POLITECNICO
MILANO 1863

Requirements Analysis and Specification Document

Students & Companies

December 22, 2024

Authors:

- Dimić Nikola
- Tatalović Veljko
- Žiga Edin

Contents

1 Introduction

1.1 Purpose

The purpose of the Students & Companies (S&C) platform is to provide a centralized, user-friendly environment where university students can search for internship opportunities and where companies can advertise their offers. By consolidating internship advertisements in one place, the platform allows students to easily compare opportunities based on criteria such as required skills, offered benefits, and other terms. It ensures a safe and transparent process, minimizing the risk of exploitation by providing mechanisms for university supervision and feedback. Companies benefit from the platform's reach, enabling them to connect with a broad pool of talented students efficiently. In addition, the platform fosters trust by ensuring university oversight, making it a reliable space for students and companies to interact.

1.1.1 Goals

[G1] Companies create internship advertisement.

[G2] Students find appropriate internship and initiate contact with the selected company.

[G3] Students become interns in the companies in order to gain experience in the desired area of industry.

[G4] The platform provides a transparent and fair selection process where companies can evaluate and select suitable candidates.

[G5] The platform offers a recommendation system that matches students to internships based on their CVs, skills, and preferences, as well as company requirements.

[G6] The platform allows universities to monitor internships to ensure alignment with academic standards.

[G7] The platform collects feedback from both students and companies to improve the platform's functionality.

[G8] Ensure a safe and supportive environment by providing students with mechanisms to file complaints and enabling universities to resolve them.

1.2 Scope

The S&C platform is designed to streamline the internship process by addressing the needs of three main user groups: Companies, Students, and

Universities. Each group is provided with custom functionalities to support their respective roles in the internship ecosystem.

The platform enables companies to efficiently create and manage internship advertisements. These advertisements include detailed descriptions of requirements, projects, and relevant terms, ensuring clarity for prospective applicants. Companies can accept internship applications from students and handle the entire selection process, supported by tools for conducting interviews and distributing structured questionnaires. While the platform is conducting all the necessary steps in order to complete the selection process, interviews are supposed to be held on the external service (Microsoft Teams, Google Meet...) Once an internship is filled, companies are encouraged to provide feedback on their experience with the platform and its functionalities.

Students can utilize the platform to upload their data and CVs, creating comprehensive profiles that highlight their skills and experiences. They can search for internship opportunities that align with their goals and proactively initiate the application process. The platform enables easy and smooth participation in the selection process by allowing students to respond to invitations to interviews and questionnaires. In addition, students receive timely notifications regarding their selection status and are encouraged to provide feedback on their experience. For any challenges encountered during an internship, the platform provides a mechanism for students to submit complaints.

Universities play a crucial role in ensuring the integrity of the internship process by handling complaints submitted by students. They monitor and resolve issues, ensuring that internships provide a safe and productive environment. This oversight contributes to maintaining the reputation of the platform as a trusted intermediary between students and companies. Handling of the complaints should be done between the university, student, and company directly and not through the platform.

1.2.1 World Phenomena

- **WP1** Students have their own CVs, experiences, and preferences when looking for internships.

- **WP2** Companies create internship opportunities and search for qualified candidates for their roles.

- **WP3** Company employees decide how the process of selection will look like before accessing the platform.

- **WP4** Complaints and conflicts can arise during internships, requiring resolution by a neutral entity (universities).

- **WP5** Students participate in interviews and selection processes conducted by companies.

1.2.2 Shared Phenomena

World controlled

- **SPW1** Students upload their CVs, experiences, projects and personal data.

- **SPW2** Companies interact with the system to upload internship advertisements and define the process of selection.

- **SPW3** Students use the system to search for internships and submit applications.

- **SPW4** Students and companies exchange information through the platform, including interview schedules and questionnaires.

- **SPW5** Companies evaluate students who went through the selection process and mark the selected ones.

- **SPW6** Students that got accepted decide whether they want to enroll the selected internship

- **SPW7** Universities use the system to access complaints submitted by students and monitor internship progress.

Machine controlled

- **SPM1** The system recommends internships to students based on their CVs, projects and preferences

- **SPM2** Notifications about new internships or application statuses are automatically sent to users.

- **SPM3** The system requests for feedback and ratings from both students and companies, contributing to platform analytics and recommendations.

- **SPM4** The platform provides suggestions to students and companies to improve their CVs or internship postings, based on statistical and user feedback.

- **SPM5** The system tracks and records complaints submitted by students and sends them to universities.

1.2.3 Machine Phenomena

- **MP1** The system stores and processes student profiles, including CVs and other personal data.

- **MP2** The system contains a searchable database of internship advertisements.

1.3 Definitions, Acronyms, Abbreviations

1.3.1 Definitions

- **Complaint**: A formal request filed by a student to address issues or disputes related to an internship. Complaints are handled and resolved by universities.

- **Feedback**: Insights provided by students or companies about the internship experience. Feedback contributes to platform analytics and recommendations.

- **Status**: The state of an internship, which can be one of the following:
    - Active: Open for applications and participation.
    - Closed: Completed or no longer accepting applications.
    - Draft: In preparation and not visible to students.

- **Recommendation System**: A feature of the platform that suggests internships to students based on their uploaded CVs, skills, and preferences.

- **Complaint Resolution**: The process carried out by universities to address and resolve issues raised by students regarding internships.

1.3.2 Acronyms

- AI: Artificial Intelligence

- API: Application Protocol Interface

- AWS: Amazon Web Service

- CV: Curriculum Vitae

- HID: Human Interface Device

- PC: Personal Computer

- S&C: Students & Companies

- TLS: Transport Layer Security

- UI: User Interface

- UML: Unified Modeling Language

- WCAG: Web Content Accessibility Guidelines 2.1

1.3.3   Abbreviations

- D*: Domain Assumptions

- FR1*: Functional Requirement

- G*: Goals

- MP*: Machine Phenomena

- MHIR1*: Mandatory Hardware Interface Requirements

- MSIR1*: Mandatory Software Interface Requirement

- NFR-P*: Non-functional Requirements - Performance

- RHIR1*: Recommended Hardware Interface Requirements

- SPW1*: Shared Phenomena World

- SPM*: Shared Phenomena Machine

- UC*: Use Case

- WP1*: World Phenomena

1.4   Revision history

v1.0 - 7/12/2024 - Initial release
v1.1 - 7/14/2024 - Finished section 1
v1.2 - 7/17/2024 - Draft Section 2
v1.3 - 7/21/2024 - Finalized section 2 & 3
v1.4 - 7/22/2024 - Spell check

1.5   Reference documents

This document is based on the following:

- The specification of the RASD and DD assignment of the Software Engineering II course;

- Slides of Software Engineering II course on WeBeep;

- Applying UML and patterns: An introduction to object-oriented analysis and design and the Unified Process.

1.6 Document structure

This RASD document consists of the following parts:

1. **Introduction**: a brief description of the project that is focused on the purpose, the goals that are aimed to be achieved, and the scope that is covered with its development;

2. **Overall Description**: a high-level description of how the system works presented with diagrams and with a detailed explanation of the scenarios that are possible;

3. **Specific Requirements**: a detailed analysis of the requirements needed to achieve the goals and use cases that are present on the platform. Moreover, it contains more information useful for developers;

4. **Formal analysis**: a formal analysis of the world phenomena using an alloy tool;

5. **Effort spent**: the time spent while creating this document divided in sections;

6. **References**: the references to any documents and software used to create this document.

2 Overall Description

2.1 Product perspective

2.1.1 Scenarios

User creates an account on the platform
Two main users of the platform have to create an account (companies and students). Company has to provide all the information relevant for the company, while student uploads their CV and other relevant information to create a profile that showcases their skills and experiences.

Company creates an internship advertisement
A company access the platform using their credentials and selects an option to create an internship advertisement. After opening the page for creation of the advertisement, the platform requires detailed internship description, specifying required skills, project descriptions, offered benefits, and application instructions. Also, the company must define how will the selection process look like (e.g. if there will be more then one interview, questionnaire or more than one round of selection process)

Company manages internship advertisements
Anytime, a company has an option on the platform to manage active internship advertisements. A company has possibility to update or remove an existing advertisement, ensuring it reflects the latest requirements or availability.

Student searches and applies for internship opportunities
A student after logging in with his credentials on the platform, the home page is populated with the active internship advertisements which one can browse, filtering by location, required skills, or other criteria. After finding and selecting appropriate internship, the platform opens page with the detailed description, requirements and other information about the internship. Student has an option to apply for the selected internship.

Company reviews student applications
A company, on their profile can view student applications for every active internship advertisement. The company can evaluate every student's suitability based on uploaded CV, skills and preferences. The platform provides an option for the applied students to accept and continue with the selection process as the company has chosen in the creation of the advertisement, or reject student if they believe they are not right fit for the company. After the acceptance of the certain students, the company has an option to send them questionnaire.

Student participates in the selection process

After the company selects the student to continue with the selection process, the student receives a notification and has an option to complete a questionnaire provided by a company. The student submits filled questionnaire and waits for the company to send him an invitation for the interview. During the selection process, student has an option to see his progress and all the rounds he has to pass in order to finish the selection process (e.g., questionnaire completed, interview completed).

User provides feedback on the platform

After the internship concludes, users will get a feedback questionnaire from the platform in order to collect statistical data and improve the recommendation system. The company has to provide feedback about the student's performance and the platform's usefulness, while the student has to give some insights about the internship and the company that he worked for.

The platform recommends internships to students

The recommendation system integrated in the platform recommends internships to the student based on his projects, CV and relevant data that the student uploaded when creating an account. The recommendation system analyzes a student's profile and suggests internships that match their skills, experiences, and preferences. The recommendation system utilizes simple keyword searching in order to match the internships that could be related to the student's portfolio.

User submits a complaint to the platform

During the internship, both the student and the company can file a complaint about issues that can arise. Both users have an option on the platform to file a complaint on the active or completed internship. The platform handles the complaint further.

University reviews and handles complaints

After the complaint has been filled, the university gets a notification about an active complaint request with all the information that user mentioned. The university communicates with the company and the student to resolve the issue, potentially leading to corrective actions or termination of the internship. If the university decides that the company has not met the benefits and requirements that were mentioned in the internship advertisement, the university can request from the platform to forbid internships from that company to its students.

University monitors internship progress

The university has an option to monitor the internship progress through feedback related to ongoing internships to ensure compliance with academic

and ethical standards. Also, the university has an option to monitor an active internship in order to assign the points to the student in the case of an obligatory internship.

2.1.2 Domain class diagram

The domain class diagram for the S&C platform is presented in figure 1 It is designed to represent all major entities and relationships described in the scenarios. The User class serves as a base class for Student, Company, and University which extend it. It encapsulates common attributes. Each subclass adds specific details needed for each role, such as CV and preferences for students, companyName and description for companies, and university-Name for universities. Other key classes include InternshipAdvertisement for managing detailed internship postings, InternshipApplication for tracking application statuses, and Complaint for handling issues raised by users. Additional classes like Recommendation and Feedback enhance platform functionality by supporting personalized internship suggestions and collecting user feedback.

The relationships between these classes reflect real-world interactions. For instance, companies create and manage InternshipAdvertisement objects, which are linked to multiple InternshipApplication objects submitted by students. The Recommendation class associates student profiles with internships using criteria (e.g. skills and preferences). Both students and companies can provide Feedback about internships and file Complaint objects for university review. Universities handle complaints, monitor internships through the InternshipMonitoring class, and ensure compliance with academic standards.
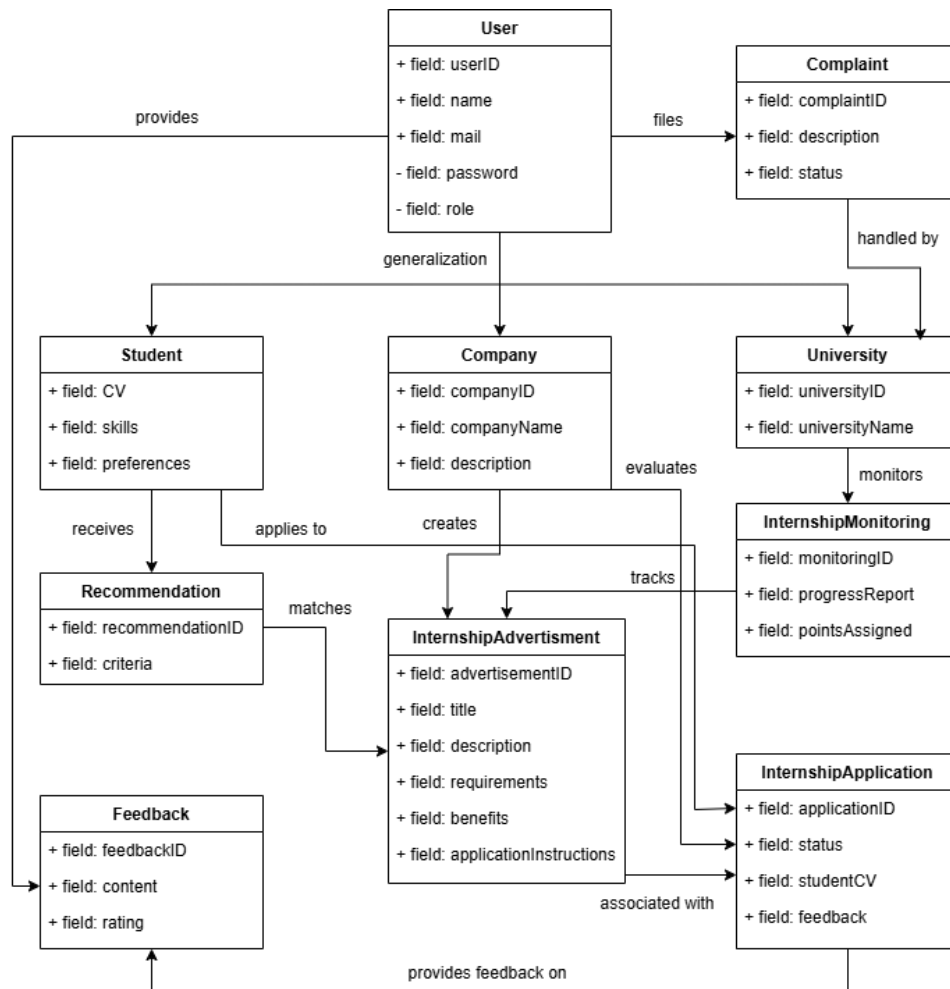
Figure 1: Domain class diagram

