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Requirement Analysis and Specification Document (RASD)

Students & Companies Problem

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1 | Introduction

For university students finding the right internship that match their interest and their skills can sometimes be hard. At the same time companies sometimes suffers to clearly defines their projects and what they are looking for from the students. For almost 60% of United States students, not knowing how to find an internship was the main reason for not taking one [1].

The number of internships available for students has plunged by 30%, with only 3,817 opportunities in October 2024 being advertised compared to almost 5,500 a year ago [2]. Also the estimated number of American college students take up formal work experience is 21.5% while only 8.7% of UK students take this path. Even among students studying at the top ten universities, the rate is only 19% [2].

While platforms like LinkedIn offer a broad range of job opportunities, they are not tailored specifically to internships, thus make it difficult for students to find internships that align with their skills and interests. Furthermore, companies may struggle to clearly define their projects and requirements, leading to mismatches and inefficiencies in the recruitment process.

Before COVID-19 in the United States, internship rates were between 50% and 60%. However, recent research indicates a much lower number of 21.5% [1].

Even if in the United States, students on average reported being very satisfied with their internship experiences, there are still many students (1 in 4 reported) that had less than satisfactory experiences showing the needs of both students and companies to clearly define what they are looking for from the internships experience. [1].

1.1. Purpose

"Students&Companies" is imagined to be a platform dedicated solely to internships that can implement sophisticated matching algorithms to facilitate the interaction of students with the companies offering an internship and leading to more successful internship experiences.

The scope of the platform is to facilitate the matching between students and companies by assessing the student experiences, skills and attitudes (available in his/her CVs) and the projects and terms offered by the companies.

S&C can be used by the companies, who want to attract students with internships, and by the students who are looking to work for a company by actively searching for an internship

or which receives a recommendation from a system implemented in the platform.

If both the student and the company have a mutual interest in each other then a contact is established, followed by a selection process during which the student is interviewed, S&C also support the selection process by helping managing the interview and finalize the selections.

If the student and the company agree, the platform can collect various kind of informations (such as feedback and suggestions), additionally S&C provides suggestions both to companies and to students on how to improve the company and student appearance on the platform (in terms of project descriptions for companies and CVs for students).

Lastly, S&C monitors the internship and the outcomes of the matchmaking process by allowing students and company to complain, communicate problems and more. Universities can also use the platform to monitor the situation of internships and handle complains.

The main goals of the platform "Student&Companies" are reported in subsection 1.1.1.

1.1.1. Goals

- **[G1]** Match students with internships that align with their experiences, skills and attitudes written on their CVs.
- **[G2]** Match companies with students that might be interested to an internship in that company.
- **[G3]** Let companies advertise the internships that they offer.
- **[G4]** Provide suggestions to students on how to make submission more appealing for the companies.
- **[G5]** Provide suggestions to companies on how to make their internship advertisement more appealing to students.
- **[G6]** Allow students to proactively look for an internship.
- **[G7]** Allow students to apply for internships proposed by companies.
- **[G8]** Offers recommendations to students for internships that match their experiences, skills and attitudes listed in their CVs.
- **[G9]** Use a matching algorithms to improve recommendations.
- **[G10]** Allow the interaction between students, companies and universities.
- **[G11]** Help companies managing the selection process.
- **[G12]** Track the status of applications and selections.
- **[G13]** Collect feedback from students and companies.
- **[G14]** Collect data to perform statistical analyses for the recommendation system.
- **[G16]** Provide a method for students, companies and universities to communicate.

- **[G17]** Allow to report complains to universities.
- **[G18]** Let universities monitor their students internships.
- **[G19]** Maintain data security and privacy on the platform.

1.2. Scope

The scope defines the broader context in which the system operates, clarifying its boundaries and interactions with external factors such as users, hardware, and other software systems. This document adopts the "World-Machine Approach," identifying phenomena controlled by the external world, by and those shared by machine and the world.

As said before and as exploited during ther whole document the **Students & Companies (S&C)** platform is designed to facilitate meaningful connections between university students and companies while supporting universities in their role of oversight and guidance. The platform comprehensively manages the internship lifecycle, from posting offers to evaluating completed experiences, while ensuring alignment with the goals of its primary users: students, companies, and universities. Students use the platform to explore and apply for internship opportunities that match their interests and profiles. They can receive personalized notifications about relevant offers and access tools that help them improve their resumes, making their profiles more attractive to companies. The platform also allows students to track their applications, engage in meaningful communication with stakeholders, and receive updates on their internship progress. For students, the system provides a streamlined process that simplifies their search and application journey while enhancing their prospects for success. Companies leverage the platform to create and manage internship postings, review applications, and oversee the selection process. They can access detailed student profiles, invite suitable candidates for interviews, and evaluate students' performance at the end of the internship. To attract the best talent, companies receive feedback from the system on how to refine their job descriptions and improve their outreach. By streamlining recruitment and enhancing the visibility of their postings, the platform helps companies identify candidates who align with their organizational needs. Universities, as key stakeholders, use the platform to monitor internships and support students throughout their professional development. They ensure that internships meet academic and institutional standards, intervene when issues arise, and provide additional guidance to students if needed. For example, if a student struggles with assigned tasks, the university can coordinate with the company to adapt the workload or provide additional support. This oversight ensures that internships are meaningful, beneficial, and aligned with students' educational goals.

By clearly defining the roles and responsibilities of students, companies, and universities, the Scope section establishes the boundaries between the world and the system through the analysis of world and machine phenomena presented in the following subsections.

1.2.1. World Phenomena

World phenomena are events that occur in the real, external context, outside the platform, and thus are not observed or controlled by the machine. These phenomena influence the operations of the system. They include:

- **[WP1]** Students create their resumes with information about experiences, skills, and attitudes.
- **[WP2]** Companies define internship offers with details about tasks, technologies used, and required qualifications.
- **[WP3]** Companies set the terms for internship offers, including salary details, working hours, work type (full-remote, smart-working, office-only), and schedule.
- **[WP4]** Universities provide guidelines for internships, such as minimum required hours, student placement areas, and the requirement for at least one company mentor.
- **[WP5]** Companies and universities collaborate through the platform to establish internship requirements and objectives.
- **[WP6]** Universities weekly contact students via messages to monitor internship progress.
- **[WP7]** Universities manage student complaints by taking concrete actions against companies (reminders via messages/calls, legal actions, etc.).
- **[WP8]** Students search and identify relevant internship offers through external resources (e.g., job boards, company websites, or social media platforms).
- **[WP9]** Students communicate with their academic tutors outside the platform for advice on internship selection or preparation.

1.2.2. Shared Phenomena

Shared phenomena involve both the external world and the machine, requiring direct interactions between the system and users. These phenomena are crucial for the correct execution of system functionalities and represent the point of contact between the machine and the world. Shared phenomena are usually classified in 2 subcategories: World controlled and Machine controlled.

World controlled

- **[SP-1]**: The student creates a profile.
- **[SP-2]**: The company tutor creates a profile.
- **[SP-3]**: The university tutor creates a profile.
- **[SP-4]**: The student uploads their resume.
- **[SP-5]**: The company tutor uploads a profile document.

- **[SP-6]**: The university tutor uploads academic documents.
- **[SP-7]**: The student logs into the platform.
- **[SP-8]**: The company tutor logs into the platform.
- **[SP-9]**: The university tutor logs into the platform.
- **[SP-10]**: The student changes the platform language.
- **[SP-11]**: The company tutor changes the platform language.
- **[SP-12]**: The university tutor changes the platform language.
- **[SP-13]**: The student recovers their password.
- **[SP-14]**: The company tutor recovers their password.
- **[SP-15]**: The university tutor recovers their password.
- **[SP-16]**: The student interacts with the chat bot.
- **[SP-17]**: The company tutor interacts with the chat bot.
- **[SP-18]**: The university tutor interacts with the chat bot.
- **[SP-19]**: The student searches for internships using filters.
- **[SP-20]**: The student browses internship offers without filters.
- **[SP-21]**: The student uses recommendations for internship search.
- **[SP-22]**: The student views and selects internship offers.
- **[SP-23]**: The student submits an internship application, demonstrating interest in an internship.
- **[SP-24]**: The student accepts an invitation from a company.
- **[SP-25]**: The student rejects an invitation from a company.
- **[SP-26]**: The student schedules an interview with the company.
- **[SP-27]**: The student accepts an internship offer.
- **[SP-28]**: The student rejects an internship offer.
- **[SP-29]**: The student views active internships.
- **[SP-30]**: The student tracks internship progress.
- **[SP-31]**: The student completes the final internship evaluation.
- **[SP-32]**: The student views upcoming events in the calendar.
- **[SP-33]**: The student sets reminders for important events.
- **[SP-34]**: The company tutor creates a company profile for their university.

- **[SP-35]**: The company tutor searches for students using filters (field, skills, location).
- **[SP-36]**: The company tutor searches for students based on recommendations.
- **[SP-37]**: The company tutor searches for students by browsing public profiles.
- **[SP-38]**: The company tutor invites students to apply for an internship.
- **[SP-39]**: The company tutor accepts a student's application.
- **[SP-40]**: The company tutor rejects a student's application.
- **[SP-41]**: The company tutor moves students to the next phase of selection.
- **[SP-42]**: The company tutor finalizes the selection and offers an internship.
- **[SP-43]**: The company tutor creates a new internship position on the platform.
- **[SP-44]**: The company tutor manages internship drafts (edits, publishes, deletes).
- **[SP-45]**: The company tutor completes questionnaires for internship feedback.
- **[SP-46]**: The company tutor manages events through the calendar (creates, edits, deletes events).
- **[SP-47]**: The company tutor schedules meetings using the calendar.
- **[SP-48]**: The company tutor views and tracks internship-related deadlines on the calendar.
- **[SP-49]**: The company tutor uses the messaging system to communicate with students.
- **[SP-50]**: The company tutor uses the messaging system to communicate with academic tutors.
- **[SP-51]**: The company tutor sends messages to students regarding selection progress.
- **[SP-52]**: The university tutor creates a university profile on the platform.
- **[SP-53]**: The university tutor monitors internship progress for assigned students.
- **[SP-54]**: The university tutor reviews applications submitted by students.
- **[SP-55]**: The university tutor communicates with students about internship progress.
- **[SP-56]**: The university tutor communicates with company tutors regarding issues or progress.
- **[SP-57]**: The university tutor provides feedback on internship quality.
- **[SP-58]**: The university tutor resolves issues reported by students or company tutors.
- **[SP-59]**: The university tutor completes a questionnaire about internship academic alignment.

- **[SP-60]**: The university tutor schedules monitoring meetings through the calendar.
- **[SP-61]**: The university tutor tracks deadlines and reports using the calendar.
- **[SP-62]**: The university tutor reviews student feedback submitted via questionnaires.
- **[SP-63]**: The university tutor reviews company feedback submitted via questionnaires.
- **[SP-64]**: The university tutor communicates with students and companies through messaging.
- **[SP-65]**: The university tutor uses the platform to approve or deny internship opportunities.
- **[SP-66]**: The university tutor requests modifications to internship offers based on academic standards.
- **[SP-67]**: The university tutor reviews and updates student records after an internship.
- **[SP-68]**: The university tutor uses the platform to monitor and report compliance with institutional policies.

