Bilkent University

Department of Computer Engineering

CS 319 Term Project Internship Management System

Project short-name: InternHub

Analysis Report

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1.0 Introduction

The project is an internship management website that not only focuses on facilitating the jobs of students, evaluators, and secretaries but also allows administrative staff, such as the dean and department chairs, to trace the progress of internship courses and view the statistics. In this project, everything related to internships should be in one place so everyone can access the necessary documents from the website. Some of these documents are internship reports written by students, work and report evaluation forms of the student reports, confidential company forms filled by department secretaries, and feedback given by instructors to submissions made by students. As evident from the previous statement, students will be able to upload their reports to the website, and instructors and secretaries can handle them on the website, so they will not need to bother themselves about other apps or emails.

The website also contains additional features that will further facilitate the process. Students can see their internship reports' current states like "Under Evaluation", "Revision Requested," or "Satisfactory" so they will not worry about their reports which is not an option in Moodle. The secretary could easily assign instructors to the students according to their numbers so she would not bother with Excel and emails. Students will be notified about the submissions assigned to them and due dates as well. In addition, students may request extensions through websites, making instructors more accessible and agreeable to students. Finally, authorized users can make announcements to remind important points to other users. All of these features will reduce the work and concerns for every user.

Based on the aforementioned enhancements, the current internship management system requires the involvement of different apps, emails, and paperwork, leading procedures to progress at a slower pace. Therefore, these issues are intended to be solved by making a website containing all necessary functionalities in a single platform so that every user can quickly fulfill their responsibilities without other apps.

2.0 Current System

The team members attended the presentation given by the department chair, Selim Aksoy. According to him, a lot of tasks are done manually by the secretary. For example, evaluation forms are filled by the secretary step by step manually. Besides that, from Selim Aksoy's presentations, the current internship management system procedure can be summarized as follows:

- The mfstaj system is used for company approvals. When a student finds a company, and if this company is not in mfstaj system, the student applies mfstaj to register this company to the system.
- When the company is in mfstaj, a student applies to this system to inform them that the student will intern in that company.
- The use of mfstaj ends once the student completes the internship program in this company.
- Students take the relevant course (XX299 or XX399) the following semester after the summer internship.

- The secretary assigns instructors to students to evaluate their reports. The secretary does this process manually.
- Instructors get an email from the secretary to learn which group of students are assigned.
- Students upload their reports to the Moodle system and wait for feedback from their assigned instructor.
- Once the instructor reads and evaluates the reports, whether he gives a satisfactory score or gives feedback via Moodle or mail.
- If the student receives feedback from the instructor, the renewed report must be uploaded to Moodle system again. This process is repeated until the student gets a satisfactory or unsatisfactory result, depending on the instructor.
- After the report evaluation is done, instructors give the result of their students to the secretary.
- While this process is ongoing, the companies send an envelope to Bilkent University, including the evaluation of a student from a related person (supervisor).
- Secretary takes these envelopes and manually writes the students' evaluation grades on the evaluation forms. The secretary, in a similar fashion, fills all students' evaluation forms by herself.
- The current system uses a combination of Moodle/Google Drive/Email.
- In the current system, students need to be made aware of the status of their reports.
- Secretary does most of this process and must complete it manually in the current system.
- The envelope coming from companies includes paperwork and a physical job, so it could be digitalized.

3.0 Proposed System

3.1 Overview

The current manual process for managing internship reports for XX299 and XX399 is not practical or efficient and requires plenty of time and effort from academicians. To address this issue, we propose developing a web application to benefit all parties involved in the internship report process.

The application will have a login screen, and users will be provided with different aspects of the system depending on their roles. To clarify, instructors will be able to list internship evaluations assigned to them (i.e., Hasan Ege Tunç's CS299 evaluation), open submission boxes to internship evaluations, and trace the status of submissions such as 'Submitted' or 'Pending'. They can provide feedback to students after assignment submission occurs. The department secretary will also be able to easily assign students who need to be evaluated to instructors through InternHub. In addition, instead of manually filling out confidential company forms, the department secretary will be able to fill them on the system and save them to edit later. Furthermore, this actor may accept or reject students' forms about companies. Adding companies not in the database to the company list and removing the existing ones are also under the authority of the department secretaries. Also,

s/he can make an announcement that can be seen by all actors sharing the same department.

On the other hand, if the user is a student, various features will be available. Students can submit any forms or documents entirely digitally, including firm approval forms - these will be referred to as *company approval validation applications* in the rest of the report - and internship reports. Students can use InternHub to fill out a form requesting that a firm be added to the database - these will be referred to as *company requests* in the rest of the report- if it needs to be included in the company list. Additionally, they will be notified about their forms' status depending on the secretary's action (i.e. rejected or accepted). They can also comment on their internship company and send it to the secretary as a form - this will be referred to as *company evaluation* in the rest of the report.

To sum up, InternHub proposes the development of a web application that will provide automated solutions for department secretaries, instructors, and students during the internship report application process. The application aims to streamline the process and reduce the time and effort required by all parties involved.

3.2 Actors

- **InternHub User:** The default actor type that is the basis for all other actor types is the InternHub User. If a user has not been assigned to a particular actor type during registration or later, they will be considered an InternHub User. However, if users have a single role of InternHub User, their access to the system will be restricted. They will only be able to see the login page to login.

- **Super User:** Super User actor type oversees the privileged operations within the InternHub application. This role is typically fulfilled by the application's maintainers, who ensure that the system operates smoothly. Super User is the only actor entitled to register other actors into the system. Additionally, super users are responsible for managing companies in the database and can make announcements. An integrated super user's account is provided with the application, and super users are authorized to create additional super users accounts as needed.

- **Student**: Students can be registered to the system by super user. Students on InternHub can see the feedback of their reports, submit company approval validation applications, company request and company evaluations, track their statuses, browse companies lists, and see announcements and feedbacks given to them.

- **Dean:** A dean can be registered to the system by super user. This actor can make announcements, browse other actors' lists (i.e. department secretary list, instructor list, student list and chair list) and filter these list according to the departments. Dean can also view the statistics of all departments. (i.e. average work and evaluation grade of students in CS department, average confidential company form grade of students in IE department, how many students received satisfactory grade in EEE

department)

- **Instructor:** An instructor can be registered to the system by the super user. Their primary responsibilities can be listed as marking students' internship reports as ‘Satisfactory’ or ‘Revision Requested’, filling the work and report evaluation forms to explain the reasoning behind their marking, and assigning an ‘Unsatisfactory’ or ‘Satisfactory’ grade to internship process based on the final version of the report. They can still view internship evaluations assigned to them, give feedback to submissions made under the internship evaluation process and see the related announcements.

- **Department Secretary:** A department secretary can be registered to the system by a super user. The department secretary can set the statuses of forms sent by students (i.e., rejected or accepted), assign internships evaluations to instructors, make announcements, process the confidential company forms into the system, and export the final grading document of particular summer training based on the confidential company form filled by her, work and report evaluation form filled by the instructor and the most recent feedback given to internship.

- **Chair:** A chair can be registered to the system by a super user. The chair has a similar authorization field to the dean, but in terms of browsing other actors’ lists and viewing statistics chair is restricted to his own department. (i.e. the CS chair cannot view the EEE students’ list.)

3.3 Non-Functional Requirements

3.3.1 Usability

Usability is a crucial aspect of the InternHub project, as it aims to enhance the internship report process experience. The system must offer a clear and comprehensible interface, especially for the instructors, and enable students to carry out their tasks smoothly via a user-friendly digital platform. To achieve this:

• Key attributes, such as uploading a company approval validation application or internship report, can be done through a single button click.

• The coloring of form statuses will be consistent. As an example, if the company approval validation application is rejected, it will appear red on the department secretary’s screen, and if it is accepted, it will appear green.

• A responsive design approach will be used to ensure that InternHub fits the screen size of various devices used by the users (i.e., 1024x768, 1920x1080, and more).

- Company and student lists can be easily scrolled to see each.

- InternHub will be in a simple design for each user, as each user will only see the necessary tabs for him/her.

3.3.2 Reliability

Reliability is a critical non-functional requirement for InternHub due to the importance of managing the internship report process without any errors. Therefore, the system must function reliably and meet all user expectations. To achieve this:

• InternHub will have a minimum uptime rate of 95%, which can be measured and tracked through insights provided by the cloud provider, such as AWS.

• Due to the importance of the reports for InternHub, database backups will be taken every 12 hours to prevent any potential data loss.

3.3.3 Security

The system contains confidential personal information about students, and it is imperative to ensure that it is kept private and safeguarded from unauthorized access.

• To maintain students' privacy, only other privileged users will have access to limited information about students, such as names, departments, student IDs, and email addresses.

• To protect student passwords, they are encrypted using the "BCrypt" hashing algorithm and stored in the database after encryption.

• Each student is permitted to register only one account in the system, which is verified against their Bilkent University email address.

• During sign-up, email authentication will be sent to students to inform them about their passwords. This process ensures that students cannot sign up on behalf of others.

3.3.4 Safety

The goal of the InternHub project is to make the Bilkent Internship system easier and faster for all users.

- The system will be developed using modern web development technologies. These technologies are optimized for performance. For instance, Django has a fast-templating engine to generate HTML that will help us keep server responses faster as possible.

- The report uploads will take less than 10 seconds.

- Receiving an email sent after registration of the user into the system will take less than a minute.

3.3.5 Maintainability

Maintainability is a crucial aspect of software projects, and the InternHub will be designed with maintainability.

• The diagrams provide a clear and concise representation of the system with all functionalities, making it even easier to modify when needed.

• Also, for maintainability reasons InternHub will have a good modular design, clear code documentation, and version controls to provide system maintainability and possible updates in the future.

• The variation of user types makes detecting and solving problems specific to those types simpler.

• Finally, using modern and enhanced programming languages and frameworks will help ensure that the system is maintainable in the future.