2.1.3   State diagrams

This section is going to visually present lifecycle of different components on the platform using state diagrams. Following state diagrams are covering management of internship advertisement, internship application and complaint handling.
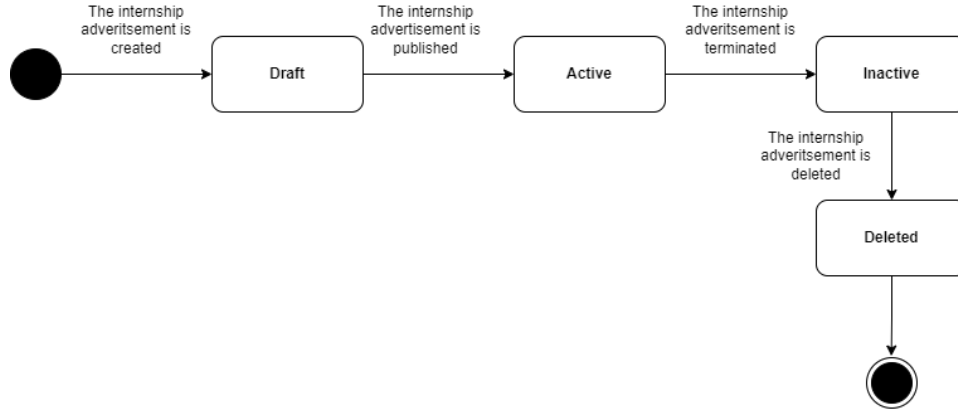
Internship advertisement management

Figure 2: Internship advertisement state diagram

This diagram represents the lifecycle of an internship advertisement on the platform, focusing on states like *Draft*, *Active*, *Inactive*, and *Deleted*. Internship advertisement lifecycle starts from the state *Draft*. This is the initial state when a company starts creating an internship advertisement until it is published. Companies can add details such as required skills, project descriptions, and selection processes. Once the advertisement is finalized and submitted, it transitions to the *Active* state. Active advertisements are visible to students, allowing them to search and apply. The advertisement can be marked as inactive by the company if it's no longer available or requires updates. Inactive advertisements are not visible to students. If the advertisement is no longer needed, it transitions to the *Deleted* state. Deleted advertisements are permanently removed from the platform. Transitions between these states occur based on user actions.

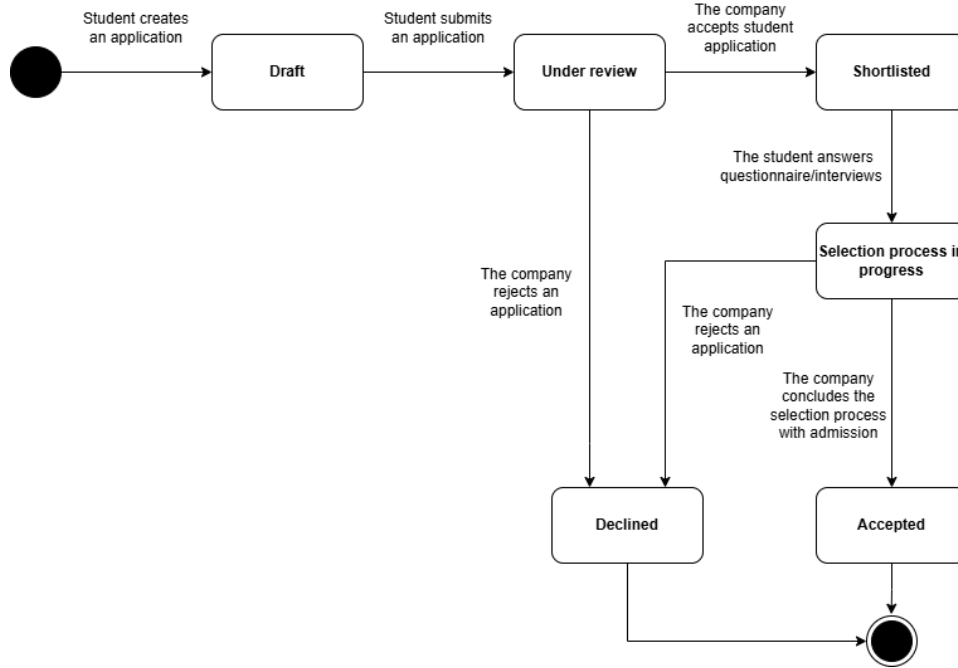**Internship application management**

Figure 3: Internship application state diagram

Application and selection process for students and companies are showed in the state diagram above (figure 3). After a student applies for an internship, their application enters the *Under Review* state. The company evaluates the application based on the CV and profile. If the student's application meets the company's criteria, it transitions to the *Shortlisted* state. The student is notified of their progress. After shortlisting, the selection process begins. This could involve questionnaires, interviews, or other methods defined by the company. The platform keeps track of the student's progress through each stage. If the student is not a fit, their application transitions to the *Declined* state with the reason for that decision indicated by the company. The student is notified of the rejection. On the other hand, if the student successfully completes all selection stages, their application moves to the *Accepted* state. This indicates that the student has secured the internship.
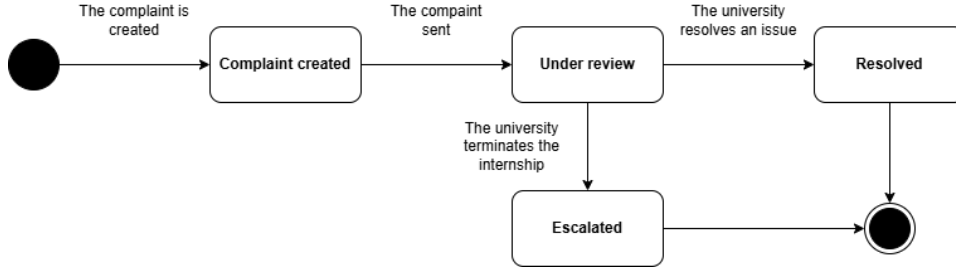
Complaint management

Figure 4: Complaint handling state diagram

The complaint process starts when a user (student or company) creates a complaint. The complaint moves to the state *Complaint created*. Immediately, the next state *Under review* is active. In that state, the university begins the review process. In this state, the university evaluates the complaint, gathering information from involved parties (e.g., students, companies, or both). If the issue cannot be resolved, the university has an option to terminate the internship and in that case state is *Escalated*. Whereas, if the university successfully resolves the complaint, complaint process transitions to the *Resolved* state.

2.2 Product functions

User Registration and Authentication

The platform allows students, companies, and universities to register by creating accounts and logging in using secure authentication methods. Besides mentioned users, the platform has administrator account that is responsible for verification of the companies. Users can register by pressing the button "Sign up" and the platform will send them to the registration page where they will enter necessary data. Students and universities have the option to sign up using an institution account, while companies after the registration have to go through verification process. Students provide their CV and skills, companies enter relevant business information, and universities add institutional details. This ensures that all users are identified and role-specific functionalities are enabled. If the user is already registered on the platform, there is an option to login using user credentials.

Profile Management

Each user can manage their profiles by updating personal information. The platform offers the page with the possibility of viewing data of the logged-in user and modifying it. Students can upload and update their CVs (by filling the textboxes related to the sections of the CV; e.g. work experience,

education, skills) and preferences; companies can refine their organizational descriptions; and universities can manage their institutional profiles. This enables users to keep their information relevant and up-to-date.

Internship Advertisement Creation and Management

Companies are able to access the page for advertisement creation by pressing the button "Create new internship advertisement" where they can create internship advertisements by providing detailed information about the role, required skills, offered benefits, and the selection process. In addition, there is an option to view all active internship advertisements offered by that company, where they can be updated, activated, deactivated, or deleted to ensure only relevant opportunities are visible to students.

Internship Search and Application

The platform offers students possibility to search for internships using filters like location, required skills, and benefits. They can view detailed descriptions of each internship by pressing on the box where the advertisement is located. After pressing on the selected advertisement the platform sends user on the page where details of the internship are presented. Button "Apply" is located on the internship page. That way, student can submit application directly through the platform. The number of applications per student is unlimited.

Selection Process Management

On the company user page on the platform, the company can view the status of any student that is in the selection process. The company can distribute among the candidates and view the answers, schedule an interview with the student using an option "Schedule with Google Meets", view the date and time of scheduled interview and also can terminate the selection process anytime if decides that the student is not right fit for the internship role, with giving the reason for such decision. On the other hand, the student that is in the active selection process can view their progress, view the questionnaire and the deadline for submitting it. As the company, also the student has an option to view the date and time of the scheduled interview with the selected company.

Feedback System

Feedback system which is integrated on the platform is responsible for collecting information from the students and companies after the selection process finishes and after the internships conclude. Companies provide feedback on the students' performance and their experience using the platform, while students share their thoughts about the platform or about the internship and the company. In order to avoid any bias if the student is admitted to the internship, reviews are anonymous. Data collected this way is used for

improvement of the platform and in order to build trust between users.

Recommendation System

The recommendation system is built with the intention to suggest internships to students based on their CVs, skills, and preferences. Method that the recommendation system uses is a keyword-matching algorithm to identify opportunities that align with a student's profile, helping them find relevant internships more efficiently. On the home page of the platform when the logged in user is student where the internship opportunities are shown, the first one which are showed are the ones that recommendation system chose. Those internship advertisements have label *Suggested* in order to highlight them.

Complaint Handling System

Both students and companies can submit complaints about issues that arise during selection process or internships that are active or completed. The platform provides an option on the page of the active internship or selection process to file a complaint. Complaints are reviewed by universities, which act as mediators to resolve disputes. When the complaint is requested by the student or the company, the university account gets a notification about the active complaint request. This system ensures that the platform maintains ethical and fair practices.

Internship Monitoring

Universities are able to monitor ongoing internships by accessing feedback and progress reports. Progress reports are requested for the student and the company every month. This function ensures compliance with academic and ethical standards. This way universities can monitor the internship progress and assign points to students for completed internships when required.

Notifications System

The platform is equipped with the notification system which sends notifications to students and companies at various stages, such as when new internships are posted, application statuses are updated, or when students are invited to the next step in the selection process. Notifications keep users informed and engaged.

2.3   User Characteristics

Users that are present on the platform and interact are: *Student*, *Company* and *University*. This section presents their needs which are satisfied by the platform.

2.3.1 Student

User *Student* has an option to sign up and login in order to access the platform. On the platform the student can search for the internships and apply for them. The student can be shortlisted or declined. If the student is shortlisted, he continues with the selection process which results with admission to the internship or rejection. The student has a possibility to file a complaint if the selection process or an active internship is not as described in the advertisement or are not by academic or ethical practices.

2.3.2 Company

User *Company* is, as the student, can sign up and login in order to access the platform. When logged in, the company can create and manage an advertisement for an internship role that is open. Company is able to manage the selection process and guide students through it. Also, the company may file a complaint if the internship progress is not as expected due to student misbehaviour.

2.3.3 University

User *University* is responsible for monitoring and supervising the process of selection and progress of the active internships. The university user are able to sign up and log in to the platform. In addition, this user has to handle complaint requests by students and companies.

2.4 Assumptions, dependencies and constraints

2.4.1 Regulatory policies

The S&C platform operates within the framework of applicable local laws and regulations about employment and internships. It follows labor laws that protect interns from exploitation in Italy, ensuring fair compensation and working conditions. The platform complies with data protection regulations, such as GDPR, by securing user data and limiting access to authorized personnel. Companies must ensure that the internships meet employment standards and are according to anti-discrimination policies. Universities play a regulatory role by monitoring internships to ensure ethical practices and compliance with academic requirements.

2.4.2 Domain assumptions

The following domain assumptions are needed in order for the platform to work successfully.

[**D1**] User must have a reliable internet connection.

[**D2**] All users provide accurate information when creating profiles.

[**D3**] Universities actively engage with the platform in order to monitor active internships and to resolve complaints.

[**D4**] Companies provide accurate information about an internship.

[**D5**] The system will be available ensuring uninterrupted access to users.

[**D6**] Submitted complaints are genuine and not misused to create unnecessary conflicts.

[**D7**] Companies respond to applications promptly.

[**D8**] Students complete selection process steps within deadlines.
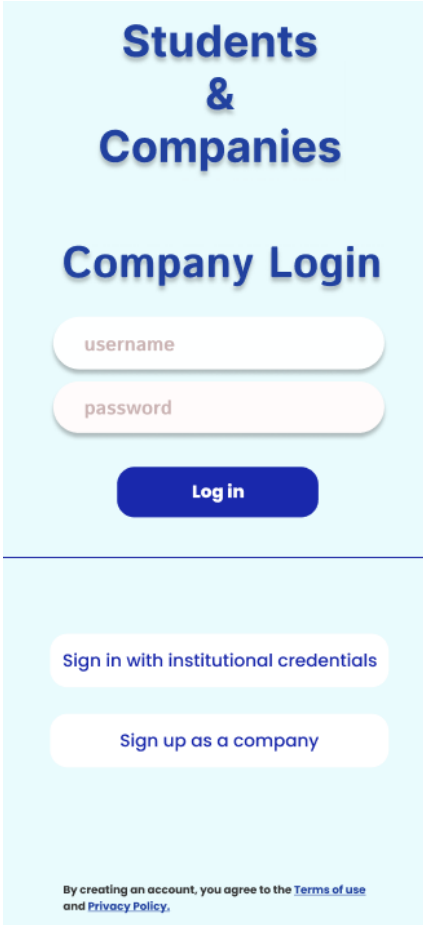
3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

This section presents the user interfaces of the web platform. For students and companies, examples are provided to illustrate how the interfaces could appear on desktop and mobile applications. These examples include the login page, sign-up pages tailored for students and companies, and the main pages specific to each user type.

The student interface focuses on features such as searching for internships and applying to opportunities. The company interface highlights functionalities like creating internships, reviewing existing ones, and displaying important information about each internship.

