2024-2025 SPRING SEMESTER

CS319 – Object-Oriented Software Engineering

Deliverable #3

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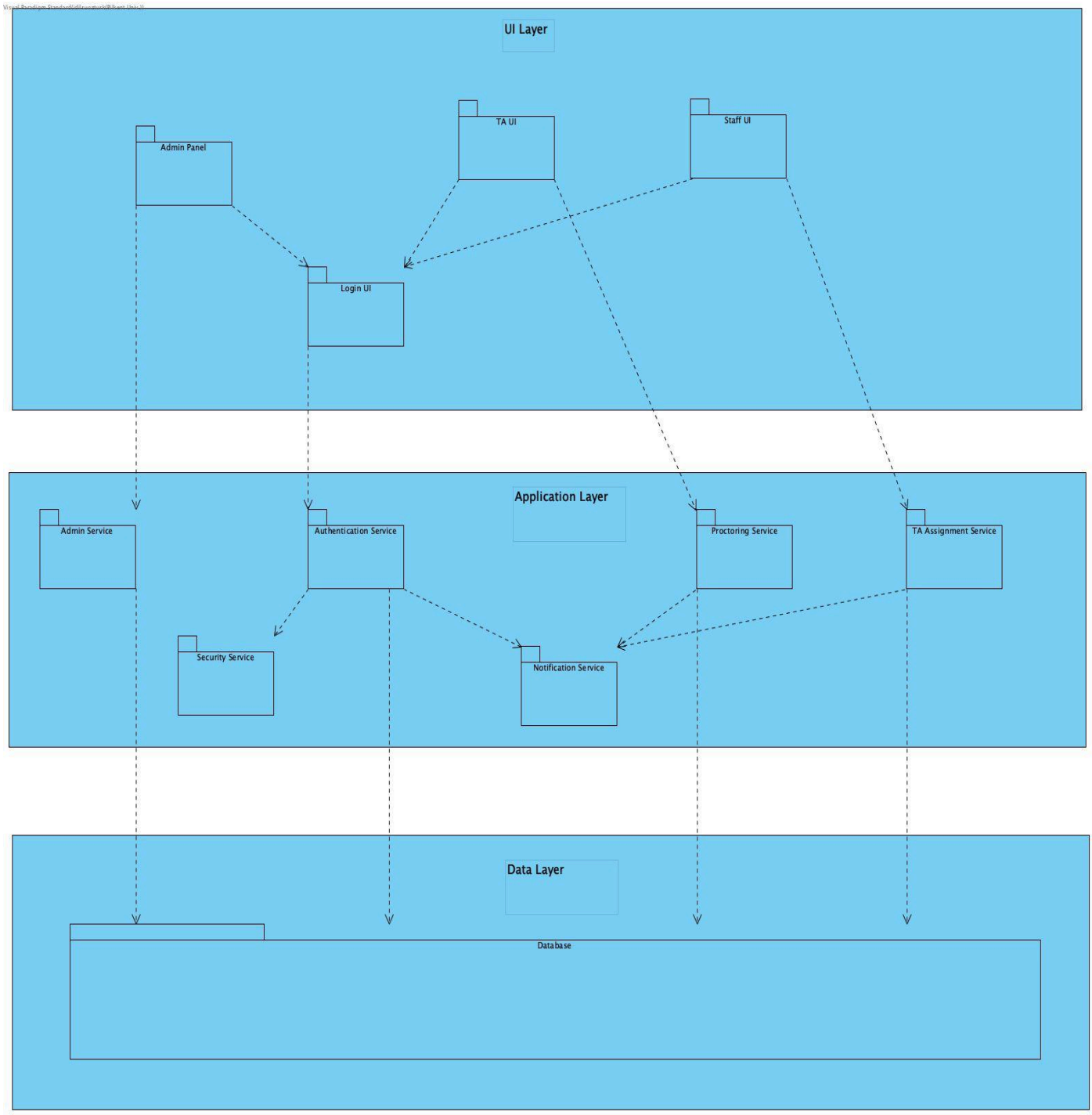
1. Subsystem Decomposition

1.1 Subsystem Decomposition Diagram



1.2 UI Layer

The UI layer of the system is used to group the frontend of the project. This layer makes the changes in frontend easier. This layering model helps with designing a user-friendly UI that does not have to affect every change in the logic of the application. UI layer consist the following packages:

Admin Panel: Contains all the frontend elements that are special to admin panels. It has interactions with Login UI as well.