3.4 System Models

3.4.1 Use-Case Model

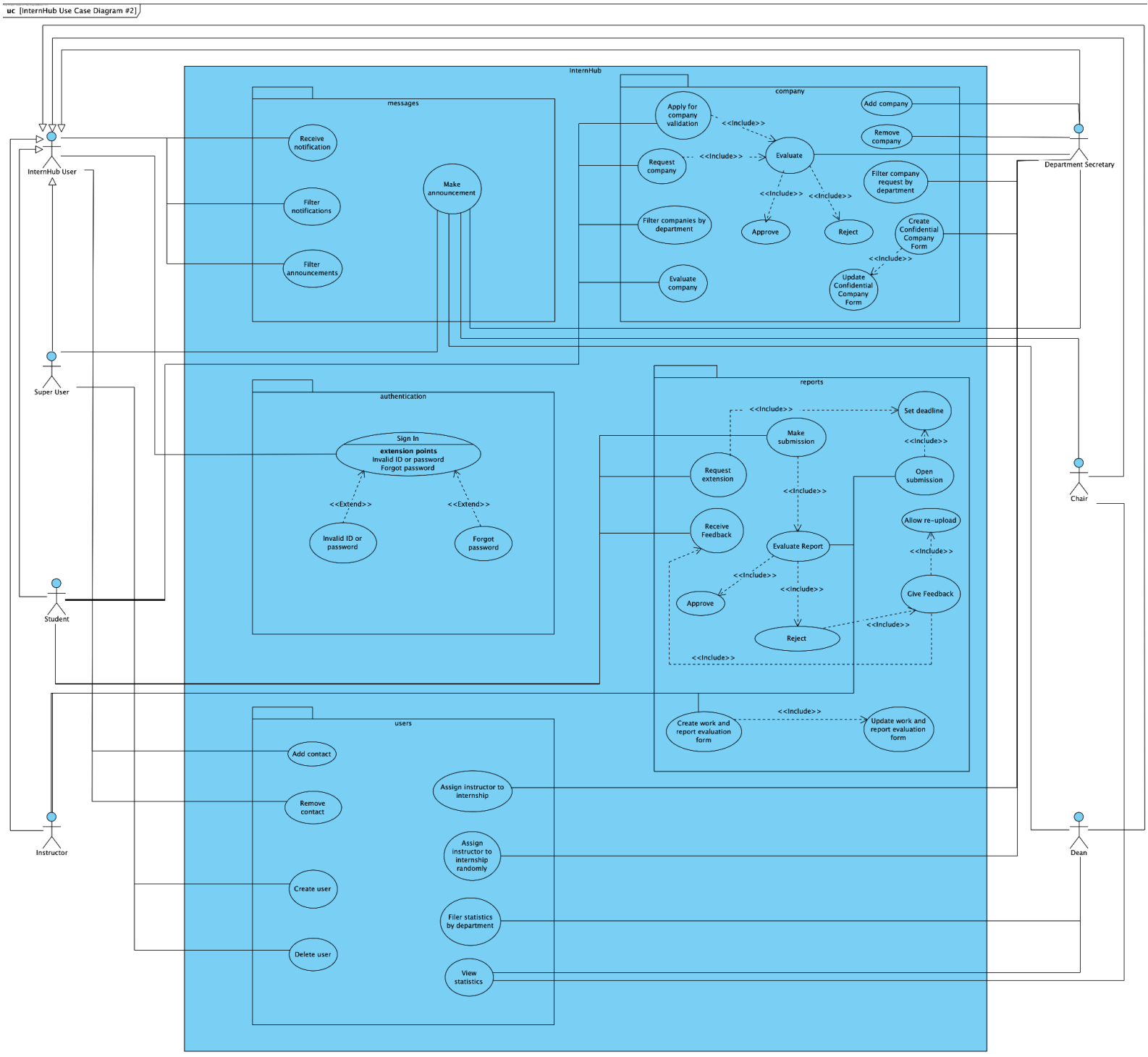

Figure-1: *Use case model of InternHub*

The above diagram illustrates use-case scenarios for InternHub's actors

For the higher resolution, please refer to the link below:

https://drive.google.com/file/d/1lGo-W1H4MQe85RYITFRnAB74B6izMI2Z/view?usp=share_link

3.4.2 Object and Class Model

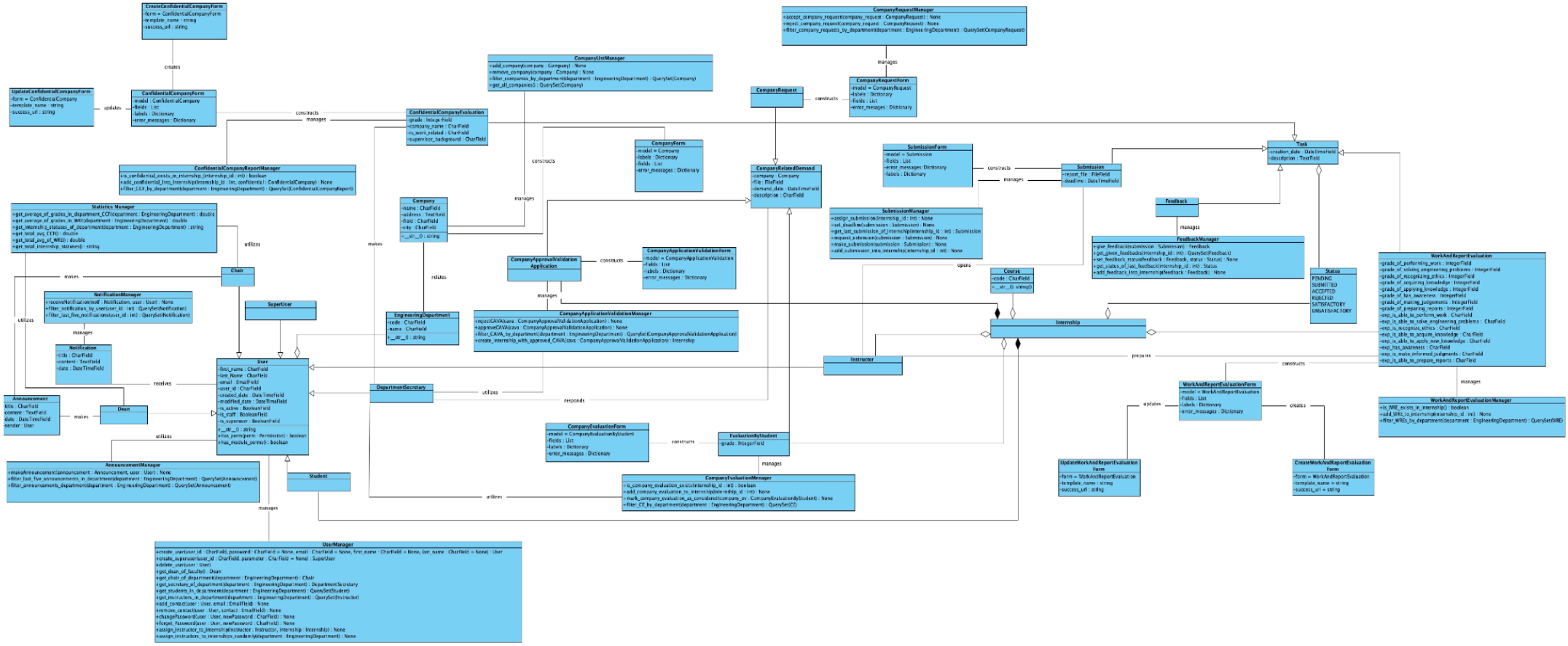

Figure-2: *Object and Class Model of InternHub*

The above diagram illustrates the object and class model of InternHub, entity classes and manager classes are given place in the diagram. For view classes see UI Layer of Design Report. For the higher resolution view, please refer to the link below:
https://drive.google.com/file/d/1KF81aY7Zwmmwp0pb8zYraNt0IzI-HtDj/view?usp=share_link

3.4.3 Dynamic Models

Two central processes for completing the summer training at Bilkent University are receiving an acceptance from a company to legitimate where the summer training will be carried out and preparing a formal internship report regarding the internship done in the summer to pass the internship-related course. This part aims to elaborate on these two processes by providing related activity and state diagrams.

3.4.3.1 Activity Diagram

This section will present the company approval validation application's activity diagram and the internship report evaluation's activity diagram.

3.4.3.1.1 Company Approval Validation Application's Activity Diagram

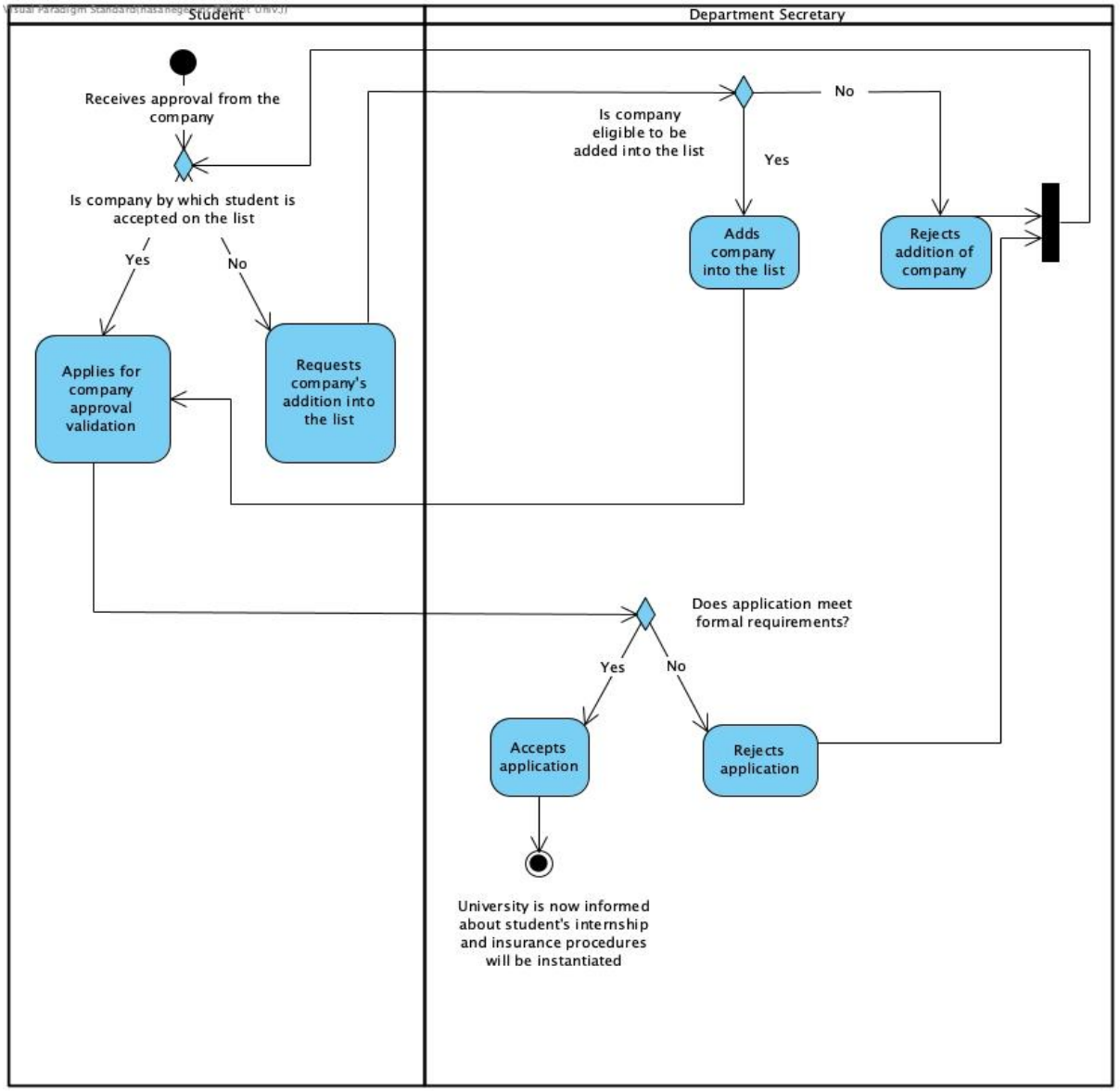

Figure-3: *InternHub's Company Approval Validation Application's Activity Diagram*