Figure 5: Log in form on mobile application

Figure 6: Sign up for companies on mobile application

Figure 7: Main page for companies on mobile application

Figure 8: Main page for students on mobile application

Figure 9: Log in form on desktop application
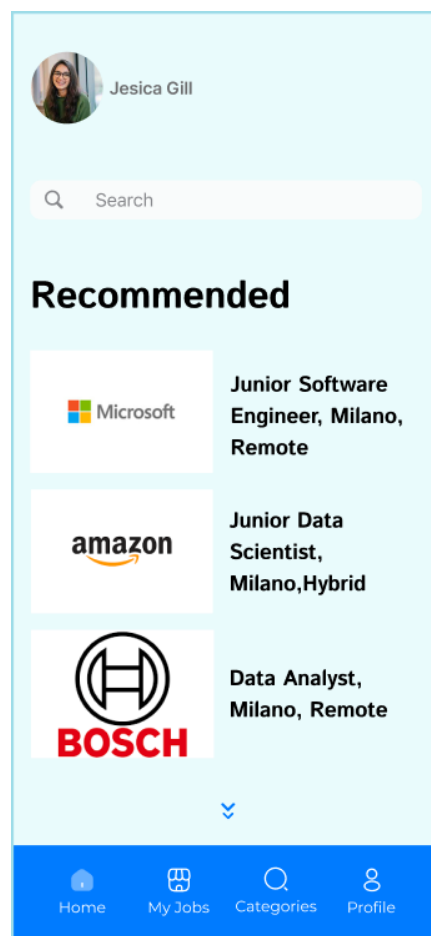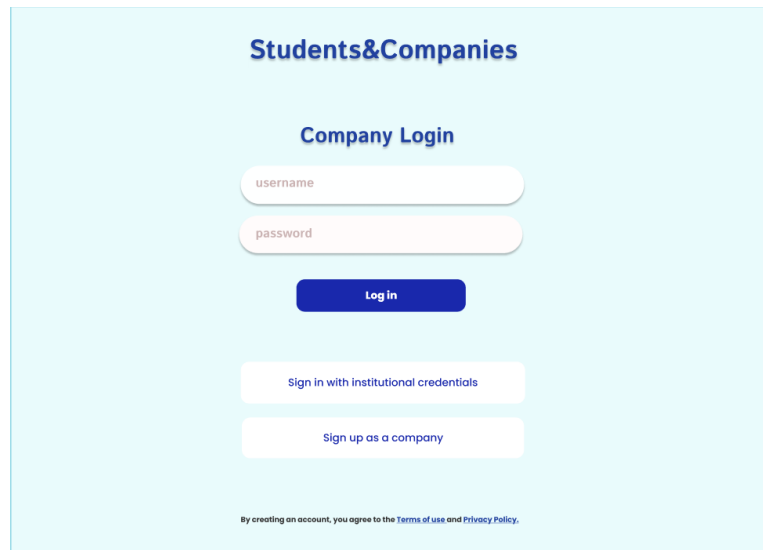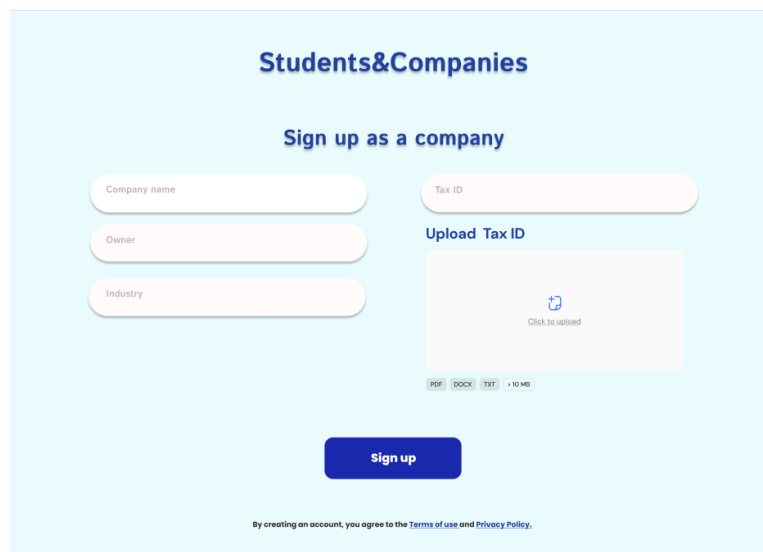

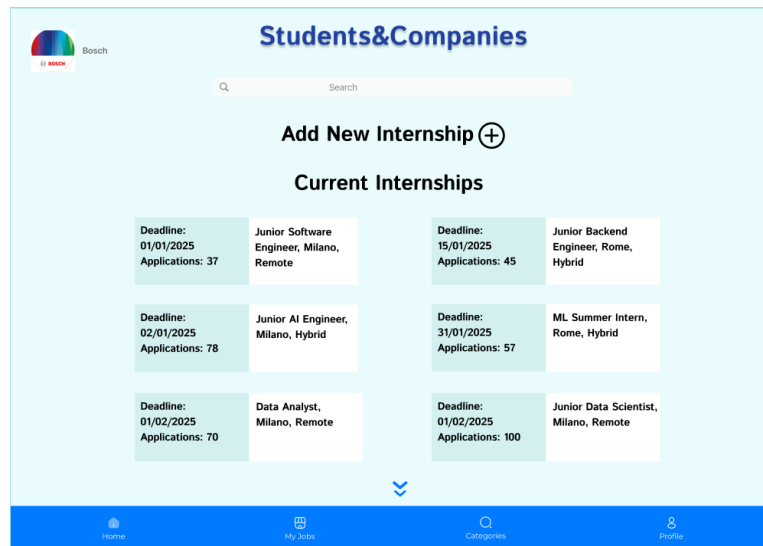Figure 10: Sign up for companies on desktop application

Figure 11: Main page for companies on desktop application
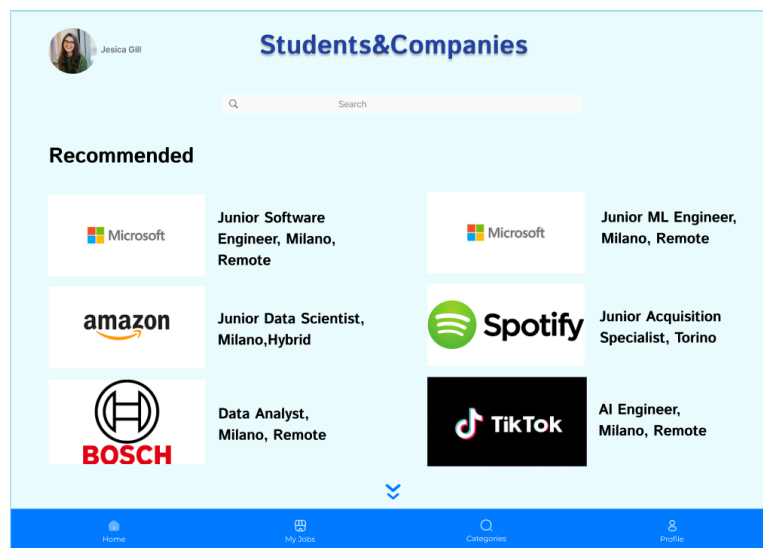
Figure 12: Main page for students on desktop application

3.1.2 Hardware Interfaces

While the platform is primarily a web application, specific hardware requirements exist to fully utilize all available features.

The minimum requirement for accessing and using the platform is a keyboard and a device that supports a modern browser compliant with HTML5 standards, as the user interface will comply with keyboard accessibility standards outlined in the Web Content Accessibility Guidelines (WCAG) 2.1.

Although not mandatory, using a pointing device is encouraged for efficiency. No specific pointer device is required for PCs or mobile devices, as the HID protocol and touchscreens are widely supported.

A summary of the described hardware interfaces is provided below.

Mandatory Hardware Interface Requirements (MHIR)

- **MHIR1.** An HID-compliant keyboard

Recommended Hardware Interface Requirements (RHIR)

- **RHIR1.** An HID-compliant pointer device

3.1.3 Software Interfaces

As noted, in order for the application to be accessed, it must be done through a modern, HTML5-compliant browser, regardless of the operating system or browser type.

The platform will be fully hosted on Amazon Web Services (AWS), so access to specific AWS APIs (e.g., AWS S3, AWS Lambda) and their associated endpoints will be required for its proper functionality.

Furthermore, as part of the platform's Artificial Intelligence (AI) integration to enhance user profiles, the OpenAI ChatGPT API will be employed. For legacy system compatibility (e.g., older authentication methods), additional APIs will also be included to ensure backward compatibility.

A summary of the described software interfaces is provided below.

Mandatory Software Interface Requirements (MSIR)

- **MSIR1.** A modern, Web2-compliant browser

- **MSIR2.** AWS API and subsequent endpoints (e.g., AWS S3, AWS Lambda)

- **MSIR3.** OpenAI ChatGPT API

- **MSIR4.** WebPurify for text checking.

- **MSIR4.** API for institutional account linking and data processing

3.1.4 Communication Interfaces

The communication between the web application and backend systems, as well as external services, will primarily use the HTTPS protocol. The application will interact with the provided endpoints via RESTful APIs for all CRUD operations, where all data exchanged will be encrypted in transit using TLS (Transport Layer Security) and stored securely in the system's database using industry-standard encryption methods. Moreover, WebSocket connections will utilized primarily for push-notifications. Lastly, as there will most likely be other system crucial third party services, their provided API gateways will be utilized within the application.

3.2 Functional Requirements

Within this section can be found a list of functional requirements for S&C, categorized by the major features of the platform.

Registration of Students

[**FR1**] The system shall allow new student users to register on the platform using their respective institutional accounts.

[**FR2**] After an institutional account has been linked with the platform, the system shall allow student users to log in using their institutional credentials.

[**FR3**] The system shall allow the registration of student users only if they are classified as students within the institutional account they provide.

Registration of Companies

[**FR4**] The system shall allow new company users to register on the platform using a valid email address.

[**FR5**] After providing an email address, the system shall verify the provided address through a verification email.

[**FR6**] After the new company user has verified their email, the system shall generate and deliver a password for the newly created account via the verified email.

[**FR7**] The system shall allow the company user to log in using the validated email address and the provided password.

[**FR8**] Upon the first login, the system shall require the new user to provide a certificate from the relevant tax authority, including the company

name and unique identifier. The system shall also require the full company name and unique identifier to be entered manually in the relevant input fields alongside the certificate.

[**FR9**] The system shall retain company user data only at two points: first, after successful email verification, where the provided email address and generated password will be retained as login credentials; and second, after submitting the initial verification information, where all submitted data up to that point shall be retained.

Registration of Universities

[**FR10**] The system shall allow new university users to register on the platform using pre-designated institutional accounts allocated for S&C.

[**FR11**] After an institutional account has been linked with the platform, the system shall allow university users to log in using their institutional credentials.

[**FR12**] If the institutional account has not been pre-designated for use on S&C, the system shall reject the registration attempt.

Profile Management

[**FR13**] The system shall, by default, provide a blank profile template for all users.

[**FR14**] The system shall provide different collections of predetermined fields based on the user type.

[**FR15**] The system shall allow all users to edit each field in their profile, with the exception of unique identifiers, such as tax numbers for companies and universities, and unique IDs for students, which cannot be altered.

[**FR16**] The system shall allow each field to be configured as public or private, provided that data is present in the respective field.

[**FR17**] The system shall automatically configure all fields with no data as private.

[**FR18**] The system shall allow all users to provide public hyperlinks to other platforms which the system shall display in a format that clearly indicates the platform to which the hyperlink leads to.

[**FR19**] The system shall integrate OpenAI's ChatGPT 4.0 API into each field to provide AI-generated suggestions for profile improvements.

Internship Advertisement Creation and Management

[**FR20**] The system shall only allow company users whose data has been verified to create, update, and delete public internship advertisements, where the system shall save unfinished advertisements as draft.

[**FR21**] The system shall allow the creation of new internship advertisements only if they possess the following fields: name, internship duration, short description, location, internship type, and the number of stages in the application process.

[**FR22**] The system shall integrate OpenAI's ChatGPT 4.0 API into each field of the internship advertisement creation process to provide AI-generated suggestions for enhancing the advertisement.

[**FR23**] The system shall allow for numerous types of stages to be created, including but not limited to questionnaires and video interviews, which may be scheduled on external platforms.

[**FR24**] Should the internship creation process be interrupted at any stage, the system shall save the unfinished internship advertisement as a draft.

[**FR25**] After creation, the system shall allow company users to make updates to all fields of each internship advertisement they have created, with the exception of that internship advertisement's unique ID and publication timestamp.

Internship Search, Application, and Management of Applications

[**FR26**] The system shall analyze the profile of the student user upon login and recommend 3 internship advertisements based on matching qualifications and background, and display these recommendations prominently to the student user.

[**FR27**] The system shall allow student and university users to view all internship advertisements posted by any company on the platform, not just those they are applying to. Company users, however, will only be allowed to view and manage the advertisements they have created.

[**FR28**] The system shall allow all student users to apply to internship advertisements, after which their profiles will be automatically inserted into the list of applicants under the Stage 1 category.

[**FR29**] Upon a successfully submitted application, the system shall notify the advertisement's creator.

[**FR30**] The system shall only allow company users who are creators of the internship advertisement to move candidates further along the selection stages.

[**FR31**] The system shall allow the company user, at any given stage, to reject any candidate without mandating a reason.

[**FR32**] Upon a change in status, be it a rejection or a move up in the selection stages, the system shall always notify the candidate of the change.

[**FR33**] Upon reaching the final stage as designated by the company, the system shall automatically classify the candidate as accepted for the internship.

[**FR34**] The system shall allow the company user to request the commencement of an internship from the candidate's host university. After the internship is approved by the host university, it shall commence on a predetermined date.

Internship Monitoring, Complaint Management & Feedback System

[**FR35**] During any stage of the internship, the system shall allow both the candidate and the company user to submit a complaint to the host university, after which the university user shall be automatically notified.

[**FR36**] After a complaint is received, the university may choose to resolve the complaint or to terminate the internship. The system shall allow for both choices to be submitted.

[**FR37**] The system shall not allow the termination of an internship by any party except the university user. The system shall allow a termination only after a complaint has been submitted.

[**FR38**] Upon the successful completion of an internship, the system shall request feedback from both the company user and the intern regarding the internship experience. Moreover, the system shall request feedback from all three users types involved in the internship regarding their satisfaction with S&C.

[**FR39**] The system shall request the university to review the submitted internship feedback. After the review, the system shall allow the university to either include the ratings in the profiles of both the student user and the company user, or keep the feedback private.