Machine controlled

- **[SP-69]**: The system sends notifications to students about new internship offers matching their profiles.
- **[SP-70]**: The system sends notifications to company tutors about new student candidates matching their criteria.
- **[SP-71]**: The system delivers student applications to company tutors for review.
- **[SP-72]**: The system matches students with internships based on skills, experience, and preferences.
- **[SP-73]**: The system matches company tutors with students based on internship requirements and student profiles.
- **[SP-74]**: The system recommends internships to students using machine learning algorithms.
- **[SP-75]**: The system recommends students to companies using machine learning algorithms.
- **[SP-76]**: The system extracts key information from student resumes to improve matching accuracy.
- **[SP-77]**: The system extracts key information from internship descriptions uploaded by company tutors.
- **[SP-78]**: The system provides students with feedback on their resumes to improve alignment with internship offers.

- **[SP-79]**: The system provides company tutors with feedback on their internship postings to attract better candidates.
- **[SP-80]**: The system generates reminders for students about application deadlines.
- **[SP-81]**: The system generates reminders for company tutors about pending student applications.
- **[SP-82]**: The system facilitates scheduling of interviews between students and company tutors using the calendar.
- **[SP-83]**: The system generates video call links for interviews scheduled on the platform.
- **[SP-84]**: The system collects feedback from students, company tutors, and university tutors through questionnaires.
- **[SP-85]**: The system analyzes feedback from questionnaires to improve internship recommendations.
- **[SP-86]**: The system tracks the progress of active internships and generates status updates for students and tutors.
- **[SP-87]**: The system automatically flags overdue tasks or issues in internships for review by university tutors.
- **[SP-88]**: The system syncs calendar events with external platforms (e.g., Google Calendar, Outlook).
- **[SP-89]**: The system displays a consolidated view of calendar events for students, company tutors, and university tutors.
- **[SP-90]**: The system enables automated messaging to notify users about changes in internship statuses.
- **[SP-91]**: The system allows users to filter and search messages by keywords, sender, or date.
- **[SP-92]**: The system generates and updates dashboards for students, company tutors, and university tutors to reflect real-time data.
- **[SP-93]**: The system calculates statistics on platform usage for reporting and analysis.
- **[SP-94]**: The system encrypts and secures user data to maintain privacy and comply with data protection regulations.
- **[SP-95]**: The system verifies uploaded documents (e.g., resumes, contracts) for format and validity and size.
- **[SP-96]**: The system provides automated suggestions for meeting times based on calendar availability.
- **[SP-97]**: The system detects potential conflicts in schedules and suggests resolutions.

- **[SP-98]**: The system provides chatbot assistance for answering frequently asked questions and guiding users through processes.
- **[SP-99]**: The system escalates unresolved issues reported in messaging to relevant university or company stakeholders.
- **[SP-100]**: The system monitors and logs all interactions for accountability and auditing purposes.

1.3. Definitions, Acronyms, Abbreviations

1.3.1. Definitions

1.3.2. Acronyms

1.3.3. Abbreviations

- **S&C**: Students & Companies
- **WP**: World Phenomena
- **SP**: Shared Phenomena
- **LLM**: Large Language Model
- **RAG**: ?

1.4. Revision History

1.5. Reference Documents

The document is based on the following materials:

- The specification of the RASD and DD assignment of the Software Engineering II course a.a. 2024/2025
- Slides of the course on WeBeep

1.6. Document Structure

- **Introduction**:
- **Overeall Description**:
- **Specific Requirements**:
- **Formal Analysis Using Alloy**:
- **Effort Spent**:

2 | Overall Description

This section provides a general overview of the Students & Companies (S&C) system, describing its operational context and interaction with users and the external environment. This part of the document is essential to understand the system's structure, its main actors, and how it fulfills user requirements. Specifically, it covers:

- The product perspective, offering a detailed analysis of usage scenarios.
- Conceptual diagrams representing the main domain entities and their interactions.
- The lifecycle of states for key system functionalities.

2.1. Product Perspective

The Students & Companies (S&C) system is a platform designed to facilitate interactions among students, companies, and universities in the context of internships. This subsection provides an overview of the system's scope and purpose, highlighting how it addresses key challenges in managing internships effectively.

The Product Perspective section is structured into the following subsections:

- **Scenarios:** Describes typical use cases for the system, illustrating how students, companies, and universities interact with its functionalities.
- **Domain Class Diagram:** Provides a conceptual representation of the main entities within the system and their relationships.
- **State Diagram:** Outlines the lifecycle of the system's core processes, detailing the transitions between different states.

These subsections collectively define the operational context of the system, offering insights into how its components work together to meet user requirements.

2.1.1. Scenarios

The purpose of this section is to illustrate the operational contexts in which the Students & Companies (S&C) system will function. It explains how the system's functionalities are designed to meet user requirements by presenting a detailed exploration of the entire operational cycle of the software from the perspective of all user types. The description begins with the creation of a user profile and concludes with the completion of the

internship.

To ensure clarity and transparency, a narrative style is used to describe these scenarios. This approach not only enhances readability but also introduces the key stakeholders, settings, and motivations driving their actions. Each scenario tells a story that depicts a possible real-life situations within the S&C software. This aims to provide transparency from both theoretical and practical viewpoints, ensuring clarity not only about what happens but also about how users interact with the system to make it happen.

The protagonists of the following scenarios are:

- **Lorenzo:** Lorenzo is a university student who pursues a Bachelor's degree in Artificial Intelligence at the University of Pavia. As part of his academic program, he is required to complete an internship which he also intends to use as the basis for his thesis. After not receiving positive responses to his CV submissions through various company websites, Lorenzo decides to explore the S&C platform.
- **David:** David works at AISent, a small and medium-sized company (PMI). He is looking for a student to collaborate on a Computer Vision project, making him an ideal example of a company recruiter who benefits from the S&C platform.
- **Claudio:** Claudio is a professor at the University of Pavia. Lorenzo contacts him to request that he serve as his academic tutor. In this capacity, Claudio will act as a liaison between the company and the intern, oversee the internship's progress.

The interaction lifecycle between these three stakeholders and the S&C platform will be analyzed in detail through the following stages:

1. Student's (Lorenzo) scenarios.
2. Company Recruiter (David) scenarios.
3. University tutor (Claudio) scenarios.

Although there are common user scenarios, it was decided to present everything separately in order to make the process clear from start to finish for each type of user.

Stage A: Student's Scenarios

Scenario [A-1]: ***The Student Opens the S&C Application*** .
The first interaction between the student **Lorenzo** and the S&C application focuses on accessing the platform. Upon entering, Lorenzo is presented with the following options on the access page which features the system's logo:

- **Login:** If Lorenzo already has an account, he can log in to access his profile and continue using the platform.
- **Registration:** If Lorenzo is a new user, he may choose to create an account, allowing him to explore the platform and assess how his profile aligns with available internships.

- **Language Change:** Lorenzo can switch the system language via a dropdown menu to suit his preference.
- **Assistant:** If Lorenzo encounters issues or has questions, he can open a chat to receive support from the platform's LLM with RAG.

This scenario focuses solely on the student's access. The subsequent four points will now be analyzed in detail as individual scenarios. They are presented here to provide context for the genesis of this scenario. The analysis will proceed with scenarios spanning from the student's initial application access to the internship's conclusion.

Scenario [A-2]: ***Student Registration*** .
Upon choosing to register on the Students & Companies (S&C) platform, Lorenzo is presented with a registration form that requires filling out various fields. He has the option to upload his CV, which the system can use to auto-fill these fields. If he does not upload a CV, he must enter his information manually:

- *Profile Photo*
- *Personal Data:* Name and Surname.
- *Contacts:* Phone Number, LinkedIn profile.
- *Institutional Email*
- *Password*
- *Department and Role*
- *Professional Biography*
- *Certifications, Awards, Recognitions*
- *Languages Spoken*
- *Security Question*

The institutional email plays a crucial role on the platform, as it is used to verify a user's status as a student along with their university affiliation. This verification is possible through a list of email domains provided by university staff such as secretaries or professors during the university profile setup process. As detailed in section C-3, "University Profile Generation" these administrators must include all relevant institutional email domains. This inclusion enables the system to accurately categorize each user's type and university affiliation. A feature at the bottom of the registration form, "Information Improvement," uses an LLM to analyze and suggest improvements for the clarity and quality of the entered information. Upon revising the details with the LLM's suggestions, Lorenzo can proceed to confirm the creation of his profile. Potential outcomes post-registration include the following 4 subscenario:

Subscenario [A2-1] Mandatory fields incomplete:
Lorenzo will be prompted to complete any missing fields.

Subscenario [A2-2] All fields completed, domain registered:
If the email domain matches one registered by his university, Lorenzo is directed to his new homepage to start using the application.

Subscenario [A2-3] Fields complete, domain not registered:
If Lorenzo's email domain is not recognized, he is put in contact with a support operator. Together, they discover that although he is part of a registered university, his specific email domain has not yet been added to the system. The university's profile creator, typically an administrative staff member like Claudio, is then requested to add Lorenzo's specific email domain to the list of recognized domains. Once this addition is made, Lorenzo will receive an email confirmation allowing him to proceed with his registration.

Subscenario [A2-4] Domain and university not registered:
If Lorenzo's email domain is not recognized, he is put in contact with a support operator. They determine that his university does not have an institutional profile on the platform. Consequently, registration cannot proceed until an administrative member or academic tutor from the university registers the institution and includes all potential institutional email domains. Lorenzo can opt to be notified via email once his university is registered, allowing him to complete his registration afterward.

Scenario [A-3]: ***The Student Login in the S&C Application*** .
Lorenzo (or any other student) proceeds to log in using the credentials obtained during the registration process. From the initial page, the student navigates to the dedicated login page with the intent of accessing the functionalities of the **S&C** platform. To complete the login process, Lorenzo must enter his username and password into the designated fields for student credentials. Once authenticated, he gains access to the platform.

Scenario [A-4]: ***The Student Credential Recovery*** .
Despite having created a profile, Lorenzo (or any other student) has forgotten both his email and password. Using the credential recovery feature, Lorenzo provides the answers to the security questions he selected during registration. The **S&C** system validates his responses, retrieves the email associated with his profile, and sends a temporary password to that email. Lorenzo can then use the provided credentials to regain access to his account and reset his password if needed.

Scenario [A-5]: ***The Student and the Chatbot Interaction*** .
Lorenzo is uncertain about the detailed functionalities of the **S&C** application and wants to understand how his data will be used before providing his information. To address this and other doubts, Lorenzo interacts with the platform's chatbot. The chatbot offers clear explanations, providing information about data usage and the platform's features. If Lorenzo requires further clarification, the chatbot sends his query to a human representative for additional support.

Scenario [A-6]: ***Student Language Change.*** .
Whenever Lorenzo wishes to change the platform's language, he can easily do so without navigating away from his current activity. A flag icon representing the current language is visible on every page of the S&C platform. By clicking on this icon, Lorenzo is presented with a dropdown menu featuring other available languages, each represented by its respective flag. He selects his preferred language, such as Italian, English, French, Spanish, or German. The platform instantly updates to his chosen language.

Scenario [A-7]: ***The Student Enters the S&C Homepage*** .
After successfully logging into the Students & Companies (S&C) platform, Lorenzo is immediately presented with a homepage tailored to support his needs as a student navigating internship opportunities. The platform welcomes him with a personalized interface designed to streamline his academic and professional journey.

Lorenzo's profile is prominently displayed on the left side of the screen. Here, he can see his profile picture, his full name, and his role at the university, reaffirming his presence on the platform. A settings option allows him to adjust his account details and preferences, ensuring the platform aligns with his personal requirements. At any moment, Lorenzo can switch the platform's language to suit his preference, and he has access to an intelligent assistant powered by an LLM with RAG, which provides guidance whenever he encounters doubts or difficulties.