3.4.3.1.2 Internship Report Evaluation's Activity Diagram

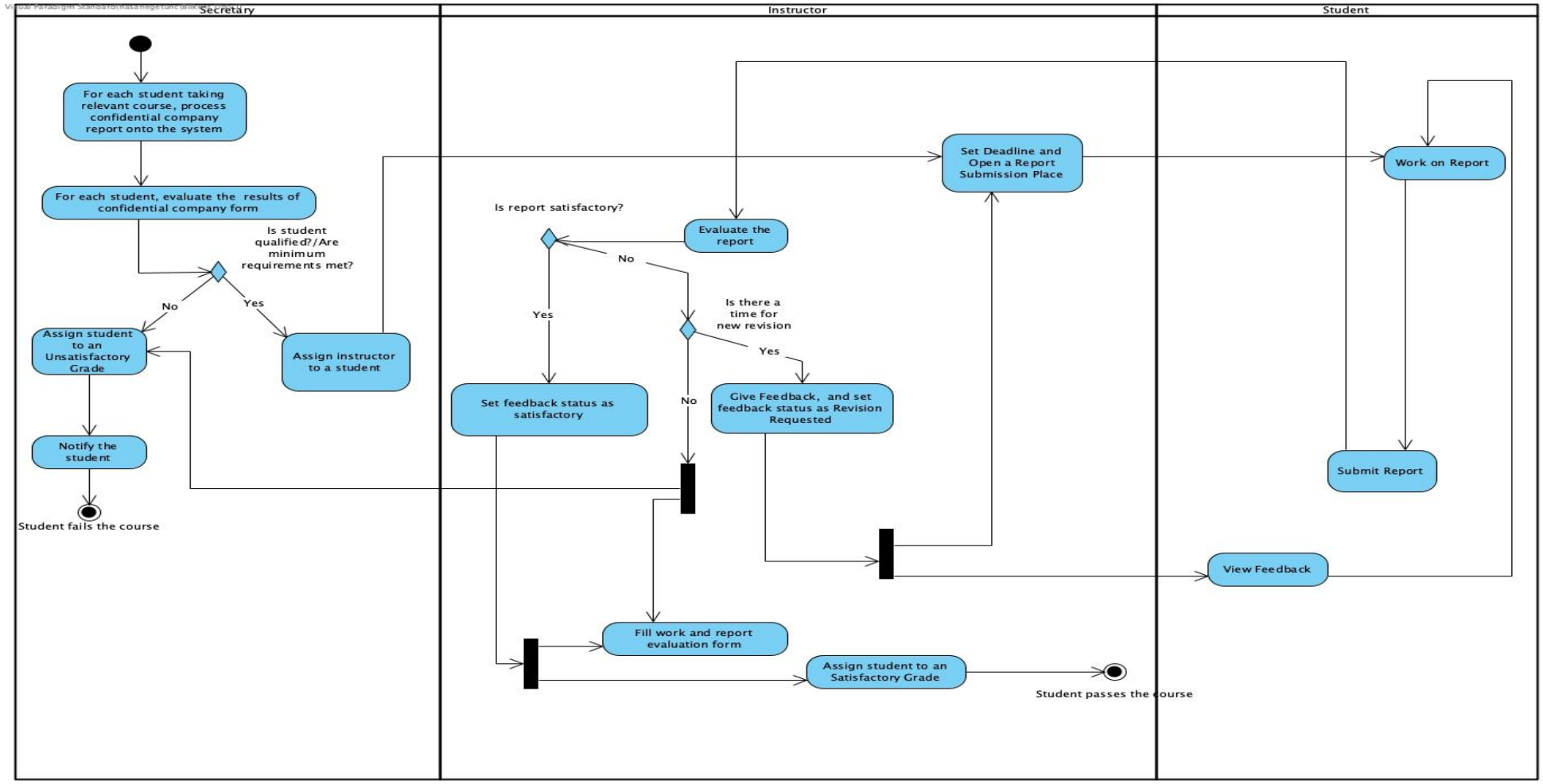

Figure-4: *Internship Report Evaluation's Activity Diagram*

The diagram above illustrates how internship report evaluations will occur in InternHub.

3.4.3.2 State Diagram

3.4.3.2.1 Company Approval Validation Application's State Diagram

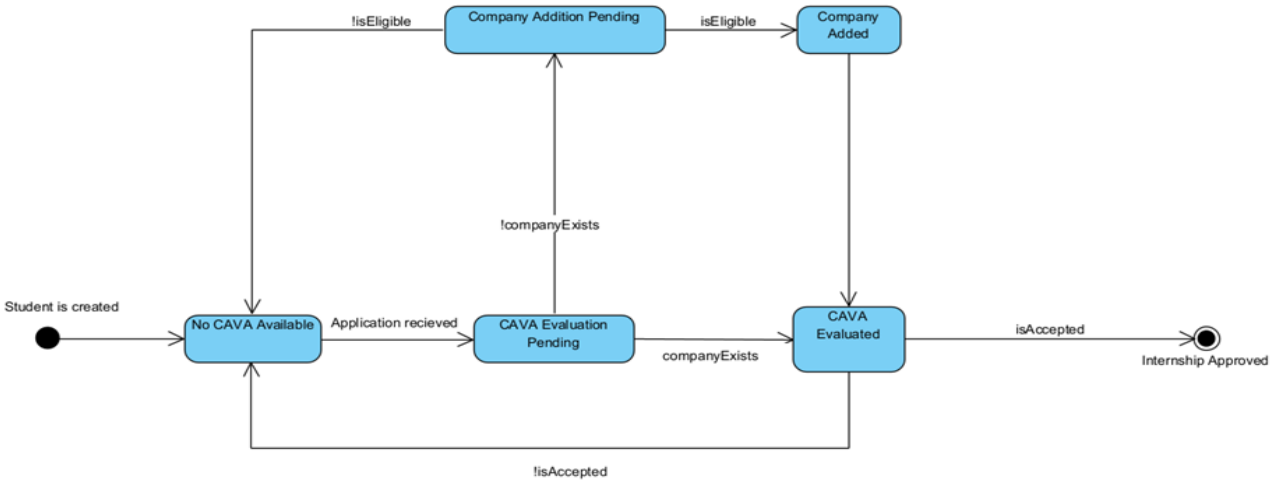

Figure-5: *Company Approval Validation Application's State Diagram*

- Initial state - "Student Instance Creation": The state diagram starts here. When a student registers or their profile is created, the system enters this state.
- Transition to "No CAVA Available" state: After student instance creation, if no CAVA (Company Academic Verification Application) is available, the system transitions to this state.
- Transition to "CAVA Evaluation Pending" state: When a CAVA application is received, the system moves from the "No CAVA Available" state to the "CAVA Evaluation Pending" state.
- Decision on "companyExists": If "companyExists" is true, the system transitions to the "CAVA Evaluated" state, meaning that the CAVA has been evaluated and the company is already in the system. If "companyExists" is false, the system transitions to the "Company Addition Pending" state, indicating that the company related to the CAVA needs to be added to the system.
- Decision on "isEligible": If "isEligible" is true in the "Company Addition Pending" state, the system moves to the "Company Added" state, and then transitions to the "CAVA Evaluated" state. This indicates that the company has been deemed eligible and added to the system and the CAVA has been evaluated. If "isEligible" is false, the system transitions back to the "No CAVA Available" state, indicating that the company is not eligible and the process needs to restart.
- Decision on "isAccepted": In the "CAVA Evaluated" state, if "isAccepted" is true, the system transitions to the final state, "Internship Approved". This means that the internship has been approved based on the evaluated CAVA. If "isAccepted" is false, the system transitions back to the "No CAVA Available" state, indicating that the

internship application has not been approved and a new CAVA needs to be submitted.

This state diagram represents the life cycle of a student's internship application from creation to approval, taking into account the evaluation and approval of a CAVA, and the existence and eligibility of the associated company.

3.4.3.2.2 Internship Report Evaluation's State Diagram

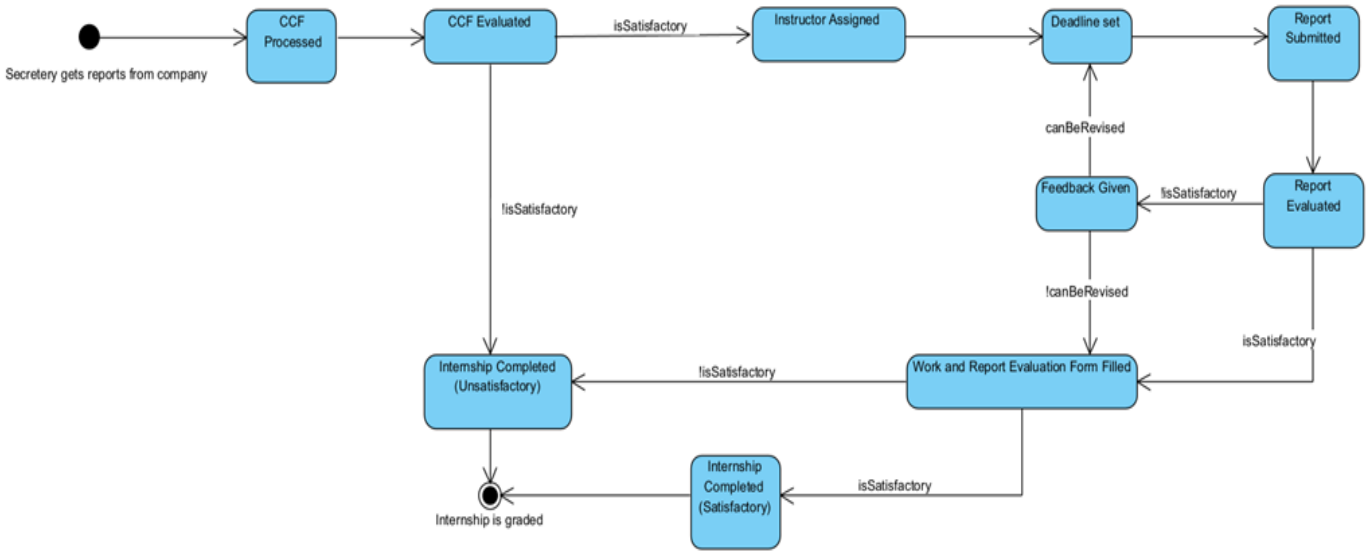

Figure-6: *Internship Report Evaluation's State Diagram*

- Initial state - "Secretary Gets Report from Company": The diagram begins here. Once the secretary receives the report from the company, the system enters the first state.
- Transition to "CCF Processed" state: Following the initial state, the system transitions to this state, where the Company Completion Form (CCF) is processed.
- Transition to "CCF Evaluated" state: After the CCF has been processed, the system transitions to this state, where the CCF is evaluated.
- Decision on "!isSatisfactory": If the CCF is evaluated as not satisfactory (!isSatisfactory), the system transitions to the "Internship Completed (Unsatisfactory)" state, indicating that the internship is complete but the outcomes were unsatisfactory. From here, the system transitions to the final state, "Internship is Graded".
- Transition to "Instructor Assigned" state: If the CCF is evaluated as satisfactory, the system transitions to the "Instructor Assigned" state, where an instructor is assigned to the student's internship.
- Transition to "Deadline Set" state: The system then moves to this state, where the deadline for the student to submit their report is set.
- Transition to "Report Submitted" state: After the deadline is set, the system enters this state when the student submits their internship report.
- Transition to "Report Evaluated" state: The system then moves to this state, where the student's report is evaluated.

- Decision on "!isSatisfactory" (Report): If the report is evaluated as not satisfactory (!isSatisfactory), the system transitions to the "Feedback Given" state. If there is time for a revision (canBeRevised is true), the system transitions back to the "Deadline Set" state, allowing the student to revise and resubmit their report. If there is no time left for revision, the system moves to the "Work and Report Evaluation Form Filled" state, and then to the "Internship Completed (Unsatisfactory)" state, leading to the final state, "Internship is Graded".
- Decision on "isSatisfactory" (Report): If the report is evaluated as satisfactory, the system also transitions to the "Work and Report Evaluation Form Filled" state. From here, the system transitions to the "Internship Completed (Satisfactory)" state, indicating that the internship was successful. The system then moves to the final state, "Internship is Graded".

This state diagram outlines the process of grading an internship, starting from the secretary receiving the report from the company, to the processing and evaluation of the CCF, assigning an instructor, setting deadlines, submitting and evaluating the student's report, giving feedback and allowing for report revision, and finally grading the internship as satisfactory or unsatisfactory.