3.2.1 Use cases Diagram

Figure 13: Use cases

3.2.2   Use cases

The following section presents the identified use cases for S&C, using the fully dressed format (Larman, 2002). It must be noted that while the use cases are written in great detail, the presented diagrams have been trimmed as to present the most common alternative flows.

Registration, Login & Profile Editing

[**UC1**] Student and University User Registration
       Actors: Student or University users
       Preconditions: The user has accessed the platform sign in page. The user has a institutionally provided account.
       Success Guarantee (Postconditions): The user is successfully registered on the platform.
       Main Success Scenario (or Basic Flow):

1. The enters their institutional email in the designated field.
2. The user presses the 'Sign in with institutional credentials' button.
3. The platform redirects the user to their institutional login page.
4. The user successfully signs in using their institutional credentials.
5. The user agrees to cross-platform data sharing and the terms of service.
6. The platform redirects the user to the platform landing page.

       Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:
1. The user reconnects to the platform.
   1a. The platform fails to recover, or the user is unable to reconnect.
2. The user begins the registration process from the beginning, unless fully registered already.

3a. The user entered a badly formatted email:
1. The platform informs the user that the entered email invalid.
2. The user re-enters his email resumes the registration process.

3b. The user entered an email which is not connect to an institutional account, the platform is unable to redirect:

31

1. The platform informs the user that the entered email is not connected to an institutional account.
2. The user re-enters his email and resumes the registration process.

3c. The University user entered an email which is not pre-authorized for university user account creation.

3-6*. The institution's login system goes offline. The user is unable to resume registration.

4a. The user is unable to log in into his institutional account.

5a. The user declines cross platform data sharing and terms of service.
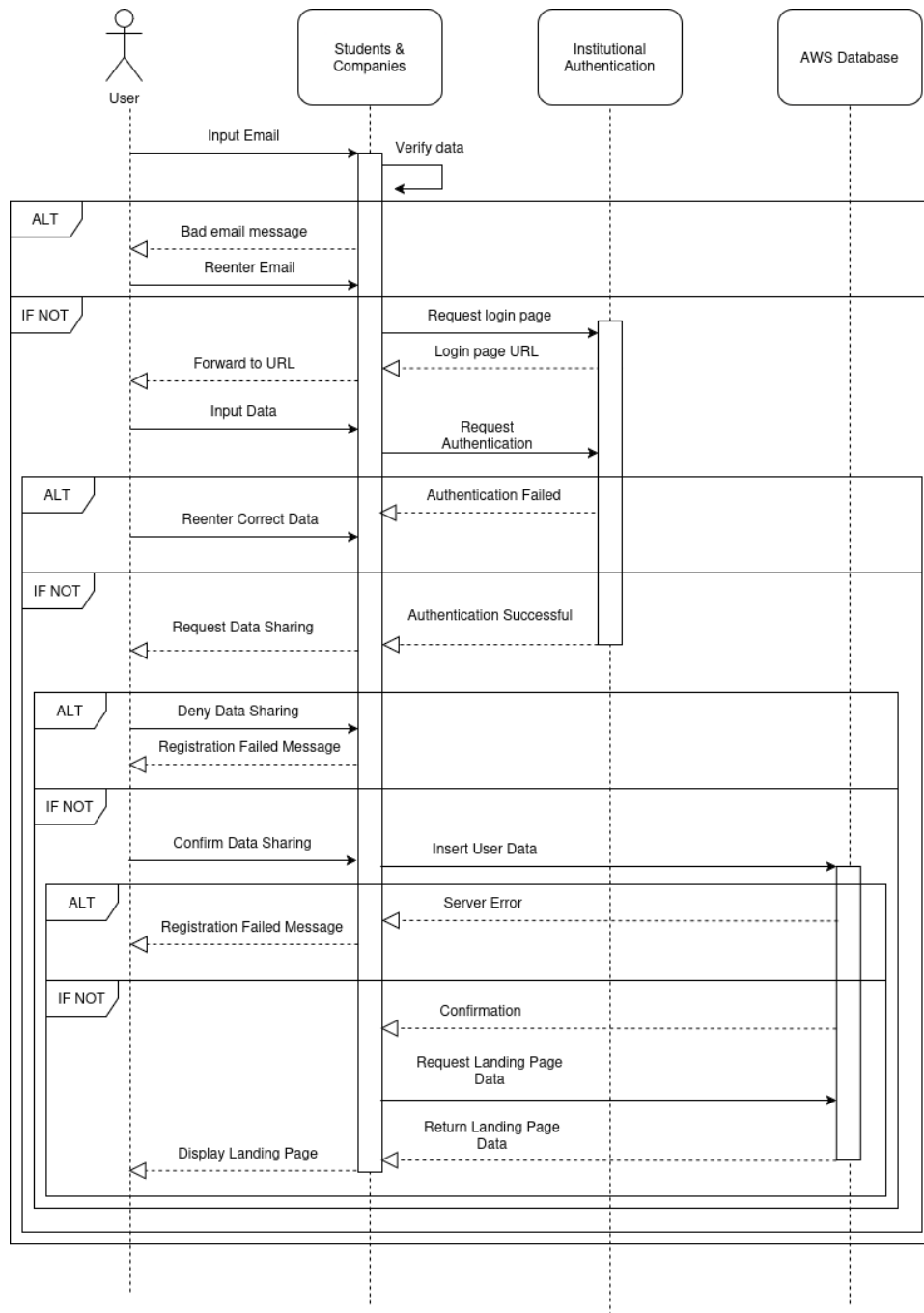
6-7a. The platform is unable to redirect the user.

Figure 14: UC1 - diagram

[**UC2**] Student and University User Login

    Actors: Student or University users

    Preconditions: The user has accessed the platform sign in page. The user has a institutionally provided account which is registered on the platform.

    Success Guarantee (Postconditions): The user is successfully logged in the platform.

    Main Success Scenario (or Basic Flow):

1. The user enters their institutional email in the designated field.
2. The user presses the 'Sign in with institutional credentials' button.
3. The platform redirects the user to their institutional login page.
4. The user successfully signs in using their institutional credentials.
5. The platform redirects the user to the platform landing page.

    Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:

    1. The user reconnects to the platform.
        1a. The platform fails to recover, or the user is unable to reconnect.
    2. The user begins the login process from the beginning, unless already logged in.

3a. The user entered a badly formatted email:

    1. The platform informs the user that the entered email invalid.
    2. The user re-enters his email resumes the registration process.

3b. The user entered an email which is not connect to an institutional account, the platform is unable to redirect:

    1. The platform informs the user that the entered email is not connected to an institutional account.
    2. The user re-enters his email and resumes the registration process.

3-5*. The institution's login system goes offline. The user is unable to resume the login process.

4a. The user is unable to sign in into his institutional account.

4-5a. The platform is unable to redirect the user.
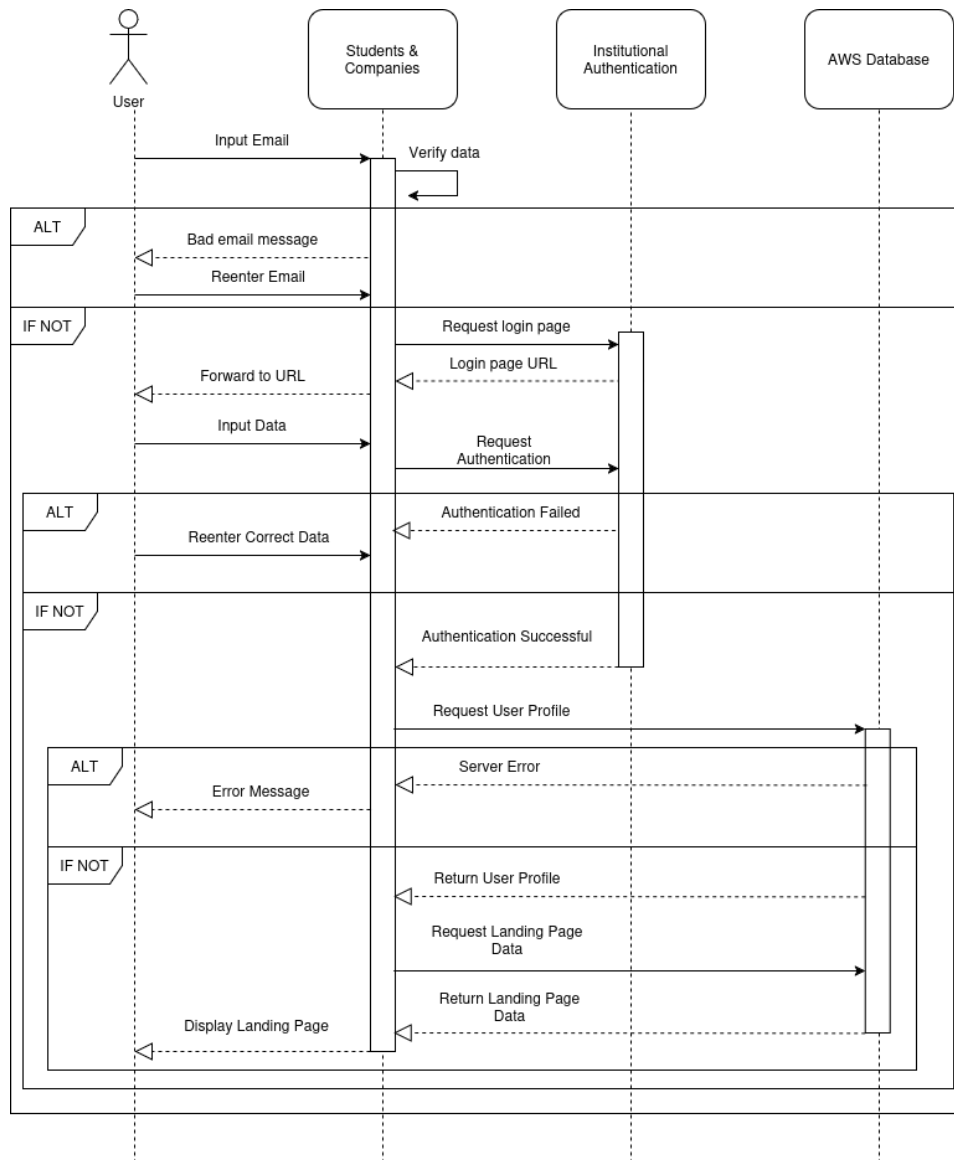
Figure 15: UC2 - diagram

[**UC3**] Register Company User

Actors: Company user

Preconditions: The company user has accessed the platform and is on the designated company sign up page. The company user has a valid email address to which they have access to. The company user possesses company tax identification documentation.

Success Guarantee (Postconditions): The company user is successfully registered on the platform.

Main Success Scenario (or Basic Flow):

1. The company user enters their desired email into the email field.

2. The company user presses the 'Sign up' button.

3. The platform sends a verification email and informs the user.

4. The user receives the verification link and a password in the email.

5. The user presses the verification link.

6. The link redirects the user back to the platform.

7. The user is informed that their email has been verified.

8. The user inputs the provided credentials, and successfully enters account creation.

9. The user successfully uploads the company name, tax id and required tax certificate, and presses 'Submit'.

10. The company user is redirected to the landing page of the platform.

Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:

    1. The user reconnects to the platform.

      1a. The platform fails to recover, or the user is unable to reconnect.

    2. The company user resumes the registration process from the last saved checkpoint.

1a.; 8a. The user entered a badly formatted email.

    1. The platform informs the user that the entered email invalid.

    2. The user re-enters his email resumes the registration process.

1b. The entered email has already been resisted on the platform.

4a. The user never receives the verification email.

5a. The verification provided link fails to redirect.

    1. The user copy-pastes the alternate link provided.

      1a. The alternative link is invalid. The user is unable to continue registration.

    2. The user returns to the website and resumes the registration process.

8a. The user's credentials are invalid.

9a. The user is unable to upload his tax certificate.
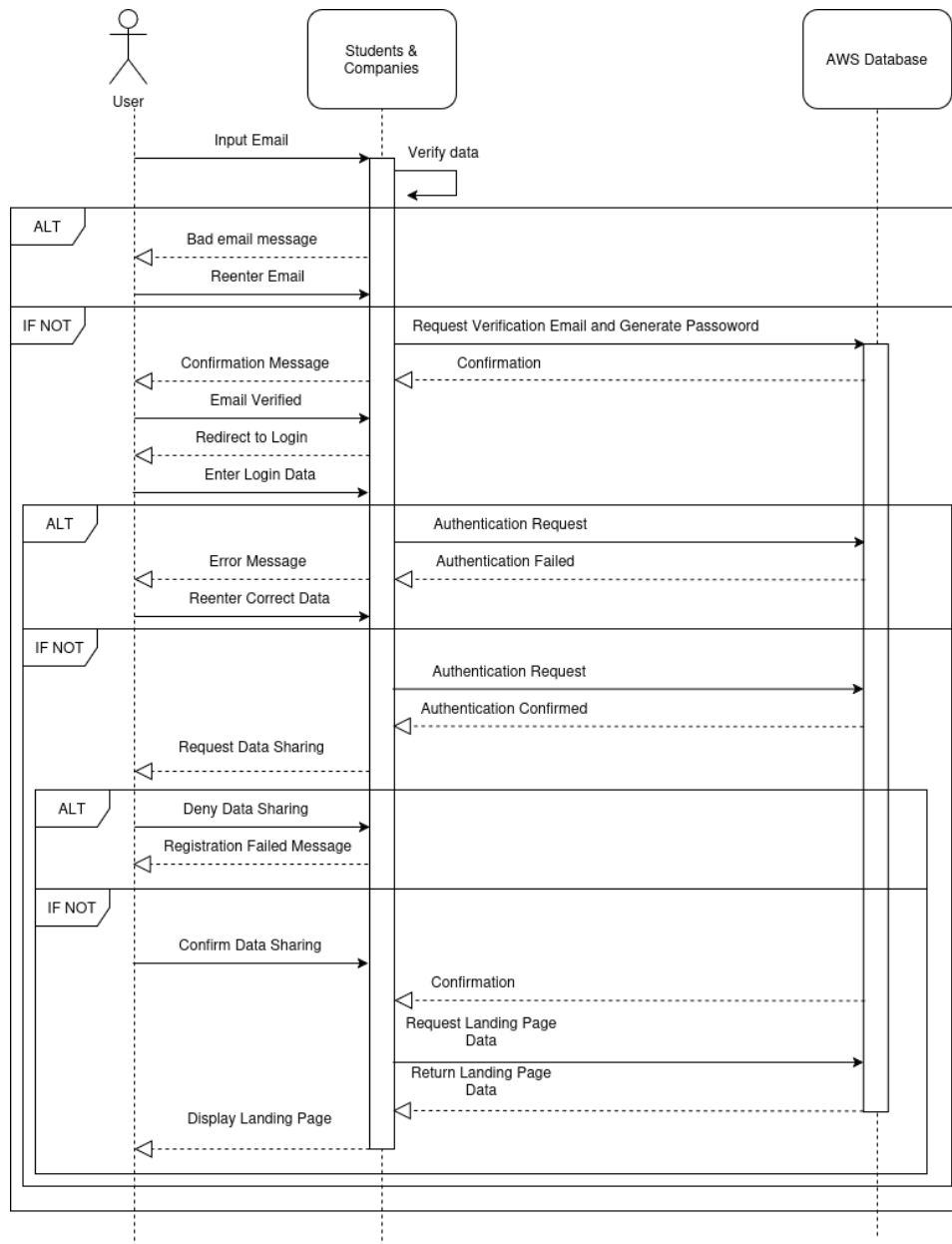
Figure 16: UC3 - diagram

[**UC4**] Login Company User
    Actors: Company User
    Preconditions: The company user has accessed the platform company login page. The company user is registered on the platform.
    Success Guarantee (Postconditions): The company user successfully logs in.

