a reason for the rejection.
6. The system updates the request status to "Rejected".
7. The system notifies the TA about the rejection with the provided reason.
8. The TA can see the rejected task log from Task Requests tab and object to the rejection (see 3.2.7)

3.2.5. Task Planning

3.2.5.1. Exam Creation

Actors: Instructor, Dean’s Office

Entry Conditions:

- The user is logged into the system and can access the dashboard, and needs to create a slot for upcoming exams.

Exit Conditions:

- The user successfully created an exam and recorded it in the system with or without selected proctors.

Flow of Events:

1. The user navigates to the “Create Exam” section from the dashboard
2. The system displays an empty form, with the areas date, course, time duration, and place. These are required to fill to finish creating the exam.
3. The user should choose to continue with either manual, or automatic TA selection in order to continue, or leave it empty and select it later.
4. The user selects automatic or manual TA selection. (Further flow about the TA selection can be found in 3.5.5 and 3.5.6)
5. After the instructor fills all the required spaces, the user can click the "Finish Creating Exam" button, and create the exam.
6. The system updates the calendar, and the specified time slot is marked as occupied.
7. The user is notified that they successfully created the exam.

Exceptional Flow:

- If there is another activity happening in that time for that course, then the system will alert Time Conflict error to the instructor, and prevent the creation of the exam until the exam time has changed.
- If a required field is missing, then the system will alert Missing Field error to the instructor, and prevent the creation of the exam until all the required spaces are filled.

3.2.5.2. Print Classroom List

Actors: Instructor, Authorized Staff

Entry Conditions:

- There exists an exam with classrooms assigned in the system and the user is logged into the system.

Exit Conditions:

- The user has successfully downloaded the classroom list PDF.

Flow of Events:

1. The user navigates to the exams page from the dashboard.
2. The system displays the upcoming exams as a list, each list item having a button "Print". (An instructor can only display the exams s/he is responsible, whereas an authorized staff can display them all)

3. When the "Print" button is clicked, the system displays a PDF preview page where the user can adjust printing settings, along with "Print" and "Cancel" buttons. The user can make a selection whether to print in alphabetic or random order.
4. If the "Print" button is clicked, the system downloads the PDF.
5. If the "Cancel" button is clicked, the system navigates the user back to the exam list page.

Quality Requirements

- The PDF preview should load within 3 seconds.
- The downloaded PDF must maintain proper formatting and readability across different devices and printers.
- The system should support commonly used print settings (e.g., page orientation, margins, and scaling).

3.2.5.3. Select TA Automatically

Actors: Instructor, Authorized Staff, Dean's Office

Entry Condition:

- The user is logged in the task planning menu from the dashboard.

Exit Condition:

- TAs are automatically assigned and new information loaded into the system.

Flow of Events:

1. The user navigates to the “Task Planning” section from the dashboard.
2. The system displays a schedule of the exams of courses assigned to the user, with already assigned or not assigned proctors, and a list of proctors that can be assigned to this task.
3. The user should choose to continue with either manual or automatic TA selection in order to continue.
4. The user chooses “Automatic TA Selection.”
5. The system retrieves available TAs, sorted by lowest total workload.
6. The system considers priorities (course TAs first, then others) and any constraints (e.g., MS/PhD rule). (For the Dean's Office, TA's from all departments are available)
7. The system proposes a set of TAs that satisfy the requirements.
8. If TAs are insufficient or conflicts exist, the system may prompt for overrides (see “Override Restrictions for Automatic TA Selection”).
9. Once TAs are finalized, the system assigns them and updates schedules.

Exceptional Flow:

- The automatic selection should complete within a few seconds.

- Assignments must minimize workload unfairness and obey restrictions by default.

3.2.5.4. Select TA Manually

Actors: Instructor, Authorized Staff, Dean's Office

Entry Condition:

- The user is logged in the task planning menu from the dashboard.

Exit Condition:

- TAs are manually assigned and new information loaded into the system.

Flow of Events:

1. The user navigates to the “Task Planning” section from the dashboard.
2. The system displays a schedule of the exams of courses assigned to the user, with already assigned or not assigned proctors, and a list of proctors that can be assigned to this task.
3. The user should choose to continue with either manual or automatic TA selection in order to continue.
4. The user selects “Manual TA Selection.”
5. The system allows the user to assign proctors from TAs list to exams in schedule by drag and locate mechanics.
6. The user chooses one or more TAs to assign. (For the Dean's office, TA's from all departments are available, whereas for instructors this is not the case)
7. The system confirms the assignment and updates the TAs’ schedules.