3.5 User Interfaces

3.5.1. Login page

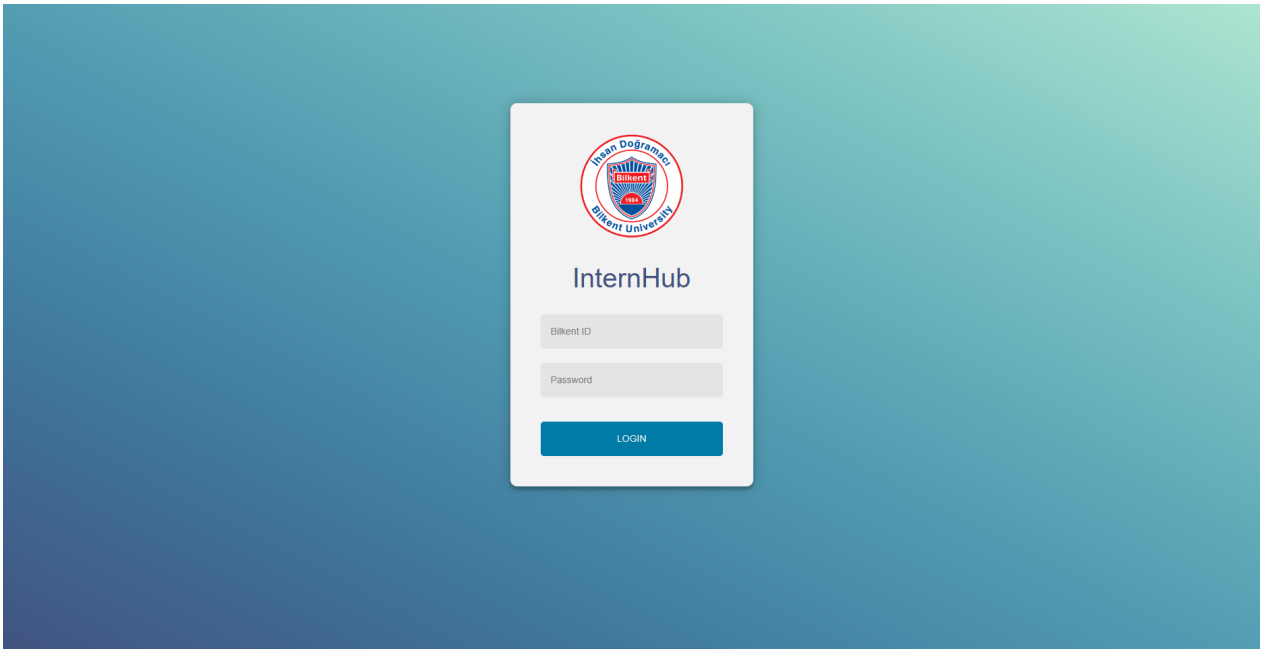

Figure-7: *Login page of the InternHub.*

3.5.2. Student Main Page

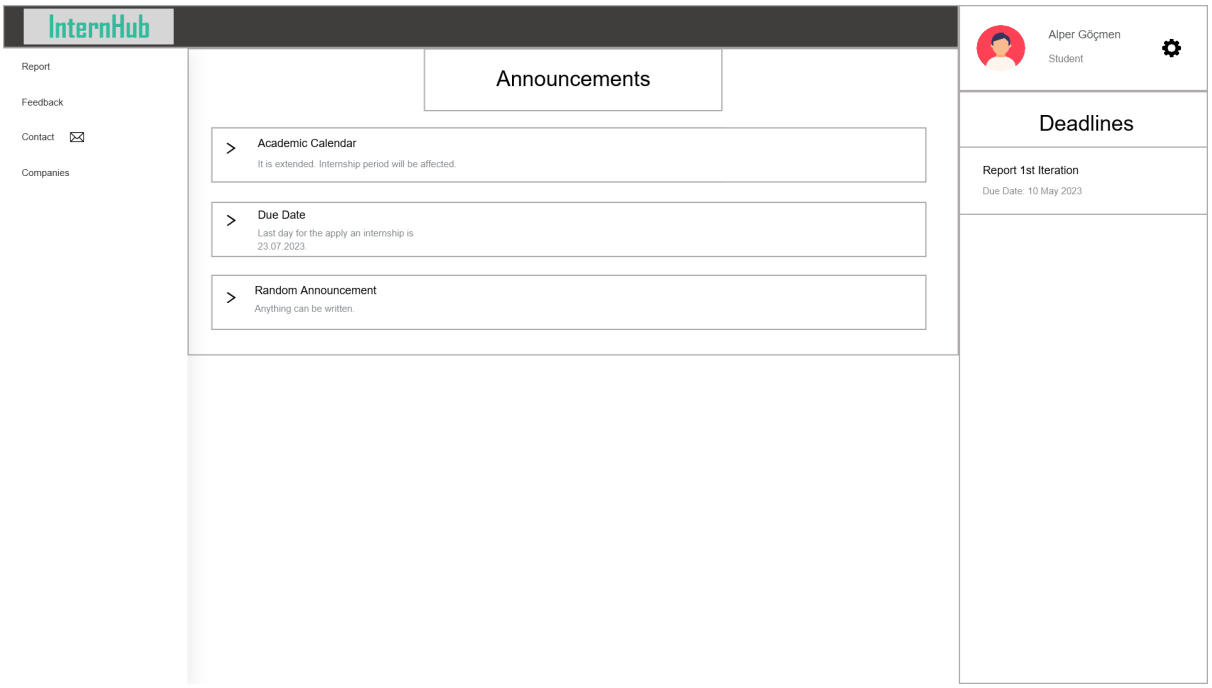

Figure-8: *Student's Main Page View*

3.5.3. Student Contact Page

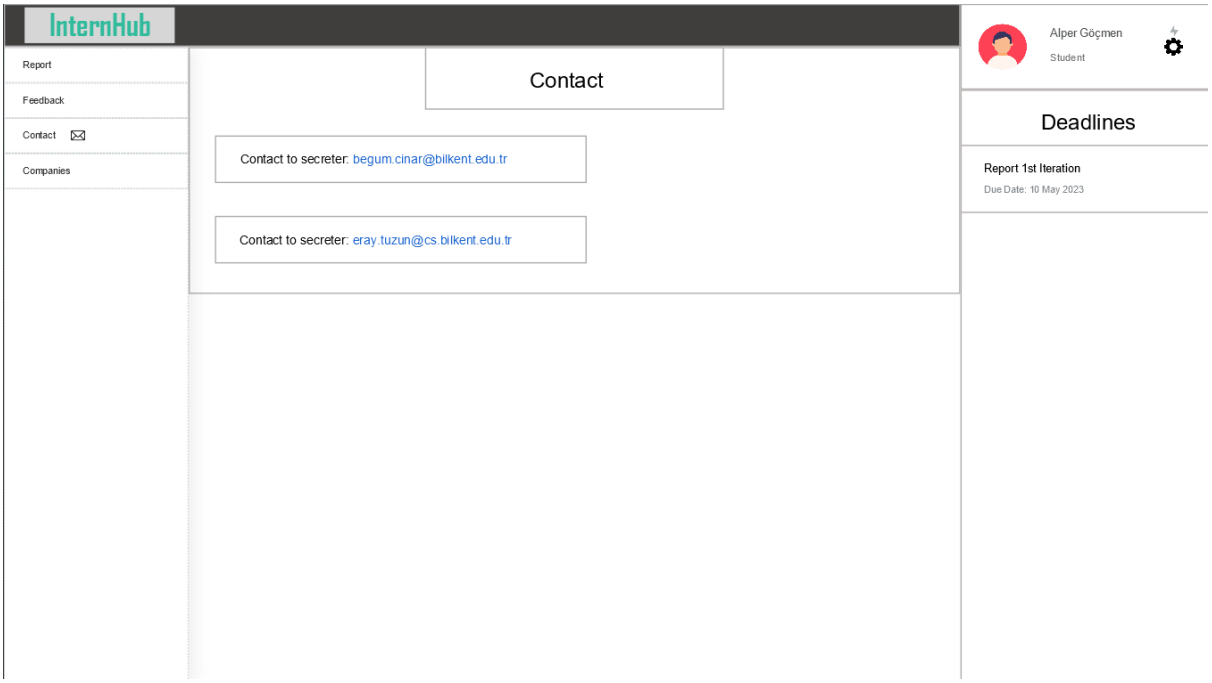

Figure-9: *Student's Contact Page View*

3.5.4. Student Feedbacks Page

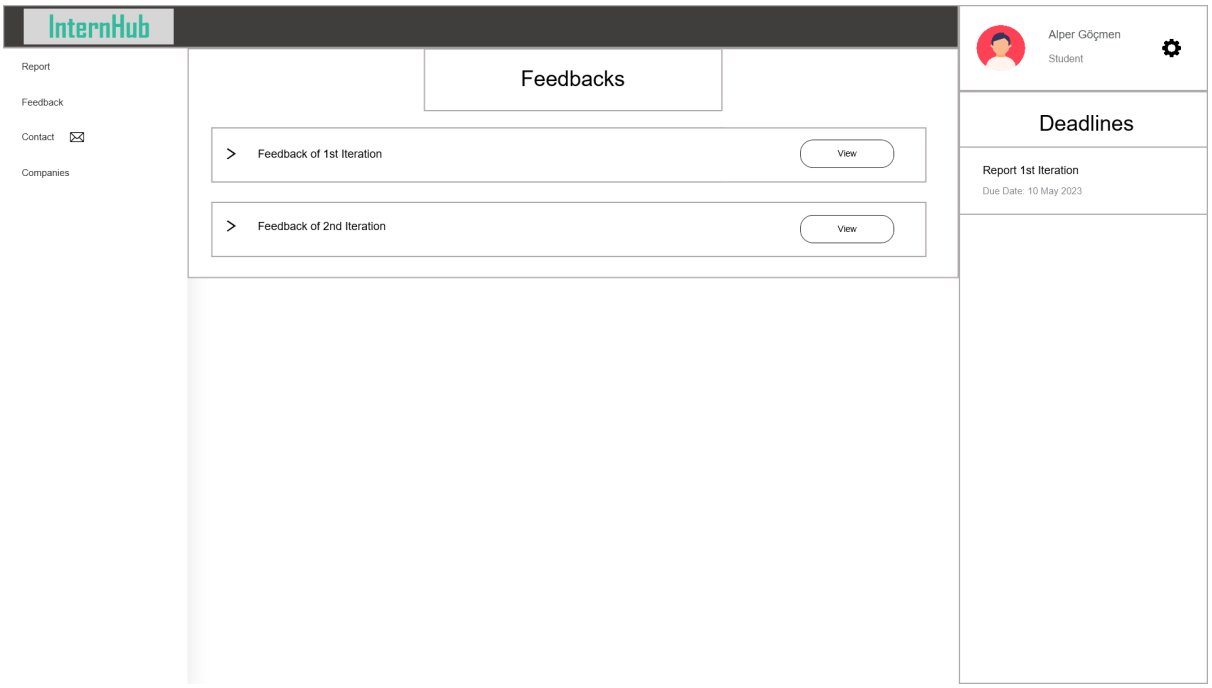

Figure-10: *Student's Feedbacks Page View*

3.5.5. Student Feedback Iteration Page

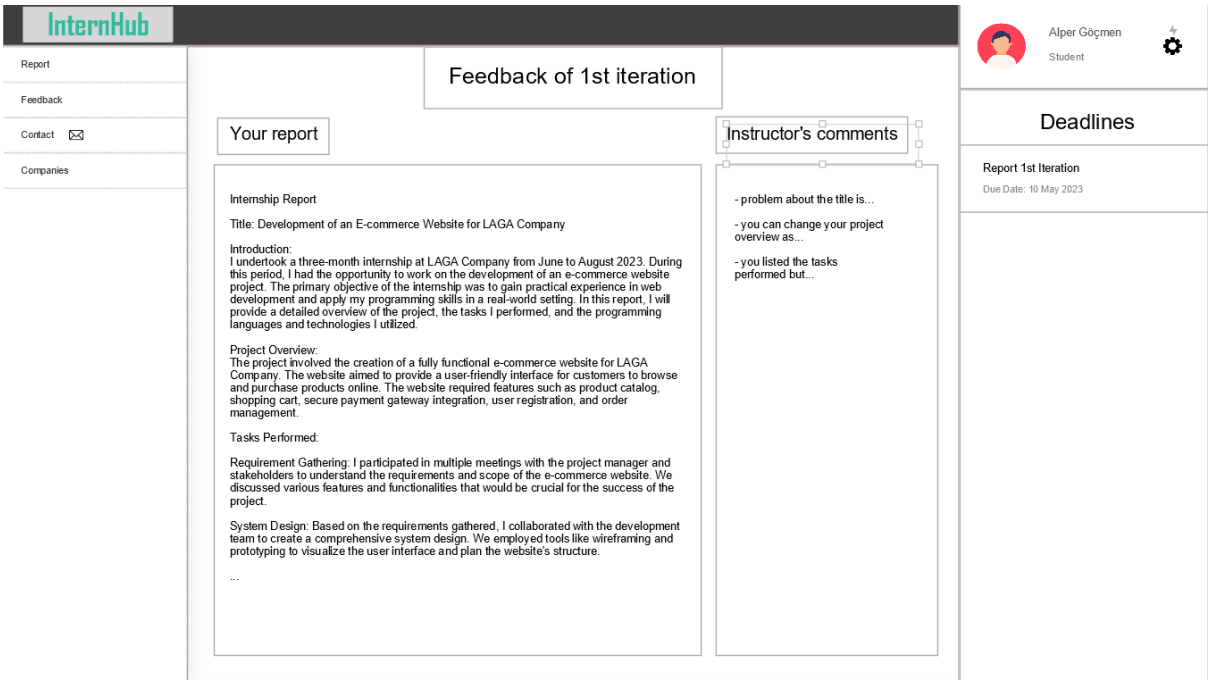

Figure-11: *Student's Feedback Iteration Page View*

3.5.6. Student Companies Page

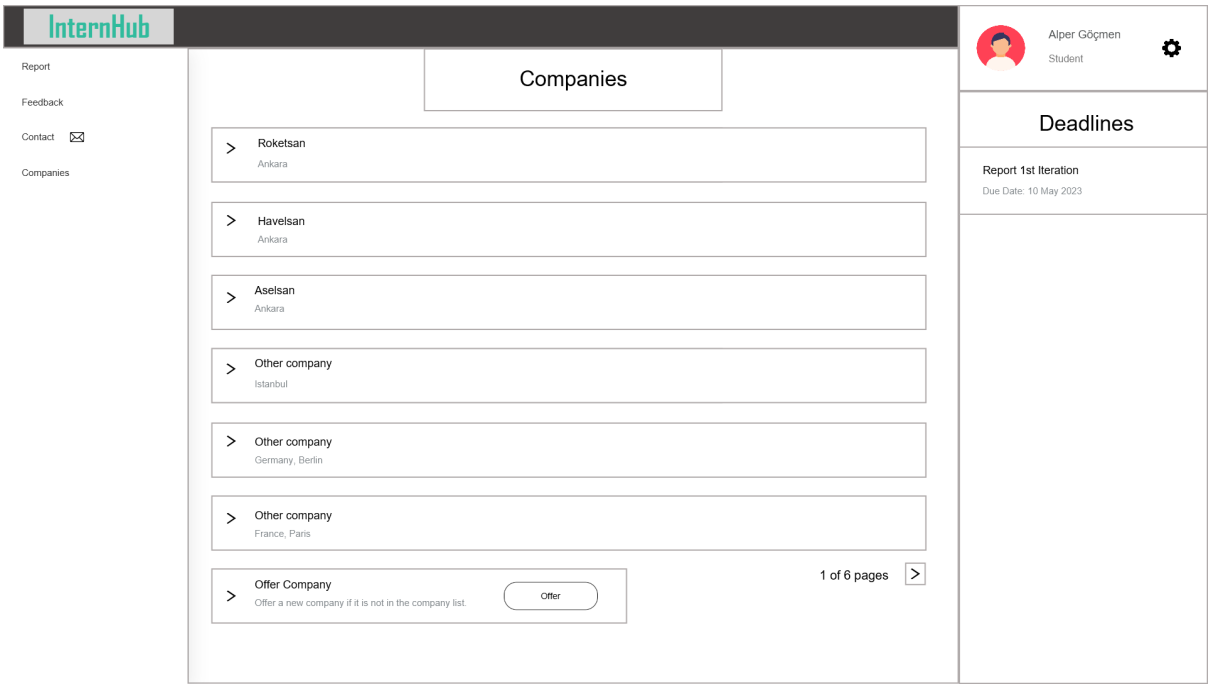

Figure-12: *Student's Companies Page View*