Main Success Scenario (or Basic Flow):

1. The company user enters their credentials in the designated fields and presses the 'Log in' button.

2. The user successfully signs in and the platform redirects the company user to the landing page.

Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:

    1. The user reconnects to the platform.

        1a. The platform fails to recover, or the user is unable to reconnect.

    2. The user begins the log in process from the beginning, unless already logged in.

1a. The user entered a badly formatted email:

    1. The platform informs the user that the entered email invalid.

    2. The user re-enters his email resumes the sign in process.

1b. The user entered a invalid credentials:

    1. The platform informs the user that the entered email invalid.

    2. The user re-enters his email resumes the sign in process.

2a. The platform is unable to redirect the user.
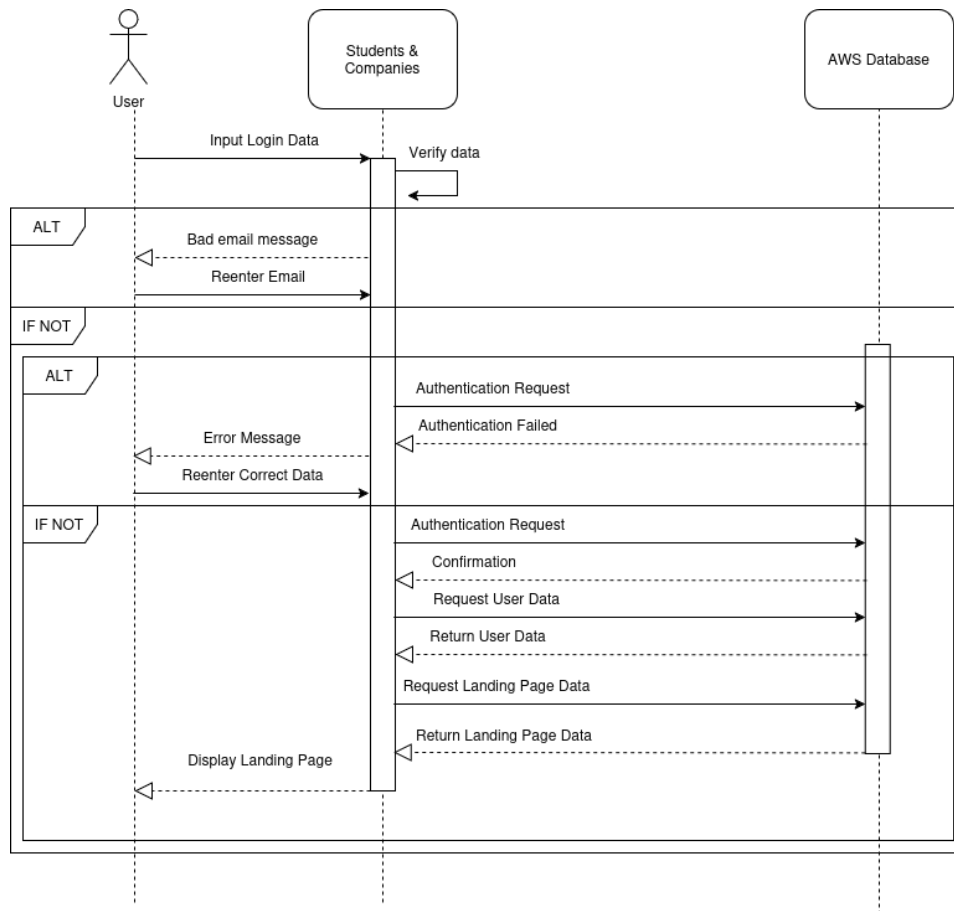
Figure 17: UC4 - diagram

[**UC5**] Edit profile

Actors: All users

Preconditions: The user has successfully logged into the platform and is viewing their own profile.

Success Guarantee (Postconditions): The user successfully makes changes to their profile.

Main Success Scenario (or Basic Flow):

1. The user presses the 'Edit' button.

2. The platform redirects the user to the profile editing page.

3. The user makes a change within their profile.

4. The user presses the 'Save changes' button.

5. The user is redirected back to viewing their profile and is informed that the changes have been saved.

Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:

    1. The user reconnects to the platform.

        1a. The platform fails to recover, or the user is unable to reconnect.

    2. The user is automatically logged back in.

    3. The user continues from the last saved checkpoint.

3a. The user makes an invalid change to their profile:

    1. The platform informs the user that the change is not possible.

    2. The user corrects their action and proceeds with making changes.

1a.; 4a. The platform is unable to redirect the user.

4a. The changes are unable to be saved due to a server error.

Figure 18: UC5 - diagram

Internship Advertisement Creation and Editing

[**UC6**] Create and Publish Internship Advertisement
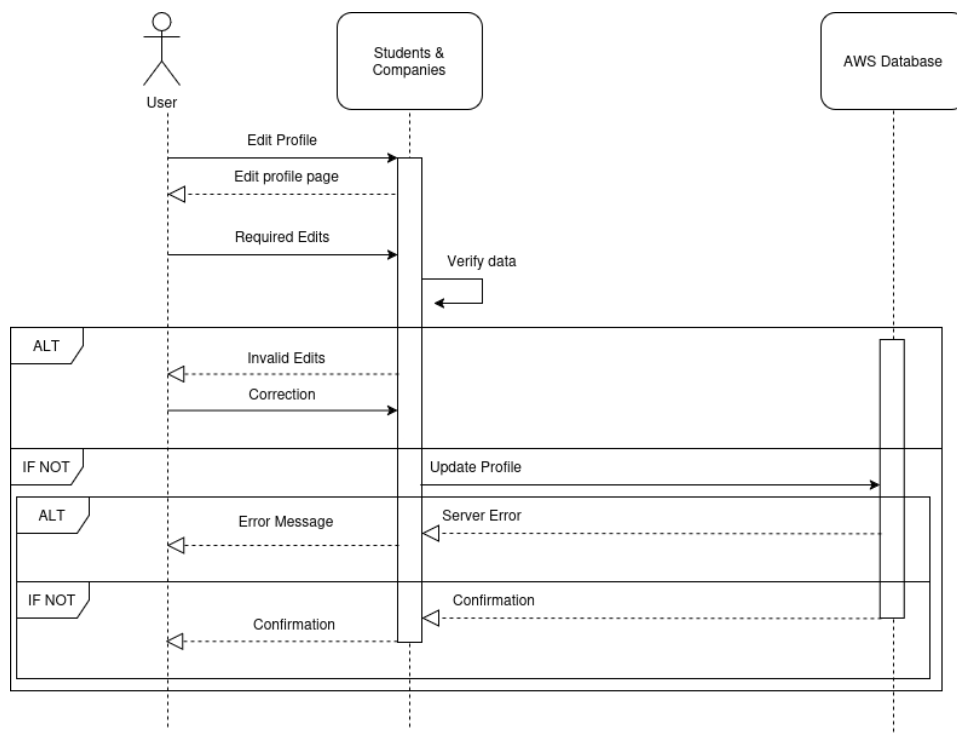**Actors:** Company Users
Preconditions: The company user has successfully logged into the platform and is viewing the landing page. The company user has been externally verified by an admin. The company user has not reached the maximum number of advertisements.
Success Guarantee (Postconditions): The company user successfully published an Internship Advertisement.
Main Success Scenario (or Basic Flow):

1. The company user presses the large '+' button for creating a new advertisement.
2. The platform redirects the user to the advertisement creation page.
3. The company user enters the mandatory information required for advertisement creation.
4. The company user presses the 'Publish button'.
5. The company user is redirected to the landing page and informed that the advertisement has been published. The company user can see his newly published advertisement.

Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:
 1. The user reconnects to the platform.
  1a. The platform fails to recover, or the user is unable to reconnect.
 2. The user is automatically logged back in.
 3. The user continues from the last saved checkpoint.

3a. The company user enters invalid information in the advertisement:
 1. The platform informs the company user that the change is not possible.
 2. The user corrects their action and proceeds with advertisement creation.

2a.; 5a. The platform is unable to redirect the user.

4a. The advertisement is unable to be published due to server error.

Figure 19: UC6 - diagram

[**UC7**] Edit Internship Advertisement
Actors: Company Users
Preconditions: The company user has successfully logged into the platform and is viewing the landing page. The company user has at least one active advertisement.
Success Guarantee (Postconditions): The company user successfully edits an Internship Advertisement.
Main Success Scenario (or Basic Flow):

1. The company user presses the large 'Edit' button for next to an existing internship advertisement.

2. The platform redirects the company user to the editing page.

3. The company user edits the desired information required for advertisement creation.

4. The company user presses the 'Save & Publish button'.

5. The company user is redirected to the landing page and informed that the advertisement edits have been made. The company user can see his newly edited advertisement.

Extensions (or Alternative Flows):

42

*a. At any point, the user disconnects or the system fails:

    1. The user reconnects to the platform.

        1a. The platform fails to recover, or the user is unable to reconnect.

    2. The user is automatically logged back in.

    3. The user continues from the last saved checkpoint.

3a. The company user enters invalid information in the advertisement:

    1. The platform informs the company user that the change is not possible.

    2. The user corrects their action and proceeds with advertisement creation.

1a.; 5a. The platform is unable to redirect the user.

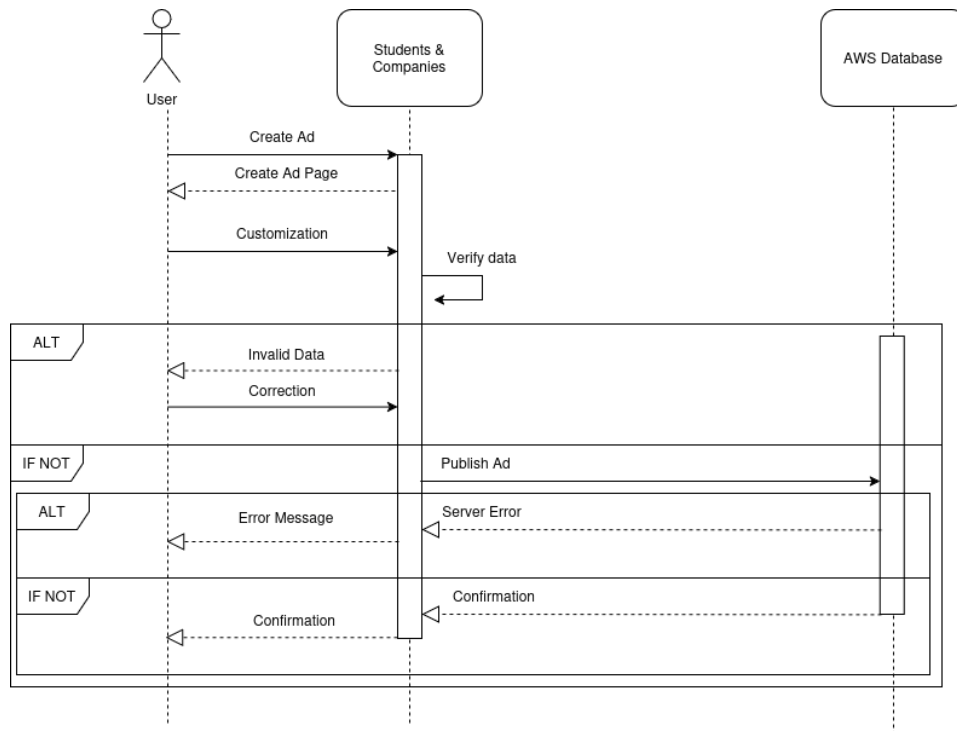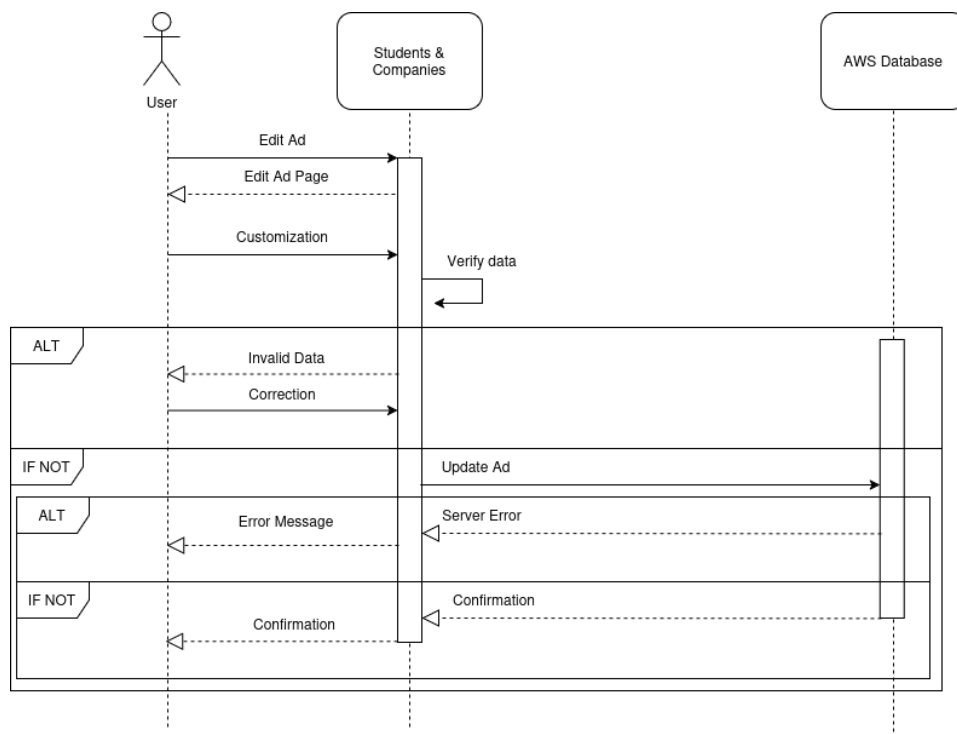4a. The advertisement is unable to be published due to server error.