Exceptional Flow:

- The list of TAs must be displayed accurately with real-time availability.
- The instructor must have clear prompts if assignment conflicts exist.

3.2.5.5. Override Restrictions for Automatic TA Selection

Actors: Instructor, Authorized Staff

Entry Condition:

- TA Selection was attempted but not enough TAs met the criteria while the user was logged in the task planning menu in the system.

Exit Condition:

- Restrictions were managed by the user in the needed way and updated in the system.

Flow of Events:

1. The user navigates to the “Task Planning” menu from the dashboard.

2. The user navigates to the Override Restrictions option.
3. The instructor chooses which restrictions to override (e.g., consecutive-day limit).
4. The system re-processes the TA list with relaxed criteria.
5. The system presents the new results for the instructor's confirmation.
6. The instructor confirms the final assignment.

Exceptional Flow:

- All overridden steps must be logged for auditing.
- The system should guide the user on which overrides might be risky.

3.3. Scheduled Tasks & Exames

Actors: TA

Entry Conditions:

- The TA is logged into the system and accesses the dashboard.

Exit Conditions:

- The TA changes the menu he wants to use from the dashboard.

Flow of Events:

1. The TA navigates to the "Scheduled Tasks & Exames" section.
2. The system displays a list of logged tasks in order by date with information about each task on it(date, time, course, and etc.). Also tasks that didn't happen yet will have a swap button on them.
3. The TA selects a specific task to view details.
4. The system presents detailed information about the selected task.

3.3.1. Swap Proctor

Actors: TA

Entry Conditions:

- The TA is logged into the system and navigated to the Scheduled Tasks & Exames menu.

Exit Conditions:

- The TA logged for swap with another TA and his task and system loaded the update while the Instructor accepted or rejected it.

Flow of Events:

1. The user navigates to the Scheduled Tasks & Exames menu.
2. The user clicks on the swap button on the upcoming task.
3. The user fills in information about the student he wants to swap with and the task he wants to be responsible for.
4. The user submits his request.
5. The request loads into the system.

3.4. Create Reporting on Total Workload

Actors: Dean's Office, Authorized Staff

Entry Conditions:

- The system contains data on TA workload and proctoring assignments.

Exit Conditions:

- The user has successfully downloaded the report as a PDF.

Flow of Events:

1. The user opens the dashboard and clicks on the "Reports" option.
2. The system navigates the user to a reports page where a list of different report types is available, each list item having a "Create" button on the right-hand side. (Available reports include: total proctoring workload per semester, total TA duty per course per semester, other relevant workload reports)
3. When the user clicks the "Create" button, the system generates a PDF preview of the selected report using the current data.
4. On the PDF preview page, the user can adjust printing settings and choose between "Print" and "Cancel" options.
5. If the "Print" button is clicked, the system downloads the report as a PDF.
6. If the "Cancel" button is clicked, the system navigates the user back to the report list page.

Quality Requirements

- The report preview should load within 3 seconds.
- The report should be formatted for clarity and readability, ensuring correct alignment of tables and text.
- The system should allow generating reports for specific timeframes (e.g., a selected semester or academic year).

4. Tech Stack

The technology stack chosen for the project is React for the front end, Express and Node js for the back end and PostgreSQL for the database.

4.1 Front End:

- **React** will be used for client-side (frontend) development. It provides an efficient way to build dynamic and interactive user interfaces using reusable components. React will allow us to provide an interactive, user-friendly interface. Schools and individuals can easily browse date and time for their preferred university tour and make appointments in real-time. React's component-based structure allows for reusability, so components like appointments, staff profiles, and tour scheduling can be consistently implemented across the system.

4.2 Back End:

- As the runtime environment, **Node.js** powers JavaScript on the server, handling requests, managing resources, and handling non-blocking I/O operations efficiently. Node.js will enable fast data processing and efficient handling of multiple requests simultaneously. Node enables asynchronous operations, which allow multiple bookings or searches to be processed without slowing down the system, ensuring a seamless experience for schools, individuals, advisors and guides.
- The server-side functionality is managed by **Express**, which enables efficient routing for various requests, such as fetching tour data, handling user appointments, processing payroll payments for guides, and managing user accounts. Express also supports authentication, which will allow secure logins for staff and admins, and will be able to handle admin-specific tasks.

4.3 Database:

- MySQL is an SQL database server that supports different back ends, API's, and a choice of administrative tools; while providing structured and efficient data storage. In our system, MySQL is a good option for managing and organizing TA assignments, tracking workload distribution, linking courses with TAs, and storing exam proctoring schedules while ensuring data integrity and consistency. Additionally, the utilization of MySQL was a client request.