3.5.7. Student Company Request Page

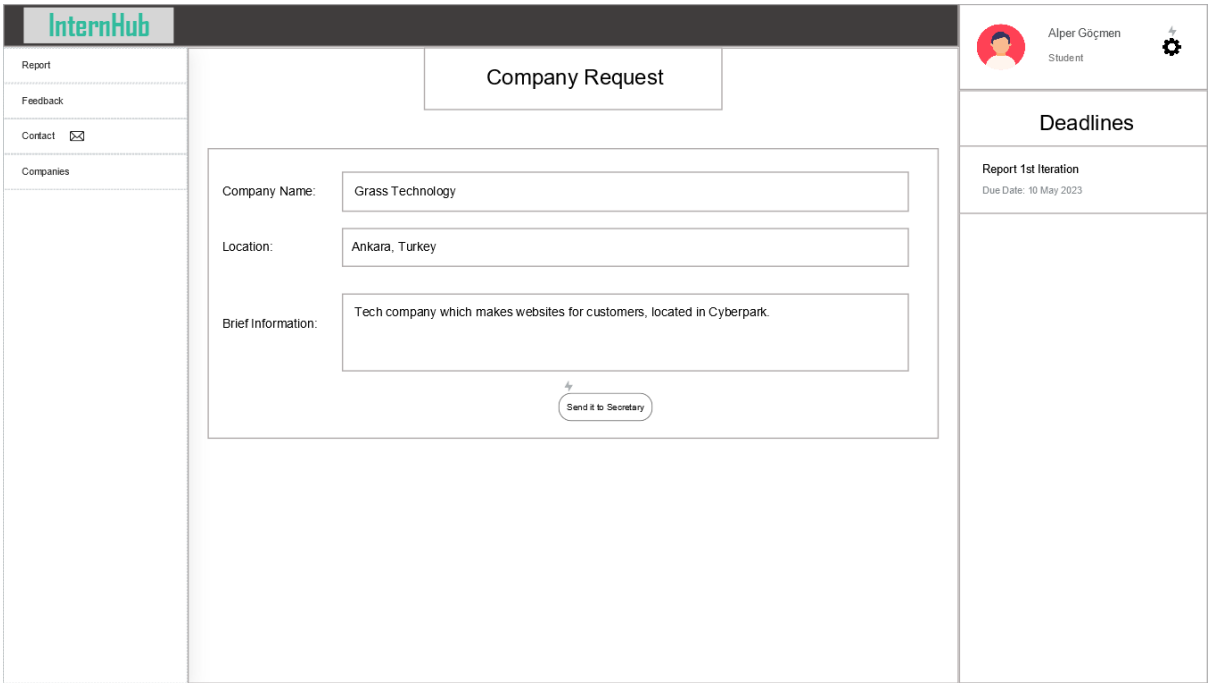

Figure-13: *Student's Company Request Page View*

3.5.8. Student Report Page

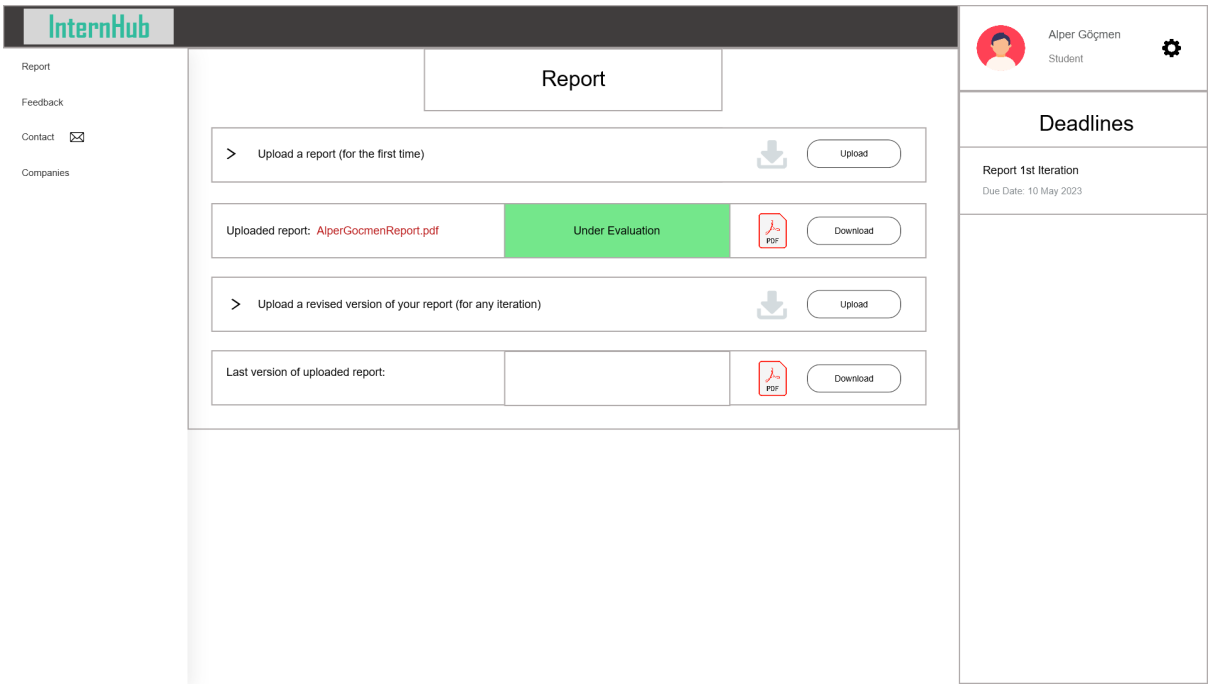

Figure-14: *Student's Internship Report Page View*

3.5.9. Instructor Page

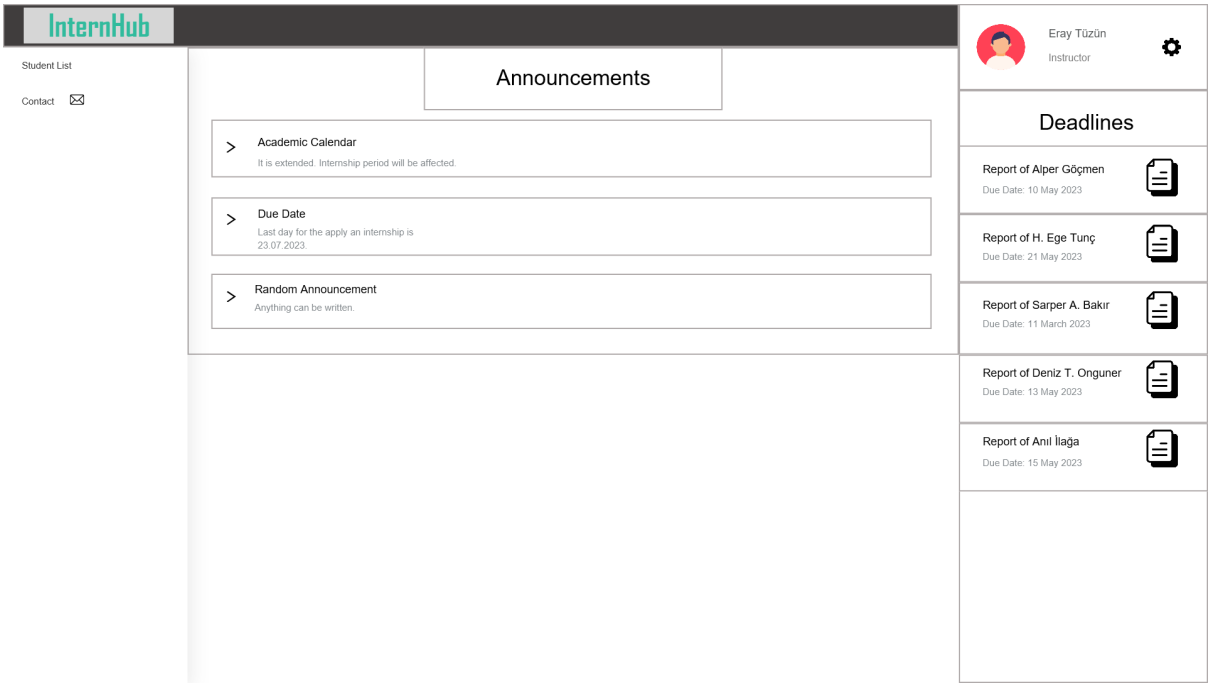

Figure-15: *Instructor's Main Page View*

3.5.10. Instructor Student List Page

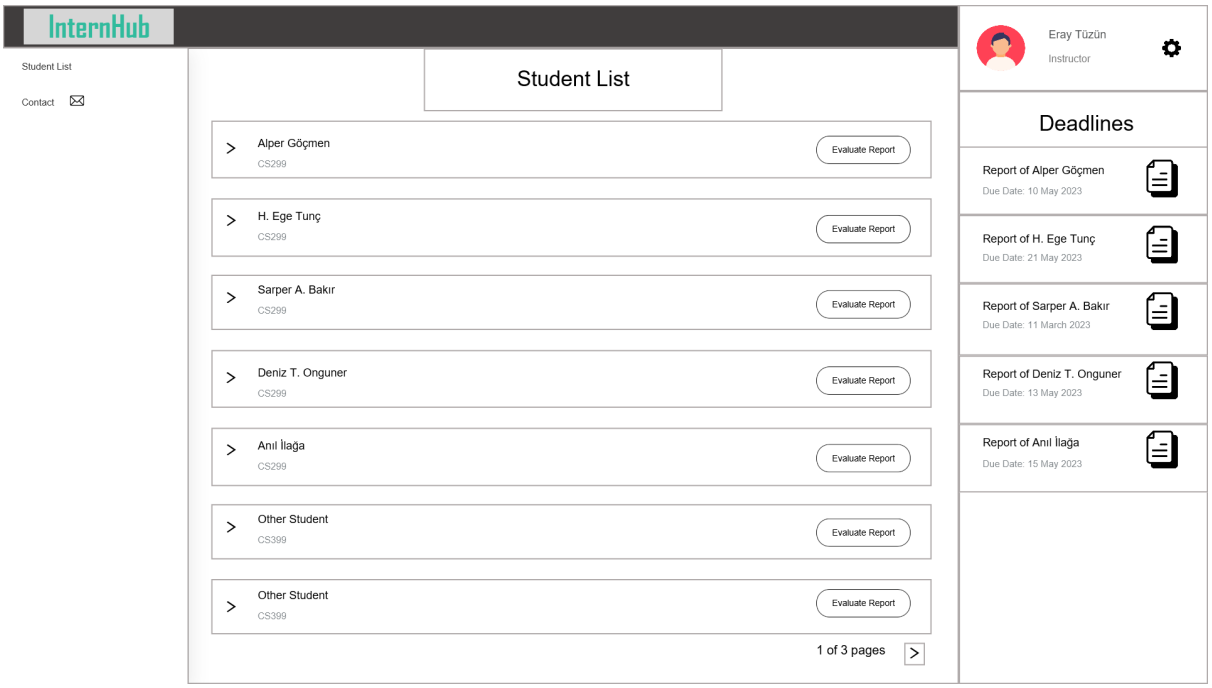

Figure-16: *Instructor's Assigned List of Students Page View*

3.5.11. Instructor Evaluation Report Page

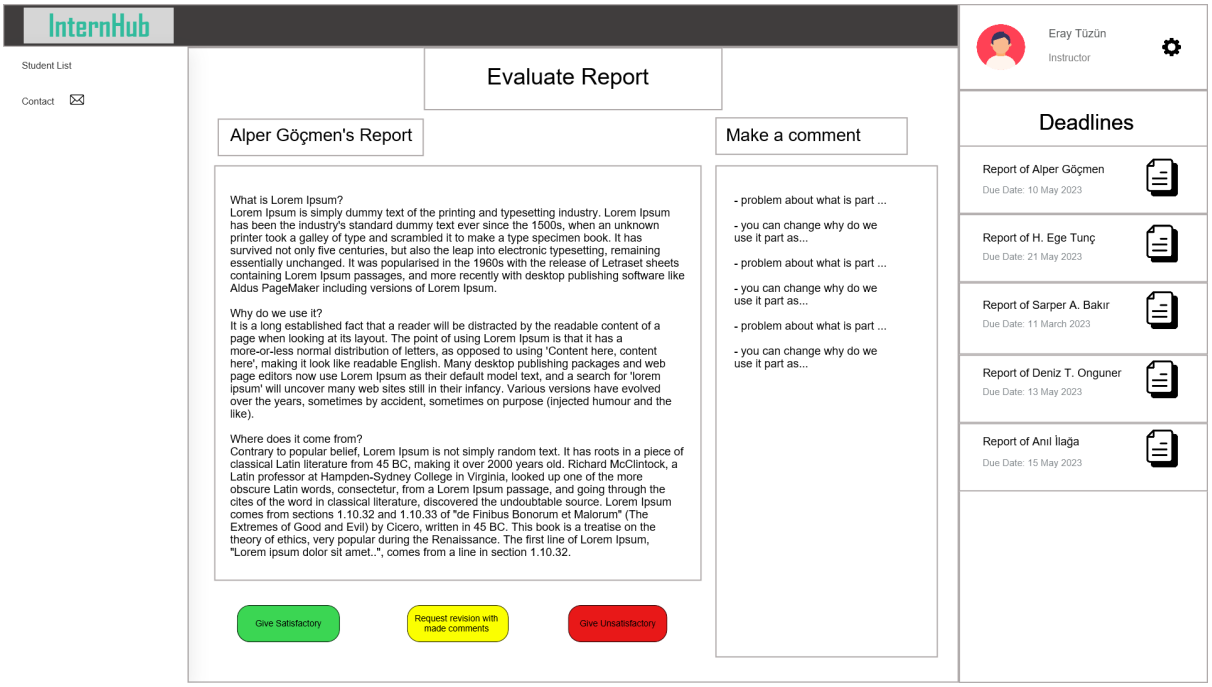

Figure-17: *Instructor's Evaluation of Internship Report Page View*

3.5.12. Secretary Page