Figure 20: UC7 - diagram

[**UC8**] Delete Internship Advertisement
Actors: Company Users
Preconditions: The company user has successfully logged into the platform and is viewing the landing page. The company user has at least one active advertisement.
Success Guarantee (Postconditions): The company user successfully deletes an Internship Advertisement.
Main Success Scenario (or Basic Flow):

1. The company user presses the large 'Delete' button for next to an existing internship advertisement.

2. The system prompts the company user to check if they are certain about deletion.

3. The company user confirms the deletion.

4. The company user is informed that the deletion has been made.

Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:
   1. The user reconnects to the platform.
      1a. The platform fails to recover, or the user is unable to reconnect.
   2. The user is automatically logged back in and returned to the lading page.

2a. The platform fails to display the confirmation prompt.

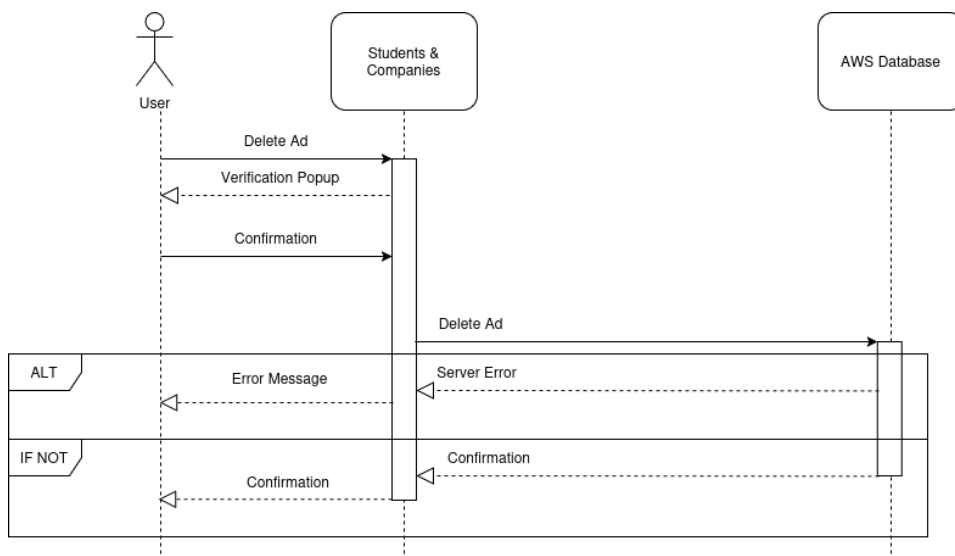3a. The advertisement is unable to be deleted due to server error.

Figure 21: UC8 - diagram

44

Application process

[**UC9**] View Recommendations & Offerings, Apply for Internship

Actors: Student users

Preconditions: The student user is logged into the platform and is viewing the landing page. There is at least one active internship advertisement.

Success Guarantee (Postconditions): The student user has successfully applied for an internship.

Main Success Scenario (or Basic Flow):

1. The student user views the available and recommended internship offerings and chooses one.

2. The student user presses the desired advertisement

3. The platform redirects the user to the detailed view.

4. The student user presses the 'Apply' button.

5. The system produces a prompt asking the user what do they want to submit with their application.

6. The user makes the desired selection.

7. The user and presses 'Send'.

8. The user is informed that the application was successful.

Extensions (or Alternative Flows):

*a. At any point, the user disconnects or the system fails:

　1. The user reconnects to the platform.

　　1a. The platform fails to recover, or the user is unable to reconnect.

　2. The user is automatically logged back in and returned to the lading page.

1a. The advertisement are unable to be viewed due to server error.

2a. The platform is unable to redirect the user.

5a. The platform fails to display the confirmation prompt.

4a. The maximum number of applicants has been reached
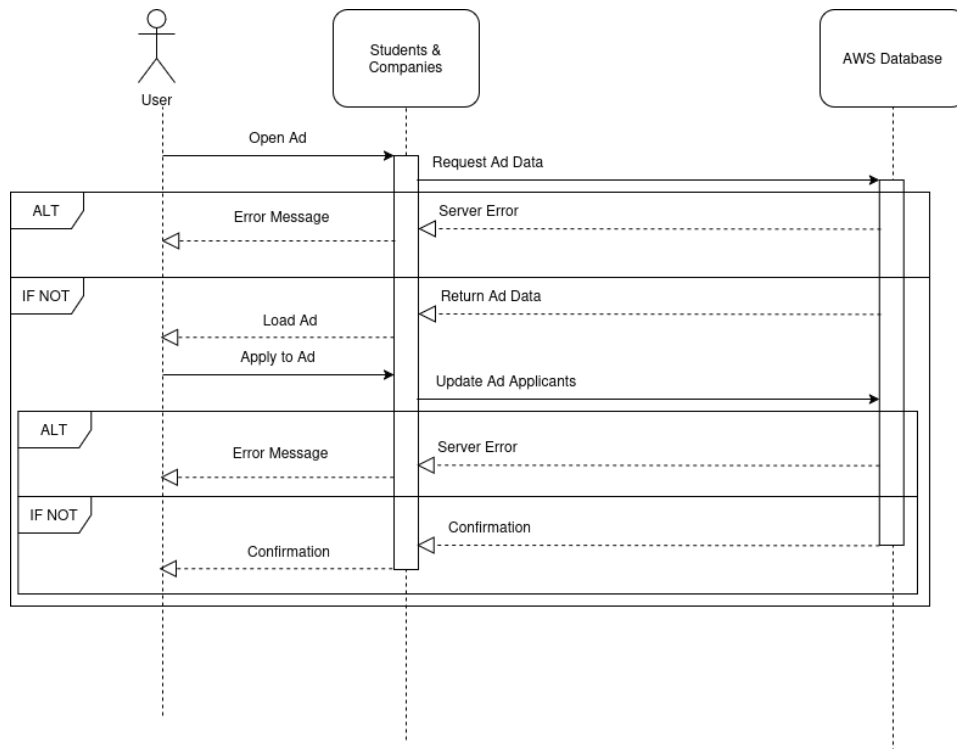
Figure 22: UC9 - diagram

[**UC10**] Change candidate status (increment or reject)

Actors: Company users, Student users

Preconditions: The company user is logged into the platform and is viewing the landing page. There is at least one active internship advertisement with at least one applicant.

Success Guarantee (Postconditions): The company user has changed a candidates status.

Main Success Scenario (or Basic Flow):

1. The company user selects the 'View candidates' button for the desired internship advertisement.

2. The platform redirects the company user to the page with the list of candidates.

3. The company user clicks the profile of a candidate they find interesting.

4. The platform redirects the company user to the selected candidate's profile.

5. The company user decides to reject the candidate or move him forward in the selection process using either the 'Reject' or 'Move forward' buttons.

6. The company user is notified that their action was successful.

7. The selected candidate is notified via push notification that their status has changed.

Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system fails:
  1. The user reconnects to the platform.
     1a. The platform fails to recover, or the user is unable to reconnect.
  2. The user is automatically logged back in and returned to the lading page.

1a. The advertisement are unable to be viewed due to server error.

3a. The candidate profile is unable to be viewed due to server error.

2a.; 4b. The platform is unable to redirect the user.

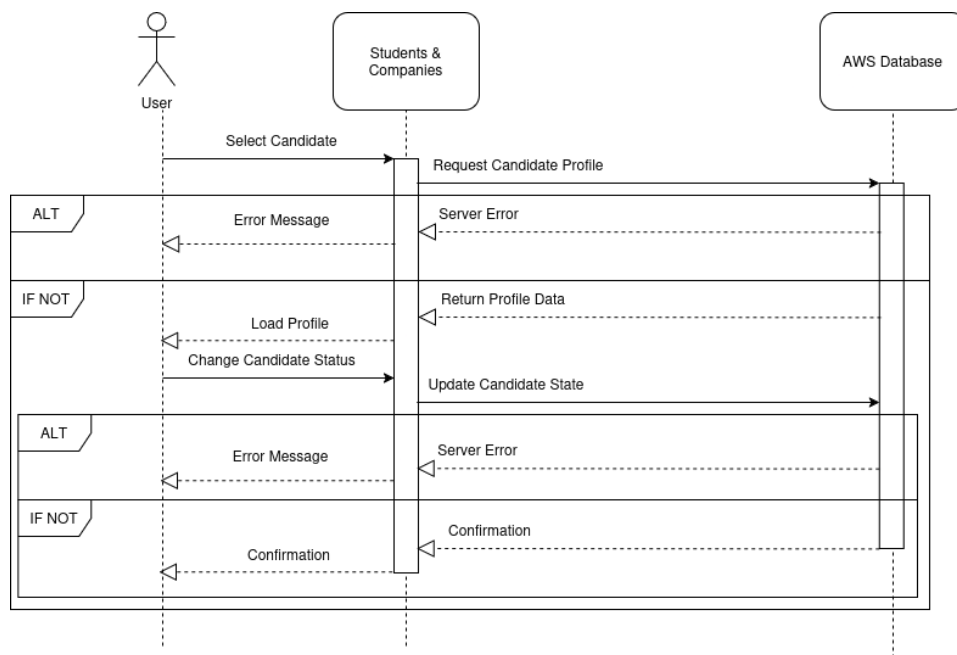5a. The platform fails to make the status change due to server error.

Figure 23: UC10 - diagram

[**UC11**] Send Prompt to Candidate (questionnaire or interview invitation)
Actors: Company users, Student users
Preconditions: The company user is logged into the platform and is viewing candidate management page for an active internship advertisement. There is at least one applicant above Stage 1.

47

Success Guarantee (Postconditions): The company has successfully sent the desired prompt to the candidate.

Main Success Scenario (or Basic Flow):

1. The company user selects the desired user and presses the 'Invite to more' button.

2. The system provides a prompt to the company user.

3. The company user selects whether they want an interview or if they prefer to send a questionnaire, providing additional relevant information.

4. The company user presses the 'Send Invitation button'.

5. The system notifies the company user that the invitation has been successful.

6. The student user is notified about the invitation.

Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system fails:

   1. The user reconnects to the platform.

      1a. The platform fails to recover, or the user is unable to reconnect.

   2. The user is automatically logged back in and returned to the candidate management page.

1a. The candidate profiles are unable to be viewed due to server error.

4a. The system fails to process the invitation due to server error.
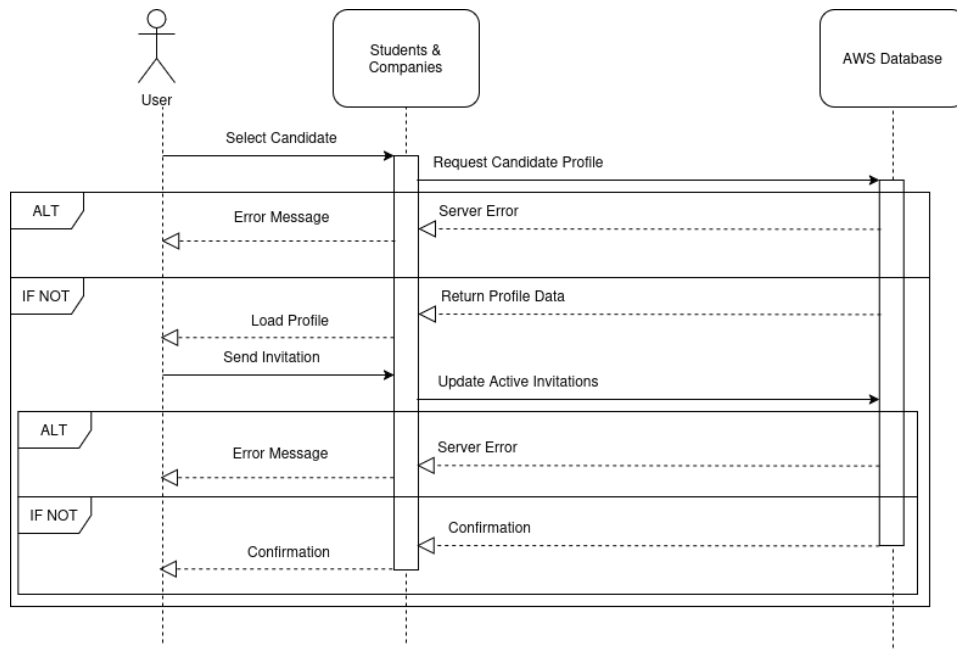
Figure 24: UC11 - diagram

[**UC12**] Reply to invitation

Actors: Student users, Company Users

Preconditions: The student user is logged into the platform and is viewing the landing page. The student has received an invitation.

Success Guarantee (Postconditions): The student user has successfully replied to the invitation.

Main Success Scenario (or Basic Flow):

1. The student user presses the 'Notifications' icon.

2. The platform displays all notifications via a pop-up.

3. The student views the notification and either presses the 'Reject' or 'Accept' buttons.

4. The platform informs the student that his action was successful.

5. The inviting company user receives a push notification about the candidate's decision.

Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system fails:

   1. The user reconnects to the platform.

      1a. The platform fails to recover, or the user is unable to reconnect.

49

2. The user is automatically logged back in and returned to the landing page.

1a. The notifications are unable to be viewed to be viewed due to server error.

4-5a. The system is unable to process the reply due to a server error.
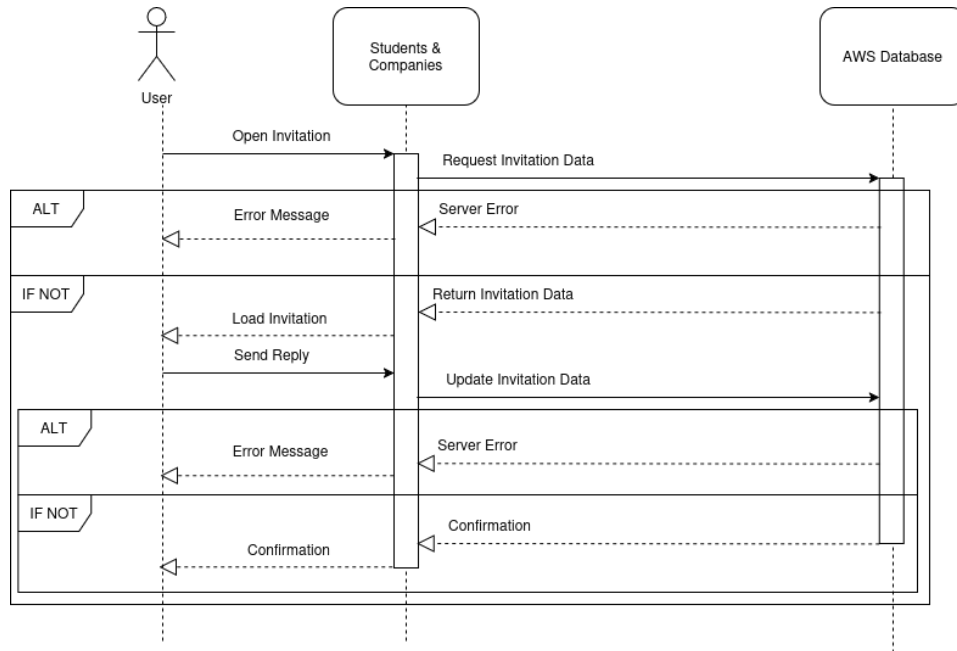
Figure 25: UC12 - diagram

[**UC13**] Initiate Internship

Actors: Company users, University users, Student users
Preconditions: The student user is logged into the platform and is viewing the an active internship advertisement. The company has at least one candidate who has reached the final stage.
Success Guarantee (Postconditions): The internship has successfully been started.
Main Success Scenario (or Basic Flow):

1. The company users views the available candidates, and selects one to begin the internship by pressing the 'Begin' button.

2. The system notifies the relevant University user that an internship start request has been opened.

3. The company user accepts the internship request by pressing 'Approve'.

50

4. The system notifies the company user and the candidate that the internship has been initiated.

Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system fails:

    1. The user reconnects to the platform.

        1a. The platform fails to recover, or the user is unable to reconnect.

    2. The user is automatically logged back in and returned to the landing page.

1a. The candidates are unable to be viewed to be viewed due to server error.

1b. The request is unable to be processed due to server error.

3a. The system is unable to process the reply due to a server error.

3b. The university presses the 'Reject' button.

    1. The system notifies the company user and the candidate that the internship has been rejected by the university.
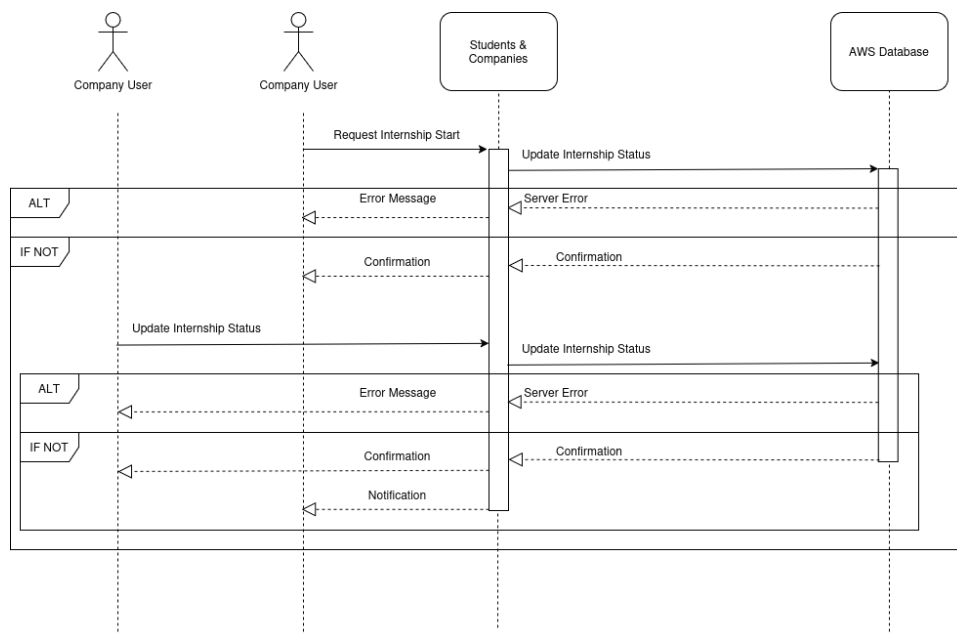
Figure 26: UC13 - diagram

[**UC14**] Submit Complaint

Actors: Student users, University users

Preconditions: The user is logged into the platform and is viewing an initiated internship.

Success Guarantee (Postconditions): The complaint has been submitted.

Main Success Scenario (or Basic Flow):

1. The user selects the 'Submit a complaint button' button.
2. The platform creates a dialog box.
3. The user enters a description of the complaint.
4. The user presses the 'Send' button.
5. The platform informs the user that the complaint has been sent.
6. The relevant University is notified of the complaint.

Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system fails:
   1. The user reconnects to the platform.
      1a. The platform fails to recover, or the user is unable to reconnect.
   2. The user is automatically logged back in and returned to the landing page.

4a. The system fails to process the request due to server error.
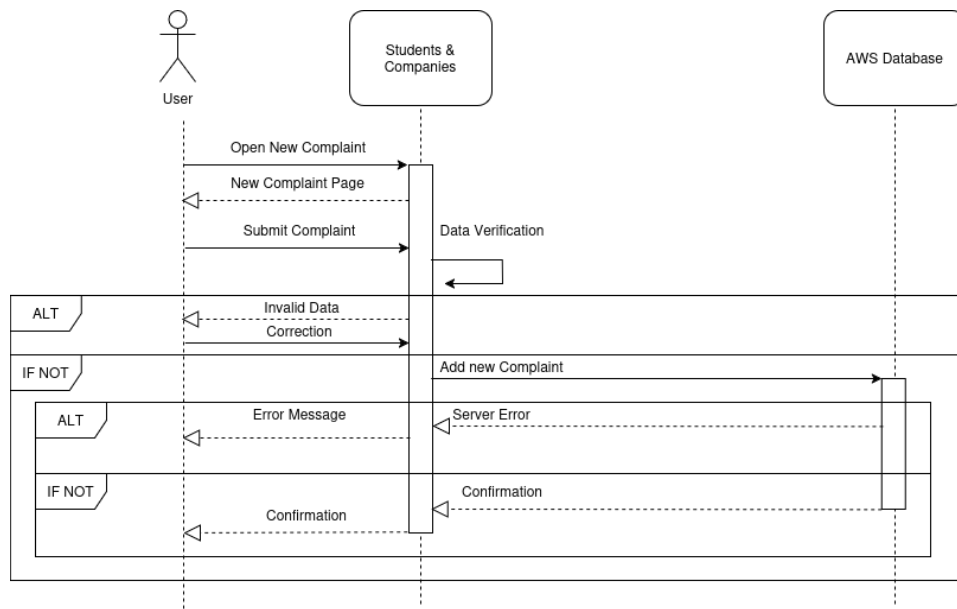
Figure 27: UC14 - diagram

52

[**UC15**] Resolve complaint

    Actors: Student users, Company users, University users

    Preconditions: The university user is logged into the platform and is viewing the list of active complaints.

    Success Guarantee (Postconditions): The submitted complain has successfully been resolved.

    Main Success Scenario (or Basic Flow):

1. The university user views the list of complaints, and selects the complaint they wish to work on.

2. The platform displays a preview of the complaint, with an open input field.

3. The university user fills the field with the reply.

4. The university user presses the 'Submit reply & Close'.

5. The platform informs the university user that the change was successful.

6. The relevant Company user and Student users are are notified of the complaint's resolution.

    Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system fails:

    1. The user reconnects to the platform.

        1a. The platform fails to recover, or the user is unable to reconnect.

    2. The user is automatically logged back in and returned to the landing page.

4a. The system fails to process the request due to server error.
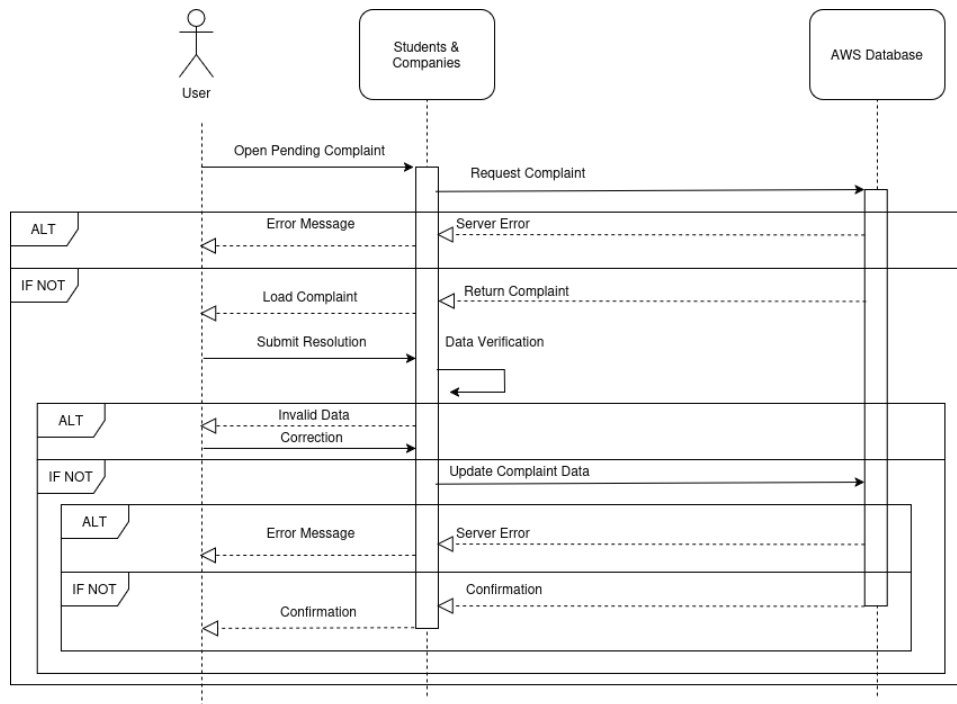
Figure 28: UC15 - diagram

Feedback management

[**UC16**] Submit feedback.
       Actors: Student users, Company users, University users
       Preconditions: An internship has been successfully finished. The user is notified of a pending internship review.
       Success Guarantee (Postconditions): The feedback has been successfully submitted.
       Main Success Scenario (or Basic Flow):

1. The user presses the 'Notifications' icon.

2. The platform displays all notifications via a pop-up.

3. The student views the pending review notification and clicks on it.

4. The platform redirects the user to a predetermined form.

5. The user enters the relevant data.

6. The user presses the 'Submit button'.

7. The platform informs the user that his action was successful.

8. The other relevant users get notified of the submitted feedback.

54

Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system
   fails:

    1. The user reconnects to the platform.

       1a. The platform fails to recover, or the user is unable to
   reconnect.

    2. The user is automatically logged back in and returned to
   the landing page.

1a. The notifications are unable to be viewed to be viewed due to
   server error.

6a. The system is unable to process the reply due to a server error.
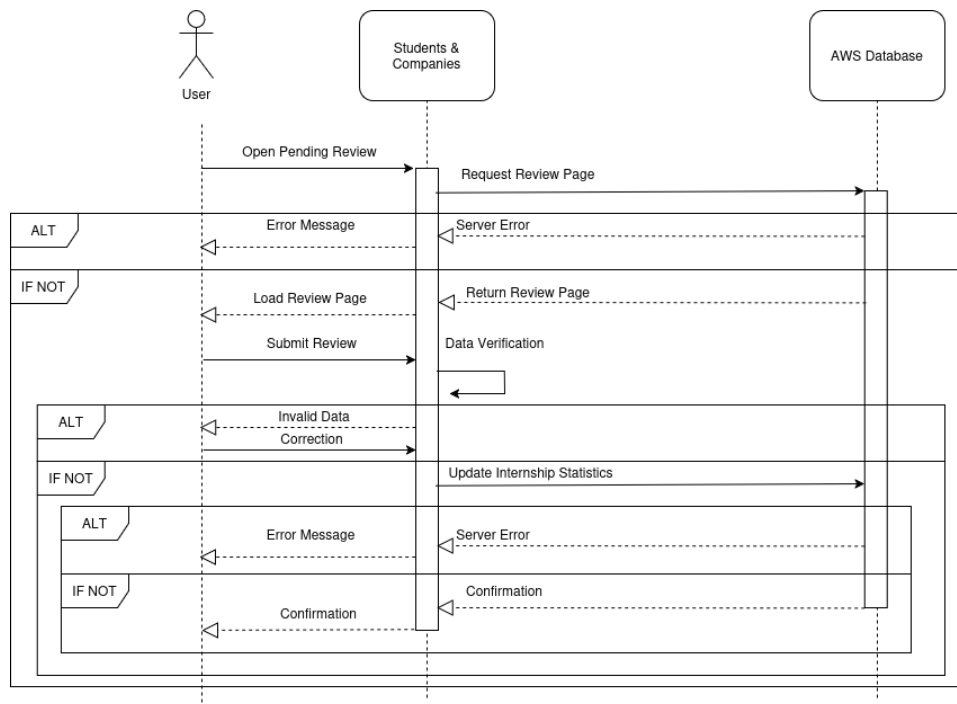

Figure 29: UC16 - diagram

[**UC17**] View feedback.
    Actors: Student users, Company users, University users
    Preconditions: An internship has been successfully finished. All
feedback has been submitted.
    Success Guarantee (Postconditions): The feedback has been
viewed.
    Main Success Scenario (or Basic Flow):

1. The user presses the 'Notifications' icon.
2. The platform displays all notifications via a pop-up.
3. The student views the new feedback notification and clicks on it.
4. The platform displays the feedback to the user regarding that particular internship.

Extensions (or Alternative Flows):

*a. At any point, the company user disconnects or the system fails:
  1. The user reconnects to the platform.
     1a. The platform fails to recover, or the user is unable to reconnect.
  2. The user is automatically logged back in and returned to the landing page.
1a. The notifications are unable to be viewed to be viewed due to server error.
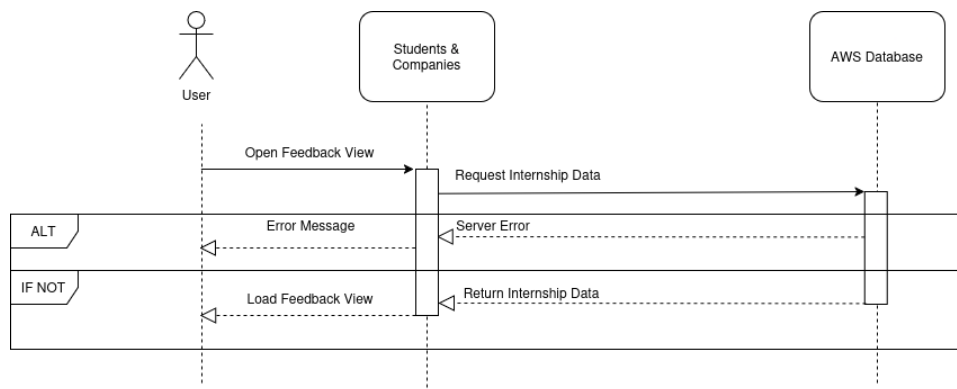
Figure 30: UC17 - diagram

3.2.3 Sequence diagrams

The following section will present the sequence diagrams which represent the different use cases. The diagrams that are presented here will represent the most complex use cases which in part or in their entirety, cover simpler use cases within them (such as editing or deletion)

3.2.4 Requirement mapping

The following section assesses each goal as listed in section 1.1.1, and presents which Domain Assumptions (D) and Functional Requirements(FR) match them. In cases

[G1] Companies create internship advertisement.

[D4] Companies provide accurate information about an internship.

[D7] Companies respond to applications promptly.

[FR10-FR15] Cover the registration of company users.

[FR20-FR25] Cover the creation, update, and management of internship advertisements.

[G2] Students find appropriate internship and initiate contact with the selected company.

[D1] User must have a reliable internet connection.

[D2] All users provide accurate information when creating profiles.

[D7] Companies respond to applications promptly.

[D8] Students complete selection process steps within deadlines.

[FR1-FR3] Cover registration and login for student users.

[FR16-FR18] Cover profile management by students.

[FR26-FR29] Cover searching, applying, and notification about internships.

[G3] Students become interns in the companies in order to gain experience in the desired area of industry.

[D2] All users provide accurate information when creating profiles.

[D4] Companies provide accurate information about an internship.

[D8] Students complete selection process steps within deadlines.

[FR28-FR30] Cover internship application and selection process..

[FR32] Cover initiation of internships by companies and universities.

[G4] The platform provides a transparent and fair selection process where companies can evaluate and select suitable candidates.

[D7] Companies respond to applications promptly.

[D8] Students complete selection process steps within deadlines.

[FR29-FR31] Cover movement of candidates through stages, rejection, and acceptance notifications.

[FR32] Cover approval of internships by universities.

[G5] The platform offers a recommendation system that matches students to internships based on their CVs, skills, and preferences, as well as company requirements.

[D2] All users provide accurate information when creating profiles.

[FR26] Cover the recommendation system for internships based on student profiles.

[G6] The platform allows universities to monitor internships to ensure alignment with academic standards.

[D3] Universities actively engage with the platform in order to monitor active internships and to resolve complaints.

[FR33] Cover monitoring by universities during internships.

[FR34, FR35] Cover feedback collection and review by universities.

[G7] The platform collects feedback from both students and companies to improve the platform's functionality.

[D4] Companies provide accurate information about an internship.

[D6] Submitted complaints are genuine and not misused to create unnecessary conflicts.

[FR36,FR37] Cover feedback collection after internships.

[FR38] Cover review and optional publication of feedback by universities.

[G8] Ensure a safe and supportive environment by providing students with mechanisms to file complaints and enabling universities to resolve them.

[D3] Universities actively engage with the platform in order to monitor active internships and to resolve complaints..

[D6] Submitted complaints are genuine and not misused to create unnecessary conflicts.

[FR33,FR34] Cover submission and resolution of complaints.

[FR35] Cover termination of internships based on complaints.

3.3 Performance Requirements

Performance requirements fall under the category of Non-Functional Requirements (NFRs) (Larman, 2002), therefore, this section will address them as such. It is important to note that, as the platform will be fully deployed on AWS, many of these requirements will be inherently met from the start. The following requirements are defined based on an estimated peak usage of 50,000 active users, serving as a reference point to ensure quality.

Below can be found a list of NFRs which relate to the performance aspects of the platform:

[**NFR-P1**] The system shall process a student and university registration within 5 seconds upon receiving the user data from the university's provider.

[**NFR-P2**] The system shall return internship search results within 2 seconds, assuming up to 500 results.

[**NFR-P3**] The system shall process and post a new internship advertisement within 15 seconds.

[**NFR-P4**] The system shall support at least 30,000 concurrent users actively interacting with the platform.

[**NFR-P5**] The system shall support up to 300 simultaneous file uploads, with excess request being queued.

[**NFR-P6**] The system shall maintain a response time under 5 seconds at all times.

[**NFR-P7**] The system shall ensure that all queries do not exceed 500ms of latency.

3.4 Design Constraints

3.4.1 Standards compliance

The S&C platform, in its current stage, is targeted at the student population within the European Union (EU) and the European Economic Area (EEA), therefore, it shall abide to the standards within that region. Should the platform expand to other markets, revisions will be made accordingly. The EU and EEA require that software solutions abide with the General Data Protection Regulation (GDPR) for data collection and storage, allow for full navigation for individuals who are impaired, and, in general, will follow the latest best practices in software development.

3.4.2 Hardware limitations

As the platform will be hosted using AWS, the hardware limitations may only refer to possible client side limitations, which there are very few. S&C is meant to be cross-platform, and hence, can be accessed by almost any

device which is capable of processing JavaScript scripts. As proposed by Graves (2021), the following specifications can be mentioned, with the limiting factor continuing to be software support for said hardware:

For Personal Computers	For Mobile Devices
CPU: Dual-core (e.g., Intel i3 or Core Two Duo).	CPU: A10 Fusion (iOS) or ARM Cortex-A53/Snapdragon 450 (Android).
RAM: 2 GB minimum (4 GB recommended).	RAM: 2 GB (iOS), 3 GB (Android).
Storage: 16 GB total (SSD preferred).	Storage: 16 GB total (1 GB free for cache).
GPU: Integrated graphics for HTML5 and CSS rendering.	GPU: Integrated graphics for HTML5 and CSS rendering.
Internet: 1 Mbps (5 Mbps recommended).	Internet: 3G minimum, 4G LTE or 5G recommended.
Browser: Latest version of Chrome, Firefox, Edge, or Safari.	Browser: Safari (iOS), Chrome or modern browser (Android).
OS: Recent version of Windows, macOS, Linux, Android, or iOS.	OS: iOS 12+ or Android 7.0+.
Display: 1024 x 768 resolution minimum.	Display: Retina/HD minimum, Full HD recommended.
Input Device: HID-compliant keyboard minimum, computer mouse recommended.	Input Device: Touch Screen recommended.

Table 1: Minimum requirements for S&C

3.4.3 Any other constraints

The platform is meant to be 'information first' and accessible to all, therefore, performance optimizations will be prioritized where possible, such as in design complexity, image resolution, data presentation etc.

3.5   Software System Attributes

3.5.1   Reliability

During development, the entire platform will be subject to rigorous testing to ensure that all features are working as described with no variations. Moreover, as the application will be dockerized and deployed using AWS, it should ensure that should whichever instance of the platform experience issues, a new instance can be deployed instantly (should it be needed).

3.5.2   Availability

Deploying on AWS ensures an availability metric between 99.80% and 99.99% (Amazon, 2024), even with issues such as cyber attacks or platform updates. As mentioned, most user activities will be subject to snapshots and draft-saving, hence, in the unlikely event of the platform going offline, users will be able to return to their activities precisely where they left off.

3.5.3   Security

Beyond following all the necessary privacy laws, the platform shall follow the highest possible security standards along with best practices as three different user groups with extremely sensitive data are at stake. Multi Factor Authentication shall be mandatory for all users and to end data encryption will be a minimum for all users, strong measures against data scraping shall be taken, a zero-trust architecture will be employed, and privacy by design will be the standard moving forward.

3.5.4   Maintainability

The software platform will be subject to the use of extensive testing and code analysis software. Technical debt shall be avoided at all costs, and monthly refactoring shall be a regular occurrence. Moreover, atomicity shall be forced for each software component, with test coverage being at 95% at all time without exception.

3.5.5   Portability

S&C is designed to be cross-platform, allowing access from virtually any device capable of processing JavaScript. In terms of porting the system to a different service provider, or moving to private hosting - the platform will benefit heavily from containerization and virtualization, therefore, transferring the client side application as well as any backend functionality to any other service should not prove to be an issue. Moreover, as identical backups of the database shall be created in real-time, migrating the database will be a straight-forward process with graceful database migration.

4 Formal analysis

This section aims to present what objectives the formal analysis is aimed to achieve. Firstly, formal model shall verify the consistency of platform constraints, test special cases and demonstrate relationships among entities through example worlds.

```
// Abstract Signature for Users
abstract sig User {}

sig Student extends User {
    cv: one CV,
    applications: set Application,
}

sig Company extends User {
    internships: set Internship,
}

sig University extends User {
 monitoredInternships: set Internship
}

sig CV {}

sig Internship {
    status: one Status
}

sig Application {
    internship: one Internship,
    status: one ApplicationStatus
}

sig Complaint {
    filedBy: one Student,
    targetInternship: one Internship,
    resolvedBy: one University
}

sig Feedback {
    source: one User,
    target: one Internship
```

```
}

abstract sig Status {}
one sig Active, Closed, Draft extends Status {}

abstract sig ApplicationStatus {}
one sig Pending, Accepted, Rejected extends ApplicationStatus {}

// Facts to Maintain Consistency
fact PlatformConstraints {

    // Each internship must have one owner
    all i: Internship | one c: Company | i in c.internships

    // Each student must have their own unique CV
    all disj s1, s2: Student |
        s1.cv != s2.cv

    // Each student must have its own application
       for a single internship
    all disj s1, s2: Student |
        s1.applications not in s2.applications

    // Students can apply to multiple internships,
        but not the same one twice
    all s: Student |
        all i: Internship |
            lone a: s.applications | a.internship = i

    //Each application must have a student
    all a: Application | one s: Student |
        a in s.applications

    // Feedback must only target valid internships
    all f: Feedback |
        f.source in Student + Company and f.target in Internship

    // Draft or Closed internships
       cannot have applicants or complaints
    all i: Internship | (i.status = Closed or i.status = Draft)
        implies no a: Application | a.internship = i

    // Each student can only file complaints
        for internships they were accepted into
```

```
    all c: Complaint, s: Student |
        c.filedBy = s implies some a: s.applications |
            a.internship = c.targetInternship and a.status = Accepted

    // Each student cannot complaint
       for the same internship twice
    all s: Student, i: Internship | lone c: Complaint |
        c.filedBy = s and c.targetInternship = i
}

pred show [] {
 #University = 2
 #Student = 4
 #Internship = 7
 #Application = 6
 #Complaint = 2
 #Feedback = 1

    // Ensure at least one internship is Draft
    some i: Internship | i.status = Draft

    // Ensure at least one internship is Closed
    some i: Internship | i.status = Closed
}


run show for 10
```
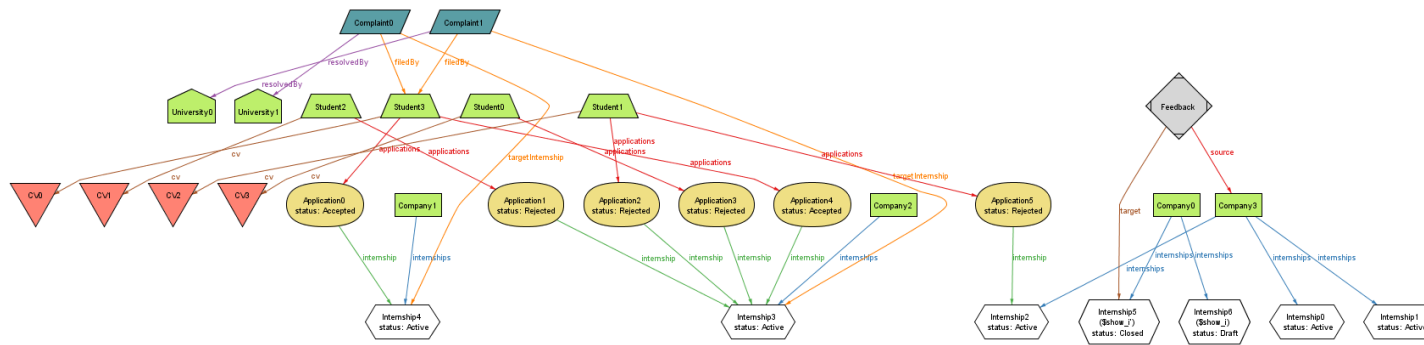
Figure 31: Example world

5 Effort spent

The time tables written below represent an approximation of the effort spent for the creating each specific section of this document. These times for producing this document are based on the personal perception of the team members.

Student	Section 1	Section 2	Section 3	Section 4	Total Hours
Veljko Tatalović	10	21	5	4	40
Edin Žiga	2	4	37	3	46
Nikola Dimić	7	8	7	18	40

Table 2: Effort Spent by students

6 References

- Amazon. (2024). Amazon API gateway - AWS documentation.
  https://docs.aws.amazon.com/apigateway/latest/developerguide/welcome.html

- Amazon. (2024b). Availability - reliability pillar. Availability.
  https://docs.aws.amazon.com/wellarchitected/latest/reliability-pillar/availability.html

- Graves, P. (2021). How system requirements for browsing the internet
  have changed - 3. System requirements of different web browsers for
  PC. https://www.gwsmedia.com/articles/how-internet-system-requirements-
  have-changed-3

- Larman, C. (2002). Applying UML and patterns: An introduction to
  object-oriented analysis and design and the Unified Process. Prentice
  Hall PTR.