In the main section of the homepage, Lorenzo can quickly orient himself using two essential tools: the *Calendar Widget* and the *Notifications Widget*. The calendar helps him stay organized, showing upcoming dates and allowing easy access to a more detailed planning view. Notifications ensure Lorenzo stays informed, highlighting key updates about internships or administrative matters. These updates are color-coded, so he can immediately distinguish between calendar events, internship updates, and urgent issues.

Lorenzo's navigation experience is further simplified by a bar at the bottom of the page, which provides direct links to vital sections of the platform. He can explore internship opportunities through the *Matchmaking* section, track his progress in the *Monitoring* area, manage his schedule in the *Calendar*, and communicate with companies or administrators in the *Messages* section. These tools are strategically designed to empower Lorenzo, giving him control and clarity over his internship journey.

The homepage reflects Lorenzo's personalized experience, making it easier for him to focus on his goals. By organizing the information and functionalities around his needs, the platform ensures that Lorenzo's time is spent effectively, allowing him to seamlessly move from planning to action in pursuit of his academic and career aspirations.

Scenario [A-8]: ***The Student Searches for an Internship*** .
After successfully logging into the S&C platform and viewing his homepage, Lorenzo is ready to embark on his search for internships. This search process includes all preliminary actions before establishing contact between Lorenzo and potential employers. Contact occurs when there is mutual interest from both the company and the student concerning a position.

The contact can be classified into two main categories: The first is related to Lorenzo's applications (i.e., the search part that starts from the student via the matchmaking page). From here, two sub-scenarios derive: A8.1 and A8.2.

The second category of internship search focuses on the possibility that contact occurs not because of initial interest from the student followed by the company's response, but the opposite—where the company sends a request for participation in the selection process. This category of contact will be explored in Scenario 11.

In this scenario, we analyze the initial part of potential contacts from CATEGORY 1, namely those that begin with Lorenzo's applications, which can occur in the two following ways:

Subscenario [A8-1]: ***Recommendation List in Matchmaking***
In the Recommendation List section of the matchmaking interface, Lorenzo is presented with internship opportunities that are closely aligned with the qualifications and career aspirations detailed in his CV during registration. This recommender system is designed to provide him with curated opportunities directly at his fingertips, offering personalized suggestions that match his preferences and requirements. The Recommendation List, centrally positioned on the matchmaking page, includes:

- **Title and Details:** Clicking on an internship title, Lorenzo accesses a detailed description of the role, outlining the expectations, responsibilities, and required qualifications.
- **Engagement Options:** Each listing provides Lorenzo with options to apply directly, save for later review, or decline. This adaptability helps him tailor the recommendations over time according to his changing preferences. Being a recommendation-based scenario, what Lorenzo selects in the engagement options can influence the system's future suggestions, enhancing the relevancy of future presented opportunities.

If Lorenzo decides to refine the list further, he can use tags recommended by the system to filter positions by job type or category.

If Lorenzo applies for a job, the application moves from the matchmaking page to the Monitoring page, where he can monitor the progress of his application as described in detail in Scenario 9.

Subscenario [A8-2]: Custom Search in Matchmaking
If the recommendation system fails to meet Lorenzo's preferences, he has the option to perform a custom search. By utilizing the Search Bar, located at the top right of the matchmaking interface, Lorenzo can input specific keywords related to his desired internships. This search functionality significantly enhances his ability to uncover roles that might not be immediately visible through default filters. Utilizing the platform's comprehensive search engine, Lorenzo explores all available positions listed on the platform. This approach grants him the ultimate flexibility in finding opportunities that perfectly align with his specific interests and career goals, ensuring he does not miss out on potential matches that could be hidden beyond the immediate recommendations.

Scenario [A-9]: ***The Student Navigates the Monitoring Page*** .
After navigating the matchmaking page, Lorenzo moves on to the subsequent Monitoring Page. This section allows him to manage various aspects of his internship process, organized into three distinct tabs, each with its unique purpose.

The first tab, *Selection Process*, is dedicated to managing all activities from the initial matchmaking phase to the start of an internship. It enables Lorenzo to track applications, respond to company invitations, and take necessary actions before an internship begins. The second tab, *Active Stage*, focuses on internships that are currently ongoing, allowing him to monitor progress and address issues during this phase. The third tab, *Questionnaire*, provides access to feedback forms completed during two critical phases of the internship: after the first meeting and at its conclusion. Navigation within this tab is organized into sub-sections, one for each questionnaire.

The *Selection Process* tab contains a detailed table listing all internships Lorenzo is currently managing. Each row in the table represents a specific internship and includes several fields. The *Company* field displays the company name, which Lorenzo can click to view additional details. Similarly, the *Company Tutor* field shows the tutor's first and last name, with clickable access to their profile. A *Tag* indicates the origin of the application, using color codes to differentiate between internships applied for by Lorenzo (green) and those sent to him by companies (blue).

The *Academic Tutor* field reflects the current status of tutor assignment. If no tutor has been selected, the field shows "Not Defined," prompting Lorenzo to make a choice. Once a professor agrees to take on the role, their name appears in the field and is clickable for further information. The *Associated Internship* field lists the title of the internship, also clickable, allowing Lorenzo to quickly review its details.

A particularly useful column, *Process Status*, summarizes the current state of each internship application, such as "Not Yet Seen" or "Accepted". This status guides Lorenzo's actions for each application. For instance, if edits are needed, the *Modify Internship* option allows him to open a pre-filled form to make changes. If he decides to withdraw from an application, the *Remove* button enables him to terminate the process, automatically notifying the company of the rejection.

Through this organized interface, Lorenzo can efficiently manage his applications and monitor the progress of each internship. The Monitoring Page serves as a central hub, providing him with the tools and insights needed to navigate the different stages of his academic and professional development with confidence and ease.

Scenario [A-10]: ***The Student Monitors the Progress of his Applications*** .
As mentioned in Scenario A-8, the applications sent by the student are tracked in the Monitoring Page, specifically within the first tab named "Selection Process" described in detail in the A-9 Scenario. These kind of application applications can be recognized as they are the ones marked with the "Sent" tag in the Tag column of the table.

Within this tag, the status of these internships can be specifically identified as follows:

- **Not yet seen:** The company has not yet responded to the sent application.

- **Seen but no response:** The company has viewed the application but has not responded.
- **Rejected2:** The company has rejected the sent application; this terminates the selection process.
- **Accepted2:** The company has accepted the sent application.

This setup allows Lorenzo to efficiently track the status of each application and respond accordingly.

Scenario [A-11]: ***The Student Monitors the Status of Requests Sent to Him***
As mentioned in Scenario A-8, contact occurs when there is mutual interest. In the previous scenario, we have seen scenarios related to Category 1, where Lorenzo initiates contact by demonstrating interest. This scenario explores Category 2, which occurs when companies express interest in Lorenzo.

To view the companies that have invited him to participate in their selection process for specific positions, Lorenzo navigates within the "Monitoring Page" tab and looks at entries where the tag column is marked "Received". Specifically, the student can accept or reject these positions, changing the status to:

- **Rejected1:** The student has rejected the received offer; this terminates the selection process.
- **Accepted1:** The student has accepted the received offer.

This mechanism allows Lorenzo to effectively manage the incoming requests from companies. He can swiftly navigate through his options, making decisions that best align with his career goals.

Scenario [A-12]: ***A Contact is Established*** .
A contact is established between Lorenzo and a company when mutual interest has been expressed, regardless of the order in which the interest was shown. To summarize the processes described in Scenarios A-8, A-10 and A-11 , a contact can occur in the following ways:

- **Through Recommendation Lists:** If Lorenzo shows interest in an internship by liking or applying directly from the Recommendation List, and the company reciprocates this interest by accepting his application. Lorenzo will receive a notification or he can view this acceptance through the Monitoring Page. Once accepted, an icon appears indicating that the company's tutor is scheduling the meeting.
- **Through Custom Searches:** Lorenzo may initiate contact by applying to a position found via a custom search. If his application aligns with the company's requirements and the company reciprocates interest, thus establishing contact, Lorenzo will receive a notification or he can view this acceptance through the Monitoring Page. Upon acceptance, an icon indicates that the meeting is being scheduled by the company's tutor.

- **Through Company Initiatives:** Companies can initiate contact by sending invitations to Lorenzo to participate in their selection processes, especially when they find his profile suitable from their end. Lorenzo can view these invitations in the "Monitoring Page" under the tab marked "Received" and can either accept or reject these offers. Accepting an invitation directly influences his status and moves the process forward. Once accepted, an icon appears indicating that the company's tutor is scheduling the meeting.

Once this connection is made, the system sends a notification to inform Lorenzo of the successful match. The notification includes key details, such as the name of the company and the position for which the contact was made. This notification is stored in the message section of the application, allowing Lorenzo to review it at any time. This ensures that Lorenzo remains informed about new opportunities and can easily keep track of his connections as they arise, supporting effective engagement with companies.

Scenario [A-12]: ***Selection Process (Student Overview)*** .
Once a contact is established between Lorenzo and a company, the selection process unfolds in a structured and interactive manner. The process is designed to guide Lorenzo through each step, ensuring he has all the tools and information necessary to make informed decisions.

After a meeting has been scheduled, an icon appears on the platform that allows Lorenzo to access a dedicated chat. This feature facilitates direct communication between him and the company tutor, enabling immediate discussion about the internship. Following the meeting, the company tutor is required to complete a questionnaire evaluating Lorenzo. They have three days to submit this evaluation, during which Lorenzo receives a notification on his homepage reminding him of the deadline. Once completed, the questionnaire is stored in a specific section for later reference.

After reviewing the questionnaire, Lorenzo has one week to make a decision regarding the internship. He can use a dedicated icon to confirm his decision, and the system provides a notification to remind him of the deadline. At this stage, Lorenzo communicates his final decision, which could take one of several paths. If he chooses to reject the internship, the selection process is terminated. Alternatively, if he requires additional information or discussion, Lorenzo can request another meeting with the company. The company selects a new date, and a pop-up notification is generated in the existing chat. Lorenzo has three days to respond to this meeting without the possibility of scheduling another. A reminder notification ensures he is kept informed of the deadline.

If Lorenzo decides to accept the internship, the process advances to the next stage. This transition does not require a specific icon but is automatically reflected in the system, moving to stage 6, which involves assigning an academic tutor. Lorenzo then selects a professor to act as his tutor by entering their email address. A notification is sent to the professor, who has three days to accept or decline the role. If the professor rejects the role, the system updates the status with an icon change, allowing Lorenzo to select a new tutor. This process repeats until a tutor is successfully assigned, activating the selection process.

The final step in the selection process involves the company making its decision. The company has three days to finalize their decision, during which they can either reject the internship, terminating the process, or accept it, activating the internship. Upon acceptance, the internship is moved to the next screen, and all other selection processes associated with Lorenzo are automatically rejected. The system also creates a history of states for the newly activated internship, starting with the status "Internship Started".

Throughout the process, Lorenzo receives timely notifications on his homepage, keeping him informed of deadlines and key updates. This structured approach ensures that Lorenzo can efficiently navigate and manage each step of the selection process, making it clear and straightforward for him to progress toward securing an internship.