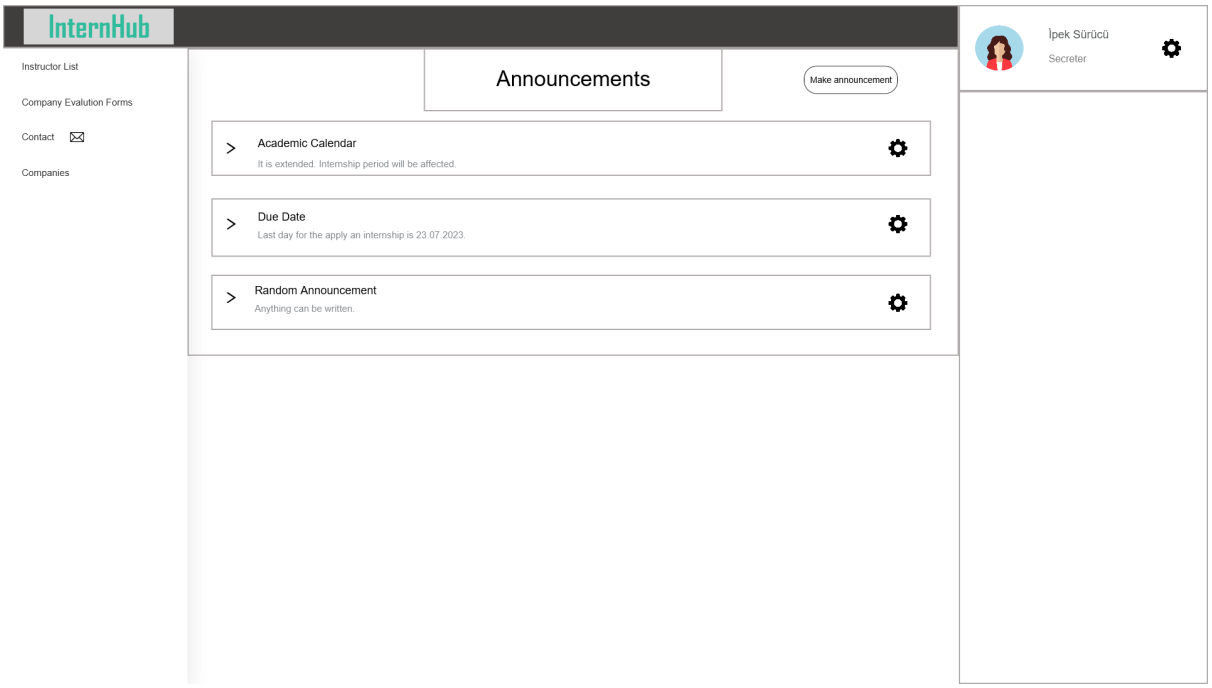

Figure-18: *Secretary's Main Page View*

3.5.13. Secretary Companies Evaluation Forms Page

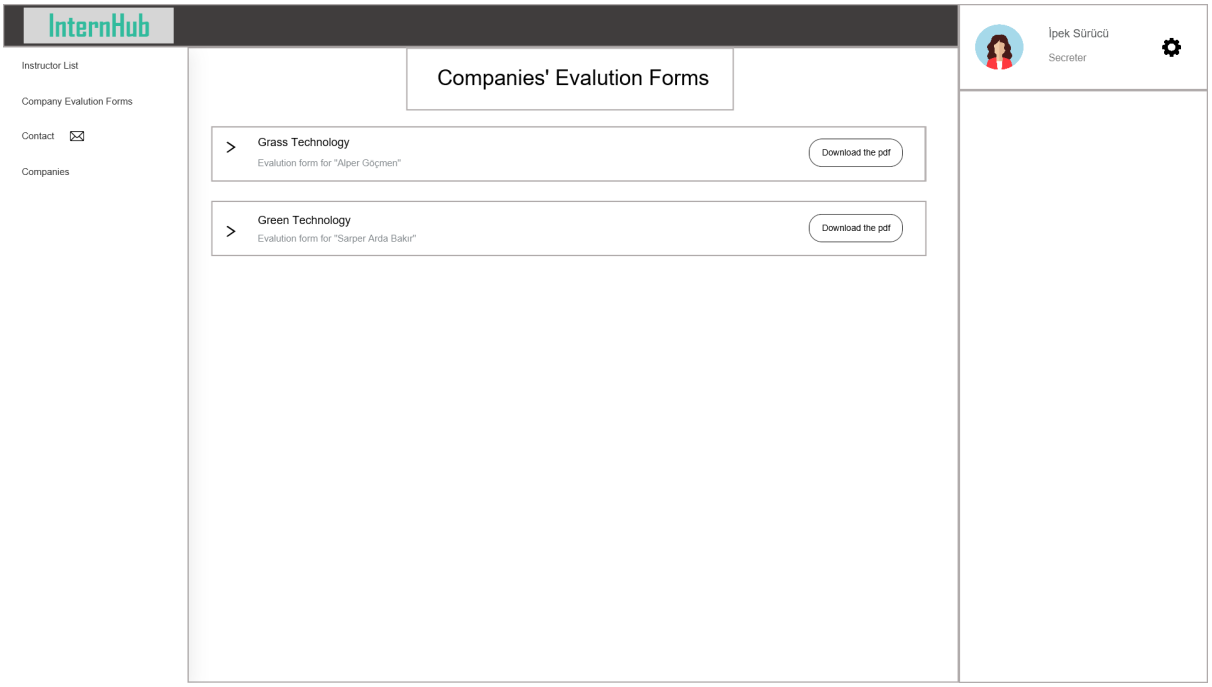

Figure-19: *Secretary's List of Company Evaluation Forms Page View*

3.5.14. Secretary Companies Page

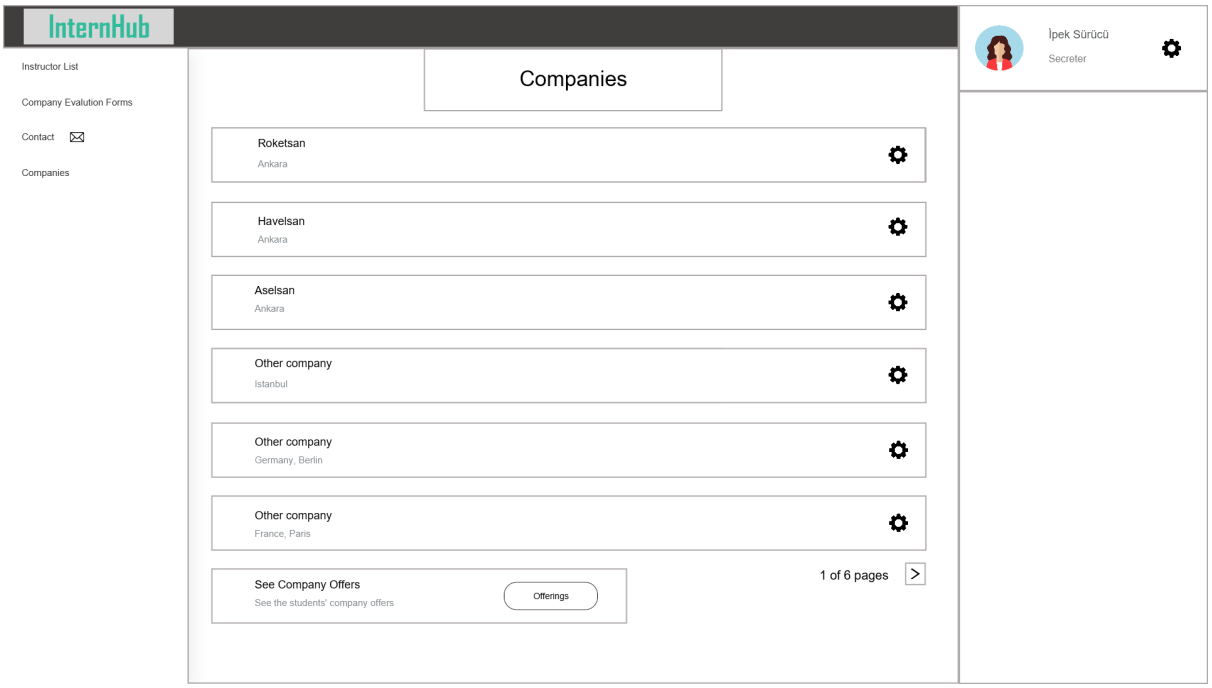

Figure-20: *Secretary's Companies List Page View*

3.5.15. Secretary Company Requests Page

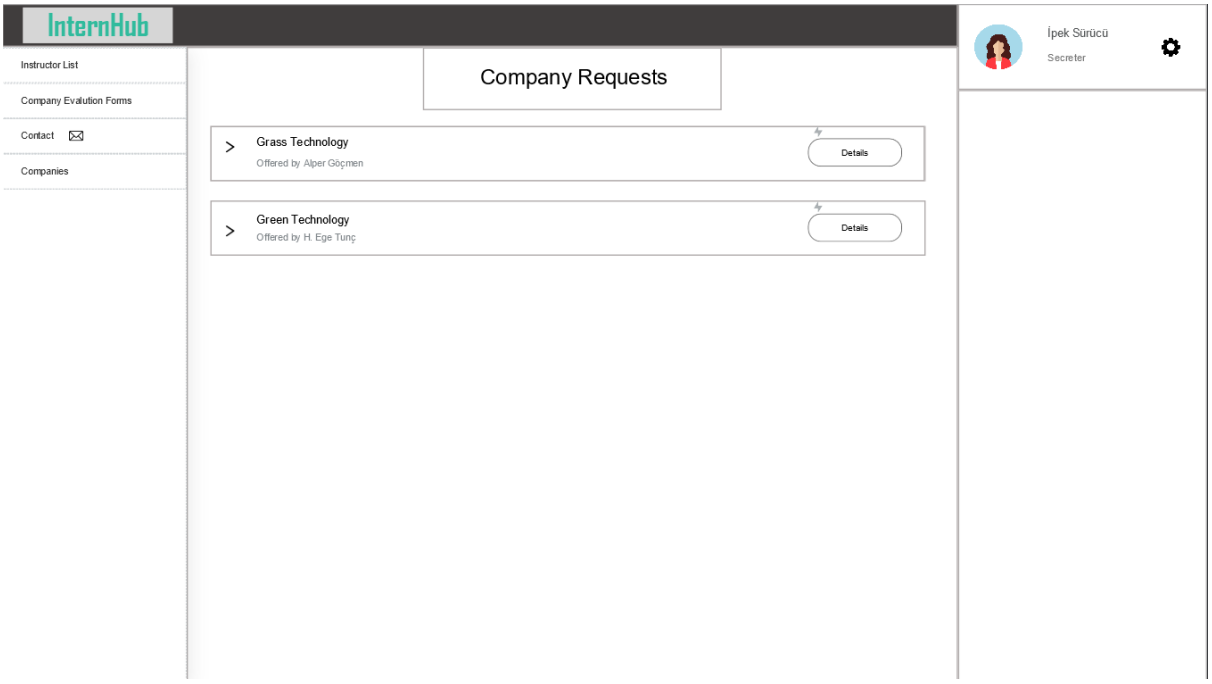

Figure-21: *Secretary's Company Requests List Page View*

3.5.16. Secretary Company Request Approval Page

It is the page shown if the company is not already in the company list and offered for the first time by a student.