TA UI: Contains dashboards, navigation bars and elements that are specific to the use of TAs, using other packages in the UI layer such as Login UI.

Staff UI: This package contains the pages for instructors, deans and faculty staff. These roles in the system do not vary much, which is why they are all in the same package.

Login UI: This package is used to implement a basic login page for all users, including admin, TAs, and staff. It is directly linked to the authentication service package.

1.3 Application Layer

Application layer includes all the services and related entities. This layer has codes for necessary functionalities of the system, such as TA and proctor assignment. Additionally, this layer connects with both Database Layer and the UI Layer of the system. The following packages are included in the layer:

Admin Service: This package contains the codes for getting data from the database and processing the data so that Admin Panel can use this to display.

Authentication Service: Includes codes for securing the login process. It is associated with Login UI and Database.

Proctoring Service: This service has some of the most important features available in the system. It makes it easier for staff to make proctoring assignments and for TAs to view information about their proctoring.

TA Assignment Service: Includes entities and controllers for manual TA assignment, which will be done by the CS department staff.

Notification Service: Responsible for generating and managing system notifications, interacting with Authentication Service, TA Assignment Service and Proctoring Service by sending emails.

Security Service: Authenticates user login operations and limits access to the elements (HTML page, CSS code, backend code, JS code, picture etc.) for unauthorized users.

1.4 Data Layer

This layer is specific to the database of the system, which is MySQL-based. All necessary information in the system, such as users, courses, and exams, are held in the database.

2. Design Goals

2.1 Functionality

One of the design goals of TA Management System is functionality because the program is designed for use in various roles with various expectations. For different departments, TA Management System presents different features. TAs can take leave of absence requests, swap proctors, enter tasks manually and view their calendars, whereas academic staff can assign TAs to sections, make their TA preference for a specific course, make manual and automatic TA assignments, swap TAs, approve or reject various requests done by TAs. Additionally, admin users can edit every table in the system and can view logs. With this variety of roles and features, it can be said that functionality is an important design goal for the system.

2.2 Security

The TA Management System contains sensitive information such as users' personal and performance data, making security one of the most critical components of the application. The system also grants broad access privileges to authorized users, which further increases the importance of implementing strong security measures. To ensure the security of the system:

- Encryption techniques will be used to protect user information.
- Authentication mechanisms will be implemented to verify the identity of users accessing the system. This will ensure that only legitimate users can log in and perform actions based on their roles.
- In addition, access rights will be limited based on user roles to prevent unauthorized access to sensitive data.

3. Design Trade-offs

3.1 Functionality vs Rapid Development

Since the TA Management System includes an excessive set of features, it makes it slower to create. However, working as a team of five and having three months to implement the system, the team has enough time to include more functionality. That is why functionality is preferred to rapid development in this project.

3.2 Security vs Usability

The TA Management System will be used by teaching assistants, instructors, and department staff individuals who are familiar with computer systems and regularly interact with academic management tools. This user group typically possesses sufficient technical literacy to navigate moderately complex interfaces. The system contains a substantial amount of sensitive information, including academic records, personal data, and internal communications. Moreover, users with authorized roles have the ability to make impactful changes such as assigning tasks or approving workload distributions. Due to the critical nature of these operations, security has been a primary concern during development. The TA Management System includes 2-factor authentication via email, which makes the login phase inconvenient for users but also secures their information.