Scenario [A-13]: ***Lorenzo Monitors Active Stages*** .
After accessing the monitoring section, Lorenzo navigates to the **Active Stages** tab, where he can track his ongoing internships and manage any issues reported by his academic or company tutors. Upon entering the tab, Lorenzo is presented with a list of his active internships. Each entry in the list prominently displays the name of the assigned company tutor, the academic tutor, and the current status of the internship, which might be labeled as *"In Progress"*, *"Suspended"*, or *"Completed"*. These statuses are accompanied by color-coded icons, allowing Lorenzo to quickly identify the state of each internship. As Lorenzo reviews the list, he notices that any reported issues are clearly highlighted in red. Clicking on an issue opens a dedicated chat window where Lorenzo can discuss the matter directly with the relevant tutor, ensuring immediate communication to resolve the problem. The platform also provides useful tools to help Lorenzo stay on top of his internship activities. He can initiate direct chats with his tutors via quick-access buttons, enabling him to ask questions or provide updates about his progress. Real-time updates ensure that Lorenzo is always aware of any changes in the internship's status, such as schedule adjustments or new deadlines communicated by his tutors. This section of the platform empowers Lorenzo to stay informed and proactively manage his internship experience. The clarity of the displayed information and the ability to engage directly with tutors make monitoring an efficient and straightforward process.

Scenario [A-14]: ***The Student Completes the Final Evaluation Form*** .
At the conclusion of his internship, Lorenzo reflects on his experience by completing the Final Evaluation form. He accesses this form through Questionnaire Tab of the monitoring page, where it is prominently available as part of the closing phase of the internship. The form allows him to share his perspective on various aspects of the internship, providing valuable input for future improvements.

Lorenzo begins by rating the support he received from his company tutor, assessing how well the objectives and responsibilities were communicated, and evaluating whether the internship contributed to his professional growth. Beyond these quantitative ratings, Lorenzo takes time to provide qualitative feedback by describing what he enjoyed most about the experience and offering suggestions for improvement.

Once he has answered all the questions, Lorenzo submits the form, ensuring his feedback is included in the overall evaluation of the internship. His responses, along with those of the

company and academic tutors, contribute to a comprehensive assessment that helps refine future internship opportunities. This step marks the final action in Lorenzo's internship process, allowing him to conclude the experience with meaningful input that supports both his personal growth and the system's continual improvement.

Scenario [A-15]: ***The Student Navigates the Calendar Page*** .
To stay organized and manage his internship commitments effectively, Lorenzo accesses the Calendar page. This tool helps him keep track of all scheduled activities, ensuring he is prepared for upcoming events and deadlines.

Lorenzo uses the calendar to view his schedule in various timeframes, such as daily, weekly, or monthly formats, depending on his needs. Key events related to his internship, including feedback meetings, monitoring sessions, and deadlines, are clearly displayed. The calendar's structure makes it easy for Lorenzo to understand the nature of each event at a glance, thanks to its intuitive layout.

Although Lorenzo cannot create new events, he can modify certain details where allowed, such as adding personal notes or setting reminders for meetings with tutors or company representatives. Additionally, the platform provides notifications to help him stay informed, ensuring he does not miss important deadlines or appointments.

To further simplify his planning, Lorenzo integrates the internship calendar with his personal tools, such as *Google Calendar* or *Outlook*. This synchronization allows him to have all his commitments in one place, making it easier to manage both academic and personal tasks. When needed, Lorenzo can also search for specific events, quickly finding relevant details without manually scrolling through the calendar.

By relying on the Calendar page, Lorenzo ensures that he remains organized and proactive, effectively balancing the demands of his internship with other responsibilities.

Scenario [A-16]: ***The Student Interacts with the Messaging System*** .
To manage communication during his internship, Lorenzo uses the platform's messaging system. This tool provides him with a convenient way to stay connected with company tutors, academic tutors, and other stakeholders. Whether he needs to coordinate meetings, seek clarifications, or report issues, Lorenzo can rely on this system for efficient and organized communication.

The messaging system notifies Lorenzo of new messages and organizes conversations by context, allowing him to quickly find relevant discussions. Through this feature, Lorenzo maintains effective communication with everyone involved in his internship, ensuring he can address concerns and stay aligned with expectations.

Subscenario [A16-1]: ***The Student Files a Complaint via Messaging***
During his internship, Lorenzo encounters a situation that requires formal intervention. Using the messaging system's dedicated complaint feature, Lorenzo submits a detailed message explaining the issue he is facing. The platform ensures that his complaint reaches the appropriate parties, such as his academic tutor or the university administration, depending on the nature of the issue.

Once the complaint is submitted, Lorenzo receives confirmation, and the system allows him to monitor the status of the complaint as it progresses. Through follow-up messages, the responsible parties communicate with Lorenzo to provide updates and solutions. This process ensures that Lorenzo's concerns are addressed in a structured and timely manner, helping him feel supported throughout his internship.

Stage B: Company Recruiter's Scenarios

Scenario [B-1]: ***The Recruiter Opens the S&C Application*** .
When David, a recruiter from AISent, accesses the S&C application, his first interaction is with the access page. He is faced with several options:

- **Login:** David can log in using his existing credentials to manage internship postings and review applications.
- **Registration:** New recruiters can register their account to start using the platform.
- **Language Change:** David can modify the system's language through a drop-down menu, facilitating communication in his preferred language.
- **Assistant:** For any assistance or queries, David can access immediate support through the chat feature powered by the platform's LLM with RAG.

This scenario outlines the initial access steps for the company recruiters. Further scenarios will detail each action individually as they relate to the recruiter's interaction with the S&C platform.

Scenario [B-2]: ***Company Recruiter Registration*** .
David, a recruiter from AISent, decides to register on the Students & Companies (S&C) platform and is directed to complete a registration form specifically designed for company recruiters. The information required includes:

- *Profile Photo*
- *Personal Data:* Name and Surname.
- *Contacts:* Phone Number, LinkedIn profile.
- *Institutional Email*
- *Password*
- *Department and Role*
- *Professional Biography*
- *Certifications, Awards, Recognitions*
- *Languages Spoken*
- *Security Question*

At the bottom of the registration form, David can use the "Information Improvement" button, which employs an LLM to analyze and suggest improvements to the clarity and quality of the information provided.

Once the form is completed and refined, David can proceed to confirm the creation of his company recruiter profile. Depending on the information provided, the following subscenarios may occur:

Subscenario [B2-1]: Mandatory fields incomplete.
David will be prompted to complete them if any required fields are left unfilled.

Subscenario [B2-2]: All fields completed, domain registered.
If the email domain matches one already registered with the platform and associated with his company, David is directed to his new homepage to start managing internship postings and reviewing applications.

Subscenario [B2-3]: Domain not registered.
If David's email domain is not recognized, he is put in contact with a support operator. Together, they discover that while his company is registered with the platform, his specific email domain has not yet been added to the system. David is then instructed to contact a company administrator to add his specific email domain to the list of recognized domains. Once this addition is made, David will receive an email confirmation allowing him to proceed with his registration.

Subscenario [B2-4]: Domain and company not registered.
If David's email domain is not recognized, he is put in contact with a support operator. Together, they determine that his company does not have a profile on the platform. Consequently, registration cannot proceed until a company administrator registers the institution and includes all potential company email domains. David will be prompted to initiate the company profile setup as described in scenario [B-3]. He can also opt to be notified via email once his company is registered if he does not want to create the company profile.

Scenario [B-3]: ***Company Profile Creation*** .
As said in Scenario B2-4, If a company recruiter like David finds that his company's domain is not registered on the S&C platform, he is put in contact with a support operator. Together, they verify that the company does not have a profile on the platform. Following this verification, David is sent a link via email to a profile creation page. This page allows him to establish a complete profile for his company with the following required fields:

- *Logo*
- *Name*
- *Contacts*

- *Office Address*
- *Operational Sector*
- *Size*
- *Description*
- *Certifications, Awards, Recognitions*
- *Tutor Domain(s)*
- *Information Improvement*
- *Language Change*
- *Assistant*
- *Continue*

Once the profile is submitted, it undergoes a verification process. If it meets the platform's standards, it is activated, and David receives an email with a link to his company's homepage. If the profile is not approved, he will receive detailed feedback with a link to revise and resubmit the profile.

Scenario [B-4]: ***Recruiter Login*** .
David (or any other recruiter) proceeds to log in using the credentials obtained during the registration process. From the homepage, David navigates to the login page, intending to access the **S&C** platform to manage internship opportunities and applications. To log in, David must enter his username and password into the fields designated for recruiter credentials. Upon successful authentication, he gains access to the platform.

Scenario [B-5]: ***The recruiter Credential Recovery*** .
David (or any other recruiter) encounters a situation where he has forgotten both his email and password. Using the credential recovery feature, David answers the security questions he set up during registration.Upon verifying his responses, the **S&C** system provides him with the email linked to his account and sends a temporary password to that email address. With these credentials, David can log in and reset his password for continued access.

Scenario [B-6]: ***The recruiter and the Chatbot Interaction*** .
David has questions about how to use specific features of the **S&C** application, such as creating an internship posting or reviewing student profiles. To resolve his doubts, David interacts with the platform's chatbot. The chatbot provides step-by-step guidance and answers frequently asked questions. If David's concerns are not fully addressed, the chatbot escalates his query to a human representative for further assistance.

Scenario [B-7]: ***Company Recruiter Language Change*** .
David can change the platform's language at any time during his session by interacting with the flag icon displayed on every page. This icon opens a dropdown menu containing

options like Italian, English, French, Spanish, and German, each accompanied by its national flag. Selecting a new language from this menu immediately updates the interface, allowing David to continue his recruitment activities in the language of his choice.

Scenario [B-8]: ***The Company Tutor Enters the S&C Homepage*** .
When David, acting as a company tutor, logs into the Students & Companies (S&C) platform, he is greeted by a personalized homepage tailored to his responsibilities.

On the left side of the page, David's profile is prominently displayed, including his name, role, and profile picture. This section also provides him with options to adjust account settings, switch the platform's language, or access support through an integrated assistant. These features ensure that the platform is adaptable to David's preferences and needs.

As he scans the central area of the homepage, David notices two key widgets that keep him informed and organized. The calendar widget highlights upcoming events, offering a quick way to view his schedule or jump to the full calendar for detailed planning. The notifications widget provides updates on critical matters, such as internship progress and reported issues. These notifications are color-coded, allowing David to quickly identify and prioritize tasks, from reviewing calendar events to resolving urgent problems flagged in red.

At the bottom of the homepage, David finds a navigation bar that simplifies access to the platform's main sections. This includes a matchmaking area, where he can explore recommended student profiles, and a monitoring section, where he can manage internships. Within the monitoring area, David can track internships he has created, review their selection processes, and oversee active engagements with students. The navigation bar also connects him to tools for managing meetings, events, and communications.

This intuitive setup allows David to efficiently oversee all aspects of his internship-related activities. Whether he needs to plan meetings, track student progress, or address issues, the homepage serves as a hub that empowers him to fulfill his role effectively and stay organized throughout the process.

Scenario [B-9]: ***The Company Tutor Searches for Candidates*** .
After logging into the S&C platform, David navigates to the Matchmaking section to explore potential candidates for his company's internship positions. The platform provides him with a personalized interface, offering recommendations based on a detailed analysis of the skills, experiences, and interests of students compared to the requirements of the internships posted by David's company.

Through this section, David can efficiently search for candidates using tailored recommendations or by conducting a more specific search. The system is designed to assist him in identifying the most suitable students, streamlining the candidate selection process and saving time.

Subscenario [B-9.1]: Recommendation List in Matchmaking .
David begins by reviewing a curated list of students whose profiles closely match the internships he has posted. Each recommendation is accompanied by key details, including the student's name, the relevant internship title, and a match percentage that indicates how well the student aligns with the position. If David finds a profile particularly relevant, he can view more details and send a direct offer to the student, initiating the selection process.

To refine the recommendations further, David can apply filters to narrow down the list based on specific criteria, such as required skills or language proficiency. He can also sort the list by relevance, ensuring the most suitable candidates appear at the top. If he feels the recommendations do not fully meet his needs, David has the option to provide feedback on the suggestions, helping improve future results.

Subscenario [B9-2]: Custom Search in Matchmaking .
If the recommended profiles do not fully satisfy his requirements, David switches to a custom search. Using keywords or specific criteria, he can locate students whose profiles might not appear in the default list. This approach provides David with the flexibility to search for highly specific qualifications or niche skills that align with the unique needs of his company.

Once David identifies a suitable candidate, he sends an invitation to initiate the selection process. The system automatically transfers this interaction to the Monitoring section, where David can track the progress of his applications and manage follow-up actions as needed.

Scenario [B-10]: ***The Company Tutor Navigates the Monitoring Page*** .
After exploring potential candidates in the matchmaking section, David moves on to the Monitoring Page to manage ongoing applications and internships. This page serves as a central hub for overseeing all stages of the internship process, from the initial selection phase to active internships and feedback evaluations.

The Monitoring Page is divided into three main tabs, each addressing a specific aspect of internship management. In the *Selection Process* tab, David tracks applications and interactions with students before an internship officially begins. This includes reviewing candidate details, monitoring application statuses, and making decisions about proceeding to the next steps. The *Active Stages* tab focuses on managing internships that are currently in progress, enabling David to address any issues or updates during this phase. Finally, the *Questionnaires* tab provides access to feedback forms, which are completed at key moments, such as after the first meeting or at the conclusion of the internship.

In the *Selection Process* tab, David sees a table summarizing all the internships he is managing. Each row represents a specific internship, displaying details about the student, including their name and the origin of the application—whether the student applied directly or was invited by the company. David can also review the associated academic tutor for each internship, if one has already been selected, or follow up if this step is still pending.

The table also highlights the title of the internship, providing a quick link to review or modify its details if needed. The current process status is clearly displayed, guiding David on what actions are required next, whether it's scheduling an interview, updating application details, or removing an application entirely. For any adjustments, David can open the internship creation screen to edit pre-filled fields or terminate the process if necessary, automatically updating the status for the student.

By using the Monitoring Page, David efficiently manages all aspects of the internship

workflow. The structured design of this section ensures that he can focus on each phase of the process, from selecting the right candidates to tracking active internships, while maintaining clarity and control over his responsibilities.

Scenario [B-11]: ***The Company Tutor Monitors the Progress of Applications Sent to Students*** .
As mentioned in Scenario B-9, the applications sent by the company to students are tracked in the Monitoring Page, specifically within the first tab named *Selection Process*. These applications can be recognized as they are the tables marked with the "Sent" tag in the Tag column.

Within this tag, the status of these applications can be specifically identified as follows:

- **Not yet seen:** The student has not yet responded to the sent application.
- **Seen but no response:** The student has viewed the application but has not responded.
- **Rejected1:** The student has rejected the sent application; this terminates the selection process.
- **Accepted1:** The student has accepted the sent application.

This setup allows David to efficiently track the status of each application and respond accordingly. The design of the Monitoring Page ensures that David is kept up-to-date with real-time updates regarding the applications he has sent, enabling him to manage the selection process effectively and plan next steps based on the feedback from students.

Scenario [B-12]: ***The Company Tutor Monitors the Status of Requests Sent by Students*** .
As mentioned in Scenario B-9, contact occurs when there is mutual interest. Until now, we have seen scenarios related to Category 1, where the company initiates contact by demonstrating interest. This scenario explores Category 2, which occurs when students express interest in the company's positions.

To view the students who have applied to participate in their selection process for specific positions, David navigates within the *Monitoring Page* tab and looks at entries where the Tag column is marked "Received". Specifically, the tutor can accept or reject these applications, changing the status to:

- **Rejected2:** The company has rejected the received application; this terminates the selection process.
- **Accepted2:** The company has accepted the received application.

This mechanism allows David to effectively manage incoming applications from students. He can swiftly navigate through the options, making decisions that best align with the company's goals. This proactive engagement ensures that David remains in control of the selection process, effectively managing and responding to the opportunities presented by students.

Scenario [B-13]: ***Selection Process (Company Tutor Overview)*** .
Once David establishes contact with a student, he begins the detailed selection process to finalize the internship. Each step is designed to guide David through his responsibilities and ensure efficient communication and decision-making.

The process starts when the student accepts the initial contact, enabling David to schedule a meeting directly through the calendar. Once the meeting is arranged, David can initiate a dedicated chat with the student, allowing for seamless communication to discuss internship details and address any questions or clarifications.

After the meeting, David completes a questionnaire to evaluate the student's suitability for the role. He has three days to finalize this task, and the platform provides reminders to ensure timely submission. The completed questionnaire is stored for future reference, contributing to the decision-making process.

Following the evaluation, the student reviews the feedback and has one week to decide whether to accept the internship. If further clarification is needed, David can schedule another meeting with the student, ensuring all doubts are resolved. Once the student makes their decision—whether to accept, request modifications, or decline the internship—the process advances accordingly. If the student accepts, they proceed to select an academic tutor, a step that involves notifying the professor and awaiting their confirmation.

At the final stage, David reviews all aspects of the process and has three days to make the company's decision. If the internship is approved, the selection process transitions to the active internship phase, automatically rejecting other pending applications from the student. The platform logs the decision and creates a history of the internship's progress, starting with the status *Internship Started*.

Throughout this process, notifications and interactive tools keep David informed and help him manage each stage efficiently. The structured approach ensures that David can make informed decisions while maintaining clear communication with all parties involved.

Scenario [B-14]: ***The Company Tutor Monitors Active Internships*** .
After logging into the Monitoring section, David navigates to the Active Stages tab to oversee the internships currently in progress. This section provides him with a clear and organized view of all active internships, enabling him to manage ongoing tasks and address any issues that arise.

David begins by reviewing a table that summarizes key details for each active internship. For every student, he can see their name, which he can click to access their profile for additional information. The table also displays the name of the academic tutor assigned to the internship, providing David with a direct communication link if needed. The status of each internship is clearly indicated, using icons to show whether it is "In Progress", "Suspended", or "Completed". If any issues have been flagged, they are highlighted in red, allowing David to quickly identify and address them. Clicking on an issue reveals further details and provides access to a dedicated chat feature for resolution.

Beyond monitoring, David has the ability to actively manage the internships. He can update the status of an internship to reflect changes, such as marking it as "Suspended"

if a problem arises. If David identifies a new issue, he can report it using the problem reporting field, ensuring that all parties involved are informed. Additionally, he can use the built-in chat system to contact the academic tutor or the student directly, facilitating quick communication and resolution of any concerns.

Through the Active Stages tab, David remains in control of all active internships, ensuring that any challenges are addressed promptly and that the process continues smoothly. This feature supports David in maintaining oversight and fostering collaboration among all participants involved in the internships.

Scenario [B-15]: ***The Company Tutor Creates a New Internship*** .
David, acting as a company tutor, accesses the "Monitoring" section of the platform to create a new internship opportunity. This task allows him to define a position that aligns with his company's needs while attracting suitable candidates from the student community. David navigates to the "New Internship Creation" screen, where he can either start from scratch or simplify the process by using predefined templates.

If David opts for a template, he can quickly populate key fields such as the title, category, and basic requirements for the position, saving time and ensuring consistency with common internship structures. For a more customized approach, David manually fills out mandatory fields, such as the title and description of the internship, specific skills or qualifications required, and the duration of the internship. He also specifies whether the position is remote, in-person, or hybrid, and includes details about compensation, the application deadline, and the operational languages needed for the role.

To ensure clarity and attractiveness, David can use the platform's built-in content optimization feature, which leverages an LLM to refine the internship description. This tool helps him present the opportunity in a professional and engaging manner, increasing the likelihood of attracting well-suited candidates.

Once the details are finalized, David has several options to manage the internship posting. He can save it as a draft to review later, publish it immediately to make it visible to students, or save it as a reusable template for similar positions in the future. If needed, David can also return to the previous screen without saving his changes.

Through this streamlined process, David creates an internship that clearly communicates the company's expectations and provides students with a comprehensive understanding of the opportunity. The platform's tools and intuitive design support David in efficiently completing this task, ensuring that the internship meets both company needs and student expectations.

Scenario [B-16]: ***The Company Tutor Manages Internship Drafts*** .
David, acting as a company tutor, accesses the "Draft Management" screen to review and manage the internship drafts he previously saved. This section provides him with a clear overview of all draft positions and the tools needed to finalize or remove them based on his current requirements.

On the screen, David sees a list of all saved drafts displayed in a central table. Each

draft includes essential details, such as the internship title, the date and time of the last modification, and the status of the draft—indicating whether it is complete and ready for publication or if mandatory fields are still missing. This summary helps David quickly identify which drafts need further attention before they can be published.

To manage a draft, David can choose from several actions. If a draft requires updates, he can open it in the "New Internship Creation" screen, where he can make modifications to fields such as the description or required skills. Once satisfied with the content, David has the option to publish the internship, making it visible to students on the platform. Alternatively, if a draft is no longer needed, he can delete it permanently, with the system prompting him to confirm the action to avoid accidental removal.

To streamline his workflow, David can use filters and sorting tools to organize drafts by their completion status, category, last modification date, or title. This functionality ensures that David can efficiently locate and prioritize drafts, saving time and effort when managing multiple internship positions.

By leveraging the tools in the "Draft Management" screen, David can effectively handle all drafts, ensuring that only well-prepared and relevant internship opportunities are published while maintaining a clear and organized workflow.

Scenario [B-17]: ***The Questionnaire Functionality (Company Tutor Perspective)*** .
David, a company tutor, uses the "Questionnaires" section within the Monitoring page to provide evaluations at different stages of a student's internship. This section is divided into two tabs, each dedicated to a specific phase: the first meeting and the final evaluation. Each tab guides David in providing structured feedback tailored to the internship's progress.

Subscenario [B17-1]: ***First Meeting Questionnaire*** .
At the start of the internship, David navigates to the first meeting questionnaire to assess the student's initial performance. This tab prompts David to evaluate key aspects, such as the student's clarity in communication, their understanding of the internship requirements, and their enthusiasm for the role. Using multiple-choice and scale questions, David provides ratings and feedback on the student's suitability for the position.

In addition to structured questions, the tab includes open-ended fields where David can highlight the student's strengths and note areas that may require improvement. At the end of the process, David can save the completed questionnaire, ensuring the feedback is recorded for future reference. This step is essential in shaping the student's development and aligning expectations for the rest of the internship.

Subscenario [B17-2]: ***Final Evaluation Questionnaire*** .
As the internship concludes, David accesses the final evaluation questionnaire to provide a comprehensive review of the student's performance. This tab allows David to assess areas such as the student's ability to meet deadlines, their problem-solving skills, and their overall contribution to the internship objectives. The questionnaire also includes

open-ended fields for David to highlight the student's key strengths and suggest areas for growth.

The final evaluation gathers input not only from David but also from the student and the academic tutor, creating a holistic overview of the internship. David can view feedback submitted by the other parties, which helps contextualize his own observations. Once completed, the evaluations are saved in the system, contributing to a detailed summary of the internship experience.

Scenario [B-18]: ***The Company Tutor Manages Events Through the Calendar***
.
David, acting as a company tutor, accesses the "Calendar Events" section to navigate, manage, and create events related to internships. This tool provides him with a comprehensive overview of all scheduled activities, ensuring effective organization and coordination with students, academic tutors, and other stakeholders.

Subscenario [B18-1]: ***Navigating Events in the Calendar*** .
David begins by exploring the calendar to review upcoming deadlines and scheduled activities. Switching between daily, weekly, and monthly views, he gets a clear picture of his commitments. Events are visually organized and color-coded based on their category, such as meetings in purple, feedback sessions in green, and project submissions in blue. This layout allows David to quickly identify the type and priority of each event.

When David selects an event, a detailed view opens, showing all relevant information. He can see the event's title, category, date, time, and description, along with the list of participants and their roles. If the event is virtual, David can access the video call link directly from the event details, along with a shortcut to the associated chat for quick communication. David also confirms his attendance using the available options, which automatically updates his status for the event.

Subscenario [B18-2]: ***Creating and Managing Events*** .
When David needs to schedule a new event, he uses the calendar's creation functionality. He specifies key details such as the title, date, and time, and selects participants, including students, academic tutors, or other company representatives. For virtual events, David includes a video call link, which automatically generates an associated chat to facilitate communication before and after the meeting.

David categorizes the event using a dropdown menu, assigning a color-coded category such as "Meeting" or "Feedback." If the event marks the end of an internship, David flags it as the "Final Event," prompting the system to send final evaluation forms to all participants. Once all details are finalized, David saves the event, and notifications are sent to all invited users to ensure they are informed.

For events already scheduled, David can make modifications, such as updating the time or participants, or canceling the event entirely. These changes trigger updated notifications to all involved, keeping everyone aligned.

Scenario [B-19]: ***The Company Tutor Manages Communications Through Messaging*** .
David, acting as a company tutor, accesses the "Messaging" section to manage his communications with students and academic tutors. This centralized platform simplifies the process of tracking and organizing conversations, ensuring effective communication and timely follow-ups.

Upon entering the messaging screen, David begins by selecting the type of user he wants to communicate with using the options at the top left of the interface. For example, he can choose to view conversations exclusively with students, companies, or university representatives. In cases where a conversation overlaps multiple categories, such as group discussions or video calls, the messages appear in each relevant category, ensuring they are easy to locate.

To refine his view further, David uses the filtering tools available at the top right. These tools allow him to search for messages by user name, date, type of message (e.g., text or video call), or specific keywords. If David needs to focus on conversations related to problem resolution, he can activate the "Problematic Messages" filter, which highlights issues flagged in red and places them at the top of his inbox.

In the central area of the screen, all messages are displayed in a unified view, organized based on David's preferences. Messages related to specific issues are emphasized, helping David quickly identify and address urgent concerns. When a video call is scheduled via the calendar, a dedicated chat is automatically generated for the invited participants, allowing seamless communication before and after the meeting.

The integration of video calls and automatic message summaries further enhances David's ability to manage discussions. By generating concise overviews of lengthy conversations, the system ensures that David can keep track of key points and follow-up actions without needing to review entire chat histories.

Through the messaging section, David ensures effective communication with all stakeholders involved in the internship process. The intuitive design and robust filtering options enable him to prioritize important conversations and maintain a clear overview of all interactions.

Stage C: University Tutor's Scenarios

Scenario [C-1]: ***The University Tutor Opens the S&C Application*** .
Claudio, a university professor, upon entering the S&C application, is greeted with the access page that provides:

- **Login:** Claudio can log in to manage his monitoring duties and oversee his students' internships.
- **Registration:** New university staff can create accounts to connect with their students and manage internship affairs.

- **Language Change:** Claudio has the option to switch the system's language via a dropdown menu to ensure comprehension.
- **Assistant:** For any technical support or questions, Claudio can utilize the chat feature to receive guidance from the LLM with RAG.

This scenario introduces the access options available to university tutors. It sets the stage for further detailed analysis of each option as individual scenarios, covering the full spectrum of the tutor's interactions with the S&C platform.

Scenario [C-2]: ***University Tutor Registration*** .
When Claudio, a professor from the University of Pavia, decides to register on the S&C platform, he follows a registration process tailored for academic staff. The form he fills out includes:

- *Profile Photo*
- *Personal Data:* Name and Surname.
- *Contacts:* Phone Number, LinkedIn profile.
- *Institutional Email*
- *Password*
- *Department and Role*
- *Professional Biography*
- *Certifications, Awards, Recognitions*
- *Languages Spoken*
- *Security Question*

At the bottom of the registration form, Claudio can use the "Information Improvement" button, which employs an LLM to analyze and suggest improvements to the clarity and quality of the information provided.

Once the form is completed and refined, Claudio can proceed to confirm the creation of his university tutor profile. Depending on the information provided, the following subscenarios may occur:

Subscenario [C2-1]: Mandatory fields incomplete.

If any required fields are left unfilled, Claudio will be prompted to complete them.

Subscenario [C2-2]: All fields completed, domain registered.

If the email domain matches one already registered by his university, Claudio is directed to his new homepage to start utilizing the application for his academic and administrative duties.

Subscenario [C2-3]: Domain not registered.

If Claudio's email domain is not recognized, he is put in contact with a support operator. Together, they determine that although his university is registered, his specific email domain has not yet been added to the system. Claudio is then instructed to contact a university administrator to add his specific email domain to the list of recognized domains. Once this addition is made, Claudio will receive an email confirmation allowing him to proceed with his registration.

Subscenario [C2-4]: Domain and university not registered.

If Claudio finds that his email domain is not recognized, he is put in contact with a support operator. They determine that his university does not have a profile on the platform. Consequently, Claudio is prompted to initiate the university profile setup. This process must be completed before he can finalize his registration, as will be detailed in Scenario [C-3].

Scenario [C-3]: ***University Profile Creation*** .
Similarly, if a university tutor like Claudio discovers that the university's domain is not registered, he receives an email with a link to a profile creation page for educational institutions. Claudio must fill out the following mandatory fields to complete the university profile:

- *Logo*
- *Name*
- *Contacts*
- *Office Address*
- *Operational Sector*
- *Size*
- *Description*
- *Certifications, Awards, Recognitions*
- *Student Domain(s)*
- *Information Improvement*
- *Language Change*
- *Assistant*
- *Continue*

The profile is then reviewed by the platform's team. If it complies with the platform's standards, it is activated, and Claudio is notified with a link to his new homepage. If there are issues, he will receive feedback and a link to adjust and resubmit the profile.

Scenario [C-4]: ***The academic tutor Login in the S&C Application*** .
Claudio (or any other academic tutor) proceeds to log in using the credentials obtained

during the registration process. From the homepage, Claudio navigates to the login page, intending to access the **S&C** platform for overseeing and managing internships. To complete the login process, Claudio enters his username and password into the fields designated for tutor credentials. Once successfully authenticated he gains access to the platform.

Scenario [C-5]: ***The academic tutor Credential Recovery*** .
Claudio (or any other academic tutor) forgets his login credentials, including both his email and password. To recover them, Claudio uses the credential recovery feature and submits answers to the security questions he chose during registration.After validating his responses, the **S&C** system provides Claudio with the email associated with his profile and sends a temporary password to that email. This enables Claudio to log in and update his password as necessary.

Scenario [C-6]: ***The academic tutor and the Chatbot Interaction*** .
While navigating the platform, **Claudio** encounters a situation requiring assistance, such as managing student evaluations or communicating with companies. To resolve his query, Claudio interacts with the platform's chatbot. The chatbot offers automated assistance, providing answers to common questions or guiding Claudio step by step through the issue. If Claudio's problem requires further support, the chatbot escalates the query to a human representative who contacts him directly.

Scenario [C-7]: ***University Tutor Language Change*** .
Claudio has the flexibility to switch the operating language of the platform directly from any page he is working on. The visible flag icon at the top of every page reveals a dropdown menu with various language options, each denoted by a flag. Claudio selects his preferred language from this menu, ensuring that the platform instantly reflects this change. This immediate update allows Claudio to manage his tasks in a language he is most comfortable with, supporting his administrative and academic duties.

Scenario [C-8]: ***The University Staff Member Enters the S&C Homepage***
When Claudio, a university staff member, logs into the Students Companies (S&C) platform, he is greeted by a personalized homepage designed to streamline his responsibilities. This dashboard provides Claudio with an overview of critical updates and quick access to tools that support his academic and administrative duties.

On the left side of the homepage, Claudio sees his profile section, which prominently displays his name, role, and profile picture. This area also provides options to adjust account settings, change the platform's language, or access support via an integrated assistant. These features ensure the platform can be tailored to Claudio's preferences and needs.

The central part of the homepage highlights two key widgets that keep Claudio informed and organized. The calendar widget offers a snapshot of upcoming events, such as meetings, deadlines, and evaluations, with shortcuts to the full calendar for detailed planning. The notifications widget organizes important updates into categories. Claudio can easily

identify calendar events, internship status updates, or reported issues, which are color-coded to prioritize urgent matters. For example, red-highlighted notifications alert Claudio to problems requiring immediate attention, with direct links to chats for resolving them.

At the bottom of the homepage, Claudio finds a navigation bar that connects him to the platform's core functionalities. He can access the monitoring section to track the progress of internships, review academic evaluations, and manage questionnaires. The calendar section helps him plan events and meetings, while the messaging system ensures effective communication with students, companies, and other staff members.

By leveraging these tools, Claudio efficiently manages his responsibilities, ensuring smooth oversight of academic processes and proactive resolution of issues. The intuitive layout of the homepage helps Claudio stay focused and organized, allowing him to dedicate more time to meaningful academic support.

Scenario [C-9]: ***The University Staff Member Navigates the Monitoring Page*** After navigating the homepage, Claudio moves on to the Monitoring Page. To understand the upcoming scenarios, it is essential to comprehend the structure of this page, where Claudio can perform various academic and administrative tasks. Let's explore what Claudio sees upon entering the Monitoring Page.

This page is divided into three different subsections (Tabs), each with unique features that allow the university staff member to perform various actions:

- The first tab, ***Selection Process***, manages the processes where students explicitly request Claudio's supervision as an academic tutor.
- The second tab, ***Active Stages***, focuses on scenarios related to ongoing internships where Claudio is actively involved.
- The third tab, ***Questionnaires***, provides access to evaluation forms completed during key phases of the internship process: the first meeting and the end of the internship.

Since the next scenarios are focused on what Claudio does in the first tab, let's analyze its structure to clarify the actions available in this and the upcoming scenarios. In the case of the university staff member, the tab contains a list of internships through tables (one per internship), with:

- **Student:** Name and surname of the student, clickable for detailed profiles.
- **Company Tutor:** Name and surname of the company tutor, clickable for details.
- **Associated Internship:** Title of the internship the student is involved in, clickable for more information.
- **Process Status:** Current state of the process, with associated and clickable icons representing specific stages and actions.
- **Remove:** Button to remove the selection process, which automatically updates the company tutor's status to rejected.

The key feature of these tables is the **Process Status**, which represents the situation for each stage and enables specific actions to be taken as described in the upcoming scenario.

Scenario [C-10]: ***The University Staff Member Manages the Selection Process***
After navigating the homepage, Claudio proceeds to the Monitoring section to oversee the selection process for internships. This process involves evaluating and responding to student requests for academic supervision and monitoring the overall progress of the selection stages.

Subscenario [C-10.1]: Tutor Selection .
In this stage, Claudio is notified when a student nominates him as their academic tutor by submitting their email. Claudio can perform the following actions:

- **Accept:** By accepting the request, Claudio confirms his role as the tutor. The system updates the status and displays Claudio's name in the relevant table row for the internship.
- **Reject:** By rejecting the request, the selection process for the specific student and internship is terminated, and the entry is removed from the table.

Claudio has three days to make a decision, during which the process status is displayed with a *Tutor* icon to indicate the pending action.

Subscenario [C-10.2]: Final Decision by the Company .
Once Claudio has made his decision, the company has three days to finalize the selection process. The company's options are:

- **Accept:** The internship is activated and moved to the *Active Stages* tab. The system creates a history log marking *Stage Started* as the initial state.
- **Reject:** The selection process is terminated, and the entry is removed from the table.

The system notifies Claudio of the company's decision through the homepage, ensuring they are informed of the outcome.

Subscenario [C-10.3]: Process Status Indicators .
The Monitoring section provides icons to represent the current state of the selection process, helping Claudio track progress and take necessary actions. Key icons include:

- **Tutor:** Indicates that the student has nominated Claudio as their tutor and is awaiting a response.
- **Accepted:** Confirms that Claudio has accepted the tutor role, and the process is progressing.
- **Rejected:** Indicates that Claudio or the company has declined the request, terminating the process.

- **Meeting Scheduled:** Appears when the company is organizing a meeting with the student.
- **Active Internship:** Displays once the internship is officially started and moved to the *Active Stages* tab.

Subscenario [C-10.4]: Notifications and Deadlines .
The platform ensures that Claudio remains updated by providing:

- **Notifications:** Alerts about pending tutor requests and company decisions.
- **Reminders:** Automated reminders of deadlines for responding to tutor nominations or tracking company decisions.

The Monitoring section equips Claudio with the tools and information needed to efficiently manage the selection process, ensuring clarity and accountability at every stage.

Scenario [C-11]: ***The Academic Tutor Reviews Active Internships*** .
When the academic tutor accesses the Monitoring section, they navigate to the Active Stages tab to supervise and manage ongoing internships. This tab provides a structured view of all active internships, helping the tutor stay informed and address any issues efficiently.

At a glance, the academic tutor can see a table summarizing key details for each internship. For every student, their name is displayed and clickable, allowing the tutor to access the student's profile for additional information. The name of the company tutor is also included, with a direct link to initiate communication if needed. Each internship's current status is visually represented with descriptive icons, while any flagged issues are highlighted in red, drawing attention to matters requiring immediate action.

The academic tutor uses this section to take several critical actions. When issues are flagged, the tutor can contact the student or the company tutor to resolve them directly. They can also review feedback provided by the company tutor, ensuring that the internship is progressing as expected. If necessary, the academic tutor can update the internship's status to reflect changes, such as marking it as "Suspended" or "Completed." For unresolved problems, the tutor can escalate them through internal university channels, ensuring appropriate follow-up and resolution.

This system ensures that the academic tutor has full oversight of ongoing internships, fostering clear communication and proactive management. By keeping all stakeholders informed, the platform helps ensure that internships are successfully guided to completion.

Scenario [C-12]: ***The Academic Tutor Completes the Final Evaluation Questionnaire*** .
At the conclusion of an internship, the academic tutor reflects on the program's effectiveness by completing the Final Evaluation questionnaire. This form is accessed through the Questionnaire Tab within the Monitoring page, where it is prominently available as part of the closing phase of the internship. The form enables the tutor to provide insights into the internship's academic value and alignment with educational objectives.

The academic tutor begins by assessing whether the internship met its intended learning goals, rating this aspect on a six-point scale. This evaluation reflects how well the internship supported the student's academic development and provided meaningful learning experiences. In addition to this quantitative feedback, the tutor provides a detailed written assessment of the internship, highlighting its strengths, identifying areas for improvement, and offering suggestions to enhance its academic relevance in the future.

Once all questions are completed, the academic tutor submits the form, ensuring their input becomes part of the overall evaluation. These responses, combined with feedback from the student and company tutor, contribute to a comprehensive review of the internship. This process ensures that all perspectives are considered, fostering continuous improvement in the structure and execution of future internships.

By completing the Final Evaluation, the academic tutor plays a vital role in maintaining the quality and academic relevance of the internship program. Their feedback not only supports the student's growth but also helps refine and enhance opportunities for future participants.

Scenario [C-13]: ***The Academic Tutor Interacts with the Messaging System*** .
To manage communication during internships, the academic tutor uses the platform's messaging system. This tool allows the tutor to stay connected with students, company tutors, and university staff, ensuring effective coordination and support throughout the internship process. Whether following up on flagged issues, providing feedback, or addressing administrative queries, the academic tutor relies on the messaging system for efficient and organized communication.

The messaging system notifies the tutor of new messages and organizes conversations based on context, making it easy to locate and respond to relevant discussions. This functionality helps the academic tutor maintain clear and timely communication with all stakeholders, ensuring that any concerns are promptly addressed and that the internships remain on track.

Subscenario [C13-1]: ***The Academic Tutor Resolves an Issue via Messaging***.
During an internship, the academic tutor may be contacted by a student or company tutor regarding an issue requiring academic guidance. Using the messaging system, the tutor reviews the detailed message outlining the concern and provides appropriate advice or instructions to address the situation. In cases where additional input is needed, the tutor can coordinate with other parties, such as the university administration or the company tutor, to ensure the issue is resolved effectively.

Once the tutor's response is sent, the platform keeps a record of the conversation for future reference, allowing all parties to track the resolution process. The system's structured approach ensures that the academic tutor can support the stakeholders involved and uphold the quality of the internship experience.

2.1.2. Domain Class Diagram

2.1.3. State Diagram

Here we include scenarios and further details on the shared phenomena and a domain model (class diagrams and state diagrams).

2.2. Product Functions

Sign Up & Log In

This function is available to all student, a professor or an employee of a company. When the Sign Up process starts the system will collect all the required information about the user.

Upload CV

This is available to a student, during the Sign Up phase, can upload his/her CV, the system will use the information contained into the file to auto-fill the fields needed for completing the registration.

Edit Profile

This functions is available to all the user after they are logged in. They can change some or all the information of their. An users can update personal details, change profile photos, and adjust account settings.

Chatbot Communication

This function is available on several pages such as during Sign Up or Log In. A user who might have an issue or is uncertain about something can ask for help to the chatbot.

Change Language

Regardless of which page of the platform the user is, this function alloy the user to easily change the language inside the platform. By clicking on the flag icon the user can pick the language that he/she wishes.

Internship Search

The search for an internship is only available to students on the platform. He/she could search on the platform using some keywords or the system could suggest to the student an internship that he/she might be interested to.

Accessing Internship Information

If a student is interested to an internship by clicking on it, the system will show addition information (such as the description of the role).

Save Internship for Later

This function, available only to students, allow a student to save for later an internship.

Communication

The platform allows student, company tutor, academic tutor and other stakeholders to communicate. This function can be used to coordinate meeting, report issues or anything else needed.

File a Complaint

This function is available to students who are completing an internship. It can be used by a student to report an issue that he/she is facing. Additionaly, the system allows the user who reported a complaint to see the progress of his/her complaint.

View Candidates

This function is available only to company tutors. If needed it can be used to see additional information about a student who applied for an internship.

Create Internships

Only a company tutor can create an internship opportunity. A company tutor can either start from scratch to define an internship or use a template pre-made.

Save Internship draft

A company tutor can save the draft for the internship to edit that later, or publish it at another time.

Accept or Reject

This function is available only to company tutor who received an application for an internship from a student. It can be used to reject the internship application or to accept it.

Monitor Active Internships

Only a company tutor can use this function to see the internships that are currently ongoing.

Create and manage events

A company tutor can use the platform to access the calendar events and can use a function to manage or create an event relative to an internship.

Accept to be a tutor

A profess can use this function to accept to become a tutor for a student or not.

Resolve an issue

An university tutor can use this function to see a problem reported by one of his student and to provided appropriate advice or instructions to address the situation.

2.3. User Characteristics

The **Students & Companies (S&C)** platform is designed to cater to three primary user groups: students, company staff members, and university staff members. Each group has

unique characteristics that influence the system's design, functionality, and accessibility requirements.

Student Characteristics

Students represent the core user group of the platform and include individuals pursuing undergraduate or postgraduate degrees. They seek internships or job opportunities in diverse fields of study, requiring the system to address a variety of industry-specific needs. Students typically possess moderate to high levels of digital literacy, particularly in using online platforms for academic and career purposes. However, the system is designed with an intuitive interface, tooltips, and clear error feedback to accommodate less tech-savvy users, ensuring accessibility for all. Their primary motivation is to secure internships and job opportunities aligned with their academic background and career aspirations. Students interact with the platform intermittently, especially during academic breaks or application deadlines, and benefit from timely notifications and reminders for pending tasks, upcoming deadlines, and relevant opportunities. Due to their academic commitments, students often have limited time to engage with the platform. To address this, the system streamlines its core functionalities, minimizing the steps required to complete essential actions.

Company Staff Member Characteristics

Company staff members, including recruiters and HR professionals, are key users of the platform. They represent diverse industries and are responsible for managing recruitment processes such as posting job opportunities, tracking applications, and conducting interviews. These users typically possess moderate to advanced technical proficiency, particularly in using professional recruitment tools. The system facilitates quick onboarding and task efficiency through intuitive navigation and clear instructions. Their motivation lies in identifying and recruiting top talent for their organizational needs, which the platform supports with advanced filtering, insightful recommendations, and streamlined communication tools. To ensure inclusivity, the platform adheres to WCAG standards, supporting assistive technologies such as screen readers and keyboard navigation. Company staff members primarily use the platform during working hours, focusing on tasks such as posting internships, managing applications, and scheduling interviews. The system accommodates asynchronous workflows with features like draft saving, reminders, and real-time notifications. Given their professional responsibilities, company staff members often face time constraints. To address this, the platform prioritizes time-efficient functionalities, reducing the steps required for key actions such as posting jobs or reviewing candidates.

University Staff Member Characteristics

University staff members include academic tutors, internship coordinators, and administrative staff who oversee student internships and ensure academic alignment. These professionals, associated with academic institutions, play a critical role in supporting students' practical learning experiences. They generally exhibit moderate technical ex-

pertise in using academic and administrative platforms, and the system provides a user-friendly interface to ensure seamless interaction. Their primary motivation is to ensure that internships deliver meaningful educational and professional experiences aligned with institutional goals. University staff interact with the platform intermittently, focusing on specific tasks such as reviewing internships, addressing issues, and evaluating reports. The platform supports asynchronous usage, enabling flexibility for users balancing multiple responsibilities. To address their time constraints, the system streamlines critical actions like reviewing applications, resolving flagged issues, and submitting feedback, minimizing effort without compromising effectiveness.

2.4. Assumptions, Dependencies, and Constraints

2.4.1. Regulatory policies

Since the S&C platforms needs to handle sensitive personal data (such as names, academic affiliations and contact information) it must comply with all the relevant legal frameworks and regulations about data protection and data privacy such as General Data Protection Regulation (GDPR) in Europe.

Also the platform might be required to respect some specific guidelines set forth by universities and companies for handling internship details and evaluation. Lastly the platform must also comply to possible institutional and corporate communication standards.

2.4.2. Domain Assumptions

- **D1**: The platform takes whatever you defined as input (if the input is of correct type, format and within the maximum size). If, for example, the name of the student is misspelled, the system is still supped to work.
- **D2**: the platform relies on the domain assumption that the role a user claim reflect the real-world status. Universities and companies are responsible for ensuring that only authorized individuals use their institutional email domains and are assigned correct roles within their organization.
- **D3**: all the companies and universities are registered in the platform are legitimate entities operating in the bounds of local laws and regulations.
- **D4**: Companies are assumed to provide genuine internship opportunities.
- **D5**: Universities are assumed to offer academic support and oversight.
- **D6**: Assume that there are no massive modifications on internships policies, jobs criteria and academic requirements over time.
- **D7**: An user belongs to one category at a time (a student can not also be a professor or a company tutor).
- **D8**: Every user has its own credentials.
- **D9**: Each user have the legal age to register to the platform.

- **D10**: Each student have the legal age to start an internship.

3 | Specific Requirements

The **Specific Requirements** section of this document outlines the detailed and technical aspects of the system. This section serves as a crucial guide for developers and designers, providing them with the necessary information to implement and test the functionalities of the **Students & Companies (S&C)** platform.

The requirements detailed in this section are derived from the scenarios and use cases described earlier. Each requirement is structured to ensure traceability, clarity, and alignment with the system's objectives. The content of this section is designed to address the following key aspects:

- **Functional Requirements:** These define the specific behaviors and functionalities the system must exhibit, such as user authentication, profile management, CV creation, and internship tracking.
- **External Interface Requirements:** This includes user interfaces, hardware interfaces, software dependencies, and communication channels, ensuring the system interacts seamlessly with users and external systems.
- **Performance Requirements:** This addresses the system's expected performance in terms of speed, reliability, and scalability.
- **Design Constraints:** Any limitations or preconditions that must be considered during development.
- **Non-functional Requirements:** This includes usability, security, and compliance requirements to ensure the system's overall quality and robustness.

The structure and content of this section are intended to provide a comprehensive reference for all stakeholders, ensuring that the system is built and maintained according to the specified requirements.

3.1. External Interface Requirements

This subsection focuses on the external interfaces with which the **S&C** platform will interact. These interfaces are essential for ensuring seamless communication and interaction between the system, its users, and external components. The external interfaces are categorized as follows:

- **User Interfaces:** This includes visual representations, such as wireframes or mockups, to clarify how users (students, recruiters, and academic tutors) will interact with

the system. While UI design is not the primary focus, these visuals help convey the intended user experience.

- **Hardware Interfaces:** If the system interacts with physical devices, such as computers, smartphones, or external sensors, this section describes the nature of these interactions and any specific requirements.
- **Software Interfaces:** This covers interactions between the **S&C** platform and external software components, such as APIs, third-party applications, or services integrated into the system.
- **Communication Interfaces:** This details the protocols and mechanisms used for data exchange, whether for system-to-system communication or user notifications over networks.

By defining these external interfaces, this subsection ensures clarity and consistency in the system's integration with external components.

3.1.1. User Interfaces

The purpose of this section is to define the user interfaces (UIs) of the **Students & Companies (S&C)** platform. User interfaces serve as the primary interaction points between the system and its users (students, recruiters, and academic tutors). This subsection outlines the structure, elements, and functionalities of these interfaces, ensuring they align with the requirements and workflows described in the overall description. User interfaces in this document are not intended to represent the final design but rather provide a clear understanding of the system's interaction points for implementers. Through wireframes and mockups, the UIs illustrated here establish a foundation for design and development while maintaining consistency with the system's overall goals and requirements. Each interface detailed below corresponds to specific functionalities. This section ensures the interfaces meet the needs of the users and support the operational goals of the platform.

Structure of Interfaces:

- **Authentication Interfaces:** Interfaces for authentication, registration and login. These are common to the three main users of the system (from x to y).
- **Homepage Interface:** Almost equal to the three main users of the system (from x to y).
- **Matchmaking Interface:** Almost the same for both students and company tutors (from x to y).
- **Monitoring Interfaces:** The three tabs for monitoring the selection process, the active stages in which the user is involved and all the questionnaires produced in these 2 processes. These interfaces are almost equal between the three users of the system (from x to y).
- **Calendar Interfaces:** Common to the three users of the system (from x to y).
- **Messaging Interfaces:** Common to the three users of the system (from x to y).

- **Complaints Interfaces:** Both the interface to signal an issue and to handle it (from x to y).
- **General Interfaces:** The common interfaces for settings, the assistant, and language setup (from x to y).

Authentication Interfaces Description

The Authentication Interfaces ensure secure and user-friendly access to the platform, guiding users through various processes necessary for account creation or login. Each screen includes the ability to interact with a chatbot (LLM with RAG) for support, and to change the platform's language. Both these two interfaces are described in the *General Interfaces*.

Authentication Interface The process begins at the Authentication Screen, which provides users with options to either log in or register. This interface serves as the entry point for all authentication-related actions, ensuring accessibility even for new users.

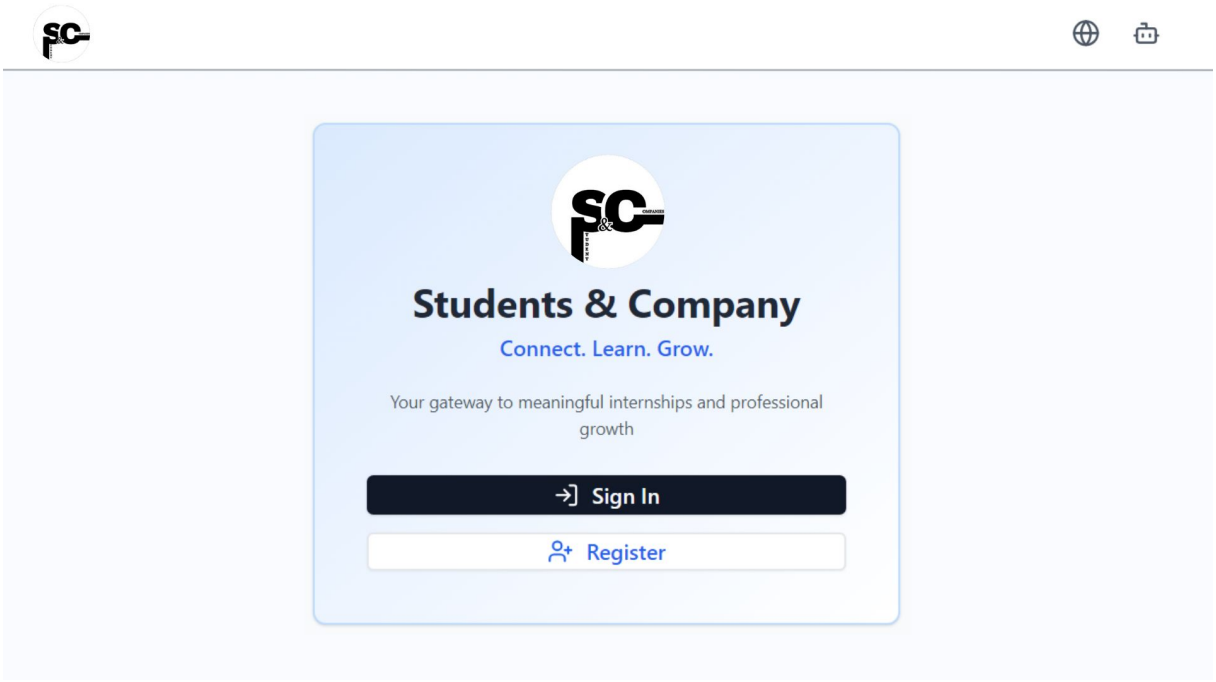

Figure 3.1: Authentication Interface of the Students & Companies platform.

Registration Interfaces The registration process is designed to onboard new users smoothly, ensuring that profiles are properly configured and linked to their respective institutions. This phase is composed of multiple screens that guide users step-by-step:

- **Introduction Screen:** This screen greets users with a welcoming interface that provides an overview of the platform's purpose and main functionalities. It introduces the system's capabilities, highlighting how it facilitates internship management, application tracking, and candidate selection. The screen also explains the types of users the platform accommodates - students, universities, and companies - without going into extensive detail. Users are then encouraged to initiate the registration process, signaling the beginning of a tailored setup experience.
- **CV Upload and Profile Creation:** Users are prompted to upload their CV, which the platform analyzes to pre-fill fields in their personal profile. While the CV facilitates automatic completion of the fields, users can still review, modify, or manually

input text into any of these fields, ensuring both flexibility and accuracy. Among the most critical fields are the security question, essential for password recovery as explained later; the email address, which enables correct user registration by linking the account to an institution; the password, which users must set for secure login; the acceptance of terms and conditions, required to complete registration; and the information improvement tool, which leverages an LLM to suggest enhancements, modifications, or additional details to make the profile more appealing to potential employers. Alternatively, users without a CV can manually fill out all the required fields, ensuring accessibility for all.

- **Institutional Affiliation:** Based on the user's institutional email domain, the system determines affiliation:
  - If the domain matches an existing institution, the user's profile is automatically linked to it.
  - If the domain is unrecognized, the user is directed to the Verification in Progress screen, where the system communicates that the domain is under review. This screen informs the user that their domain is under review by platform administrators, who will validate the domain and notify the user upon approval.

  If the email domain does not correspond to a registered institution, the system initiates specific workflows depending on the user type:
  - For students, the system notifies them that their account is pending verification and advises contacting their institution's administrators to register with the platform.
  - For tutors, being the first affiliated user of a new institution, they are prompted to create the Institution Profile. This involves uploading the institution's logo, providing contact and location details, defining affiliated email domains for students and tutors, and adding a description of the institution's mission and specializations. Once the institution profile is validated and approved, it becomes active, allowing subsequent users with the same domain to be automatically affiliated.

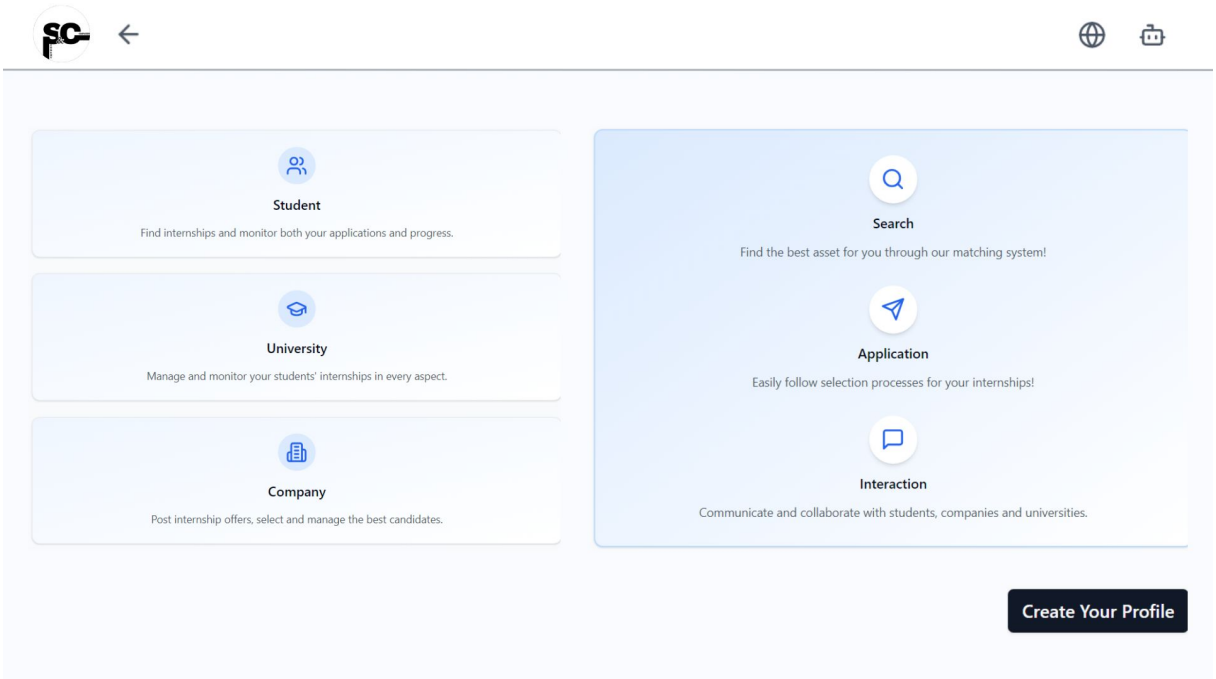

Figure 3.2: Introduction Screen.