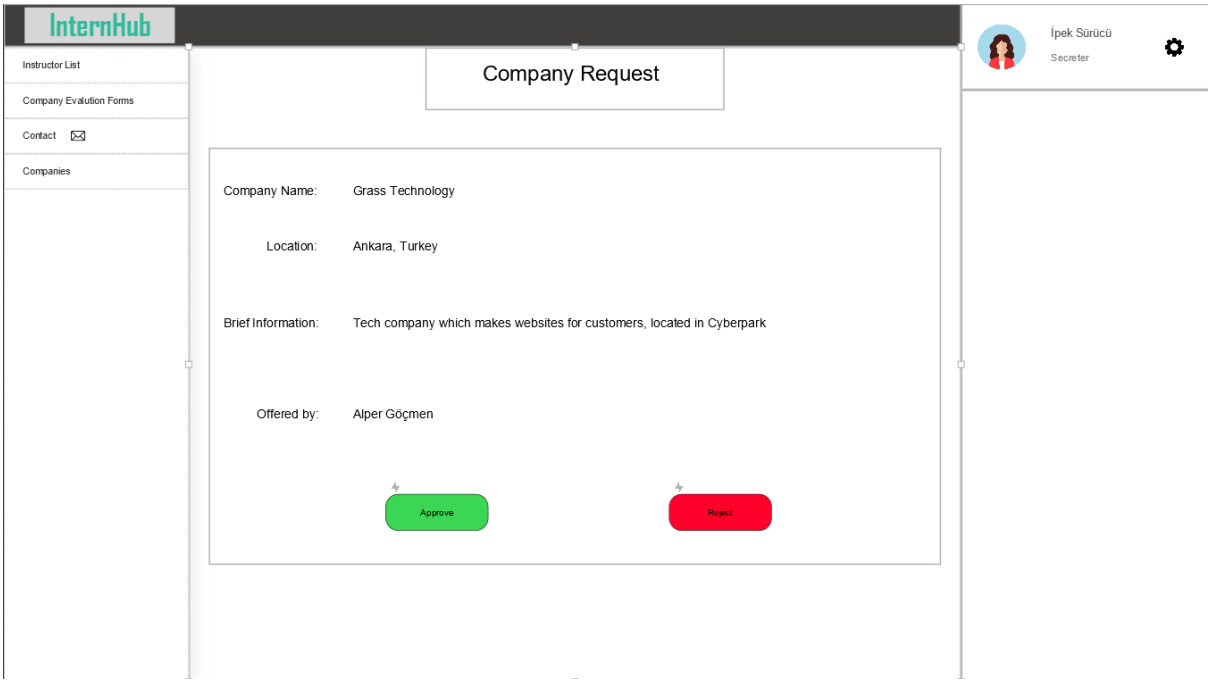

Figure-22: *Secretary's Approval of Company Request Page View*

3.5.17. Secretary Instructor List Page

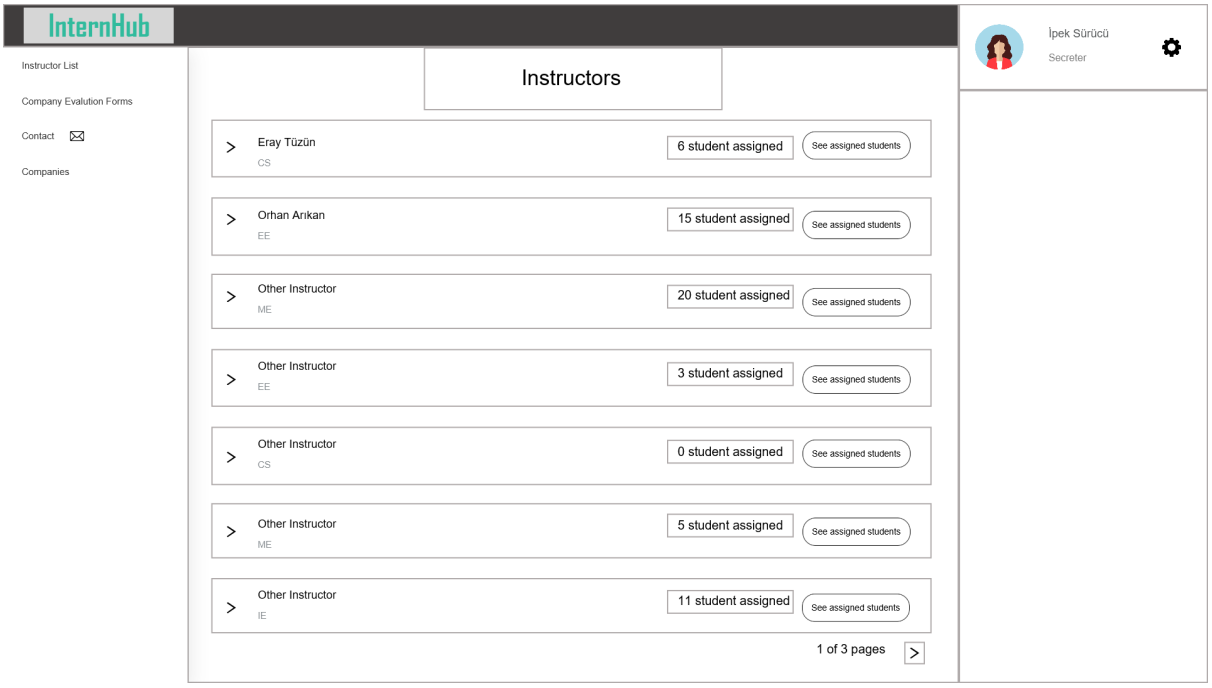

Figure-23: *Secretary's List of the Instructors Page View*

3.5.18. Secretary Instructors' Assigned Students Page

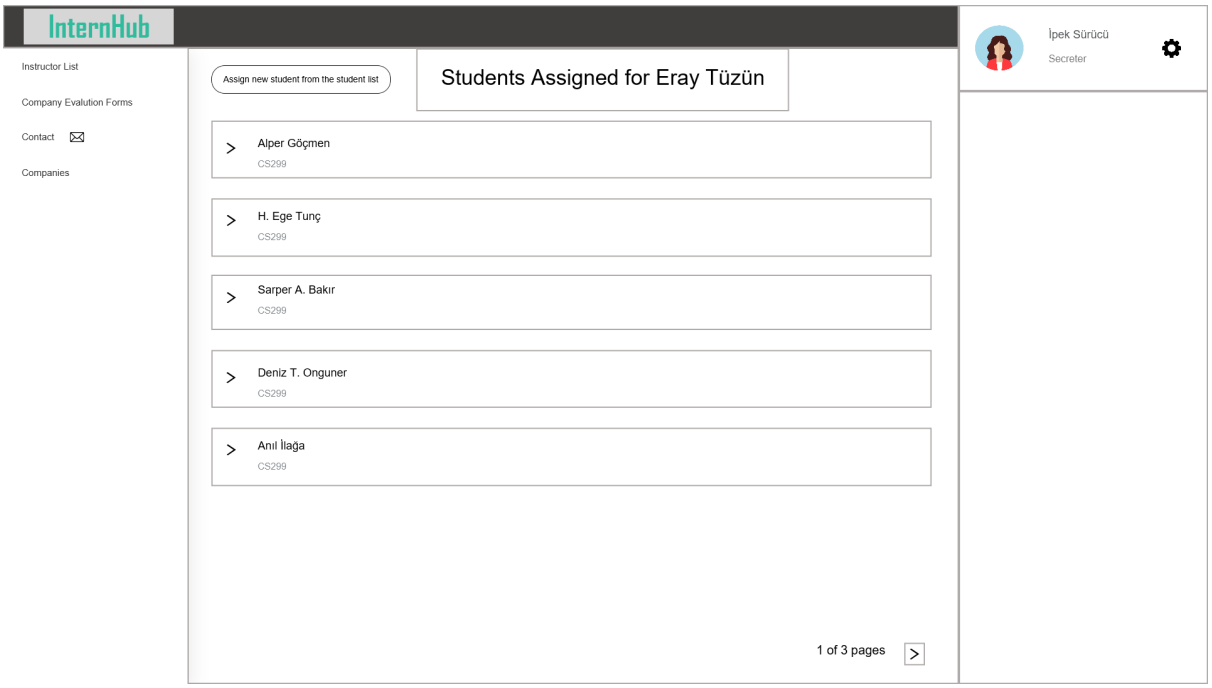

Figure-24: *Secretary's Students Assigned to Specific Instructors Page View*

3.5.19. Secretary Assigning Students to Instructor Page

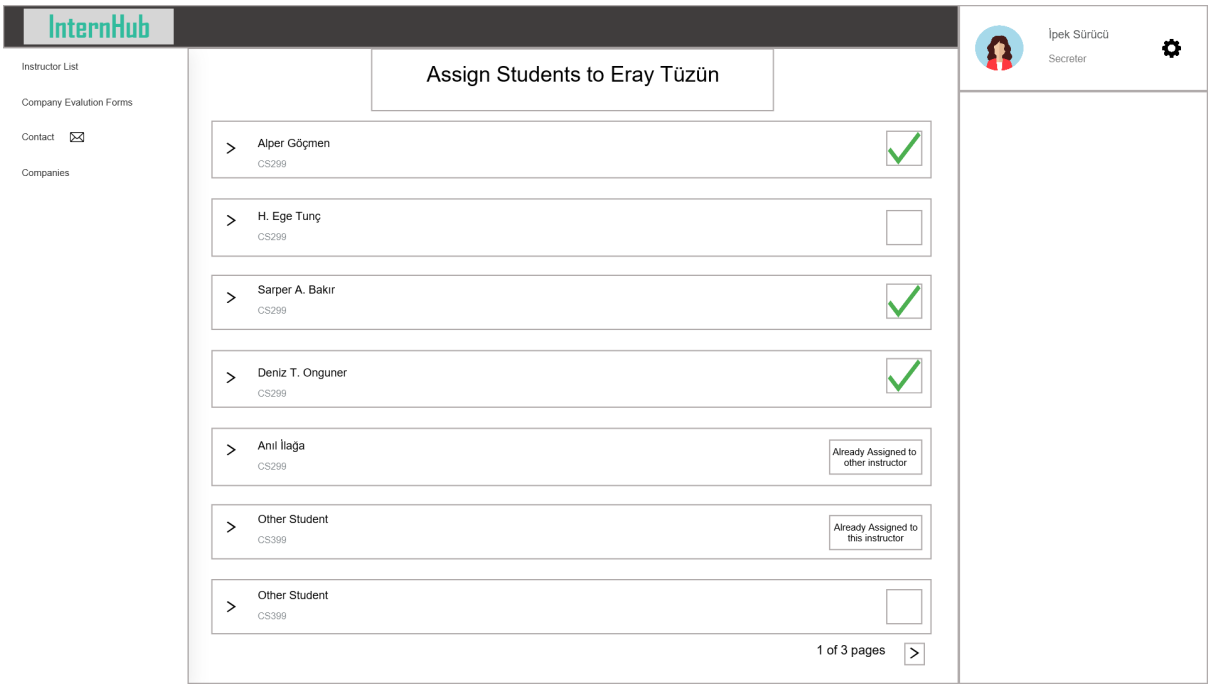

Figure-25: *Secretary's Assigning Students to Instructor Page View*

3.5.20. Dean Page

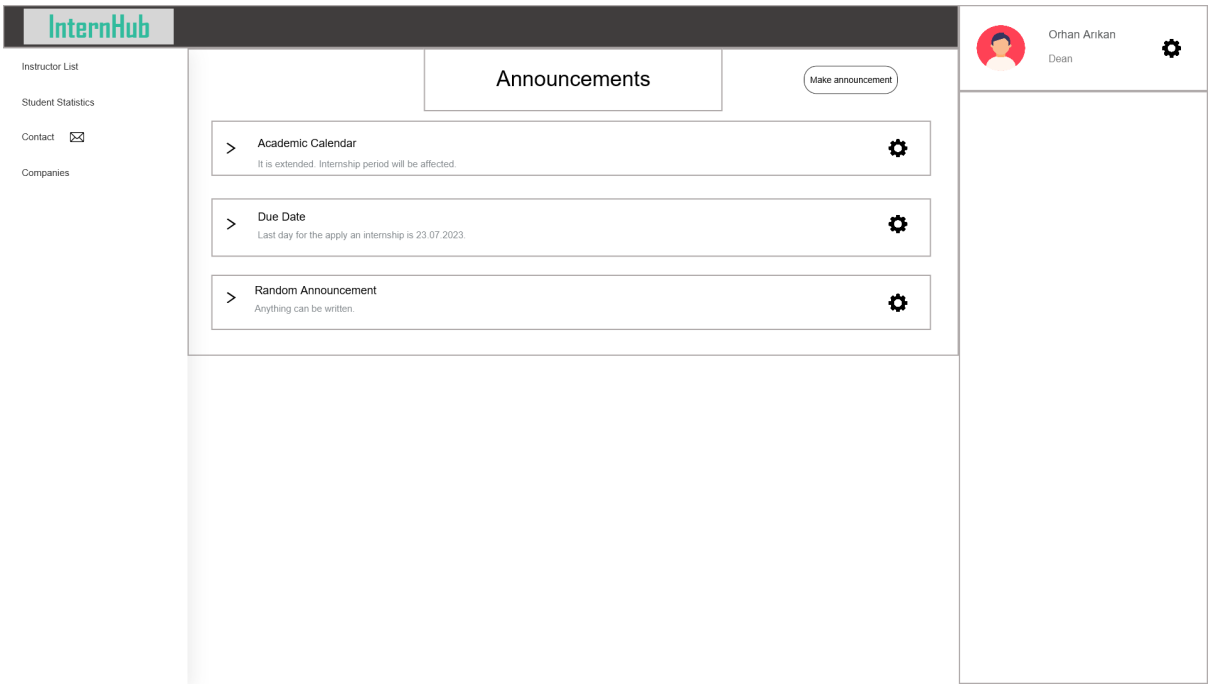

Figure-26: *Dean's Main Page View*

3.5.21. Dean Student Statistics Page

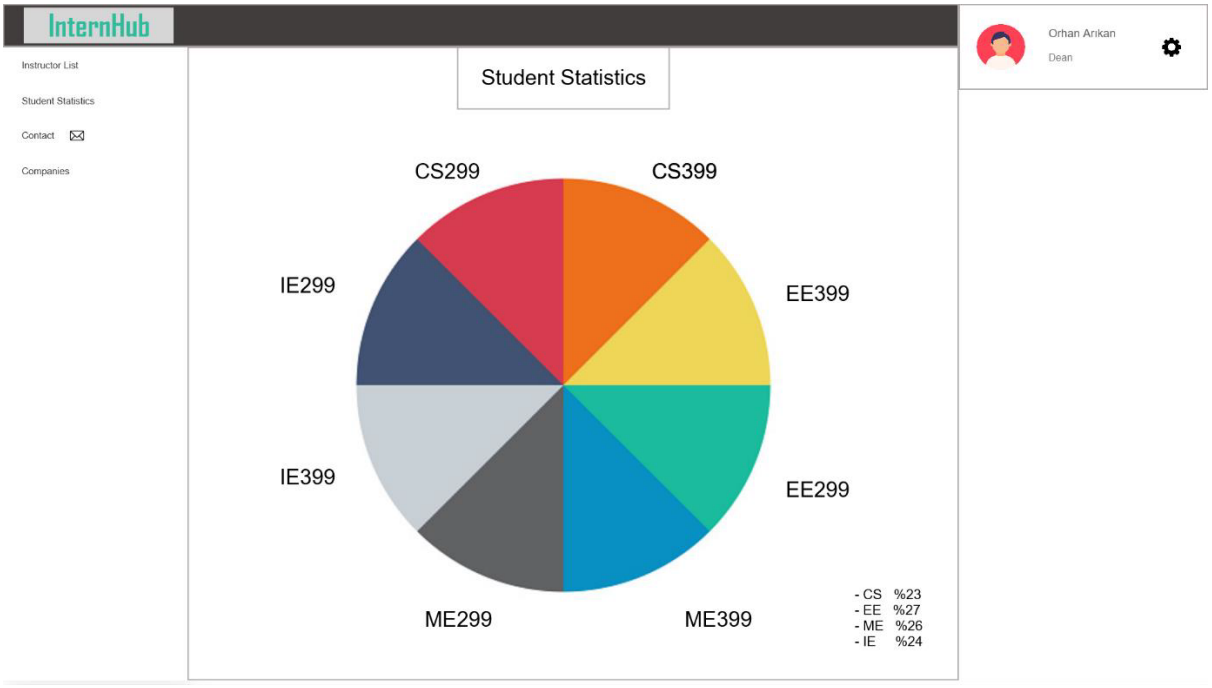

Figure-27: *Dean's Statistics of Students Page View*

4.0 Improvement Summary

In the second iteration, the tone of introduction was formalized and some additional information regarding the roles were added. In line with introduction, overview section is also elaborated now. Then, actors are updated. To clarify, teacher assistant was removed amongst actors because by consulting the more senior students, it was learnt that they have no significant role in process. Instead, chair was included in the actors so that s/he can track the progress of internship in his/her department and view the statistics concerning the department.

Regarding non-functional requirements, vague parts were supported with numerical data to solve ambiguity. In system models, use-case model is drawn from zero to comply with the recently set requirements, and explanation of each use case is omitted because the report itself is long and making the report longer with such details which can be understood by looking at the use-case diagram is not meaningful. Activity diagrams and state diagrams are updated regarding feedbacks, but even though CAVA's activity diagram was found out of the scope in feedback, it was developed and kept in the report's second iteration because it carries importance on illustrating the internship system and is inseparable part of it. Object and class model was redrawn to include all manager and entity classes to be consistent with what is presented in the Design Report. Finally, requested changes were made in user interface section.

5.0 Glossary

AWS: Amazon Web Services

CAVA: Company Approval Validation Application

CCF: Confidential Company Form

CE: Company Evaluation (by Student)

HTML: Hypertext Markup Language

RAM: Random Access Memory

SSD: Solid State Drive

WRE: Work and Report Evaluation Form

6.0 References

B. Brügge and A. H. Dutoit, *Object Oriented Software Engineering Using UML, Patterns, and Java*, 3rd ed. Upper Saddle River, NJ: Pearson, 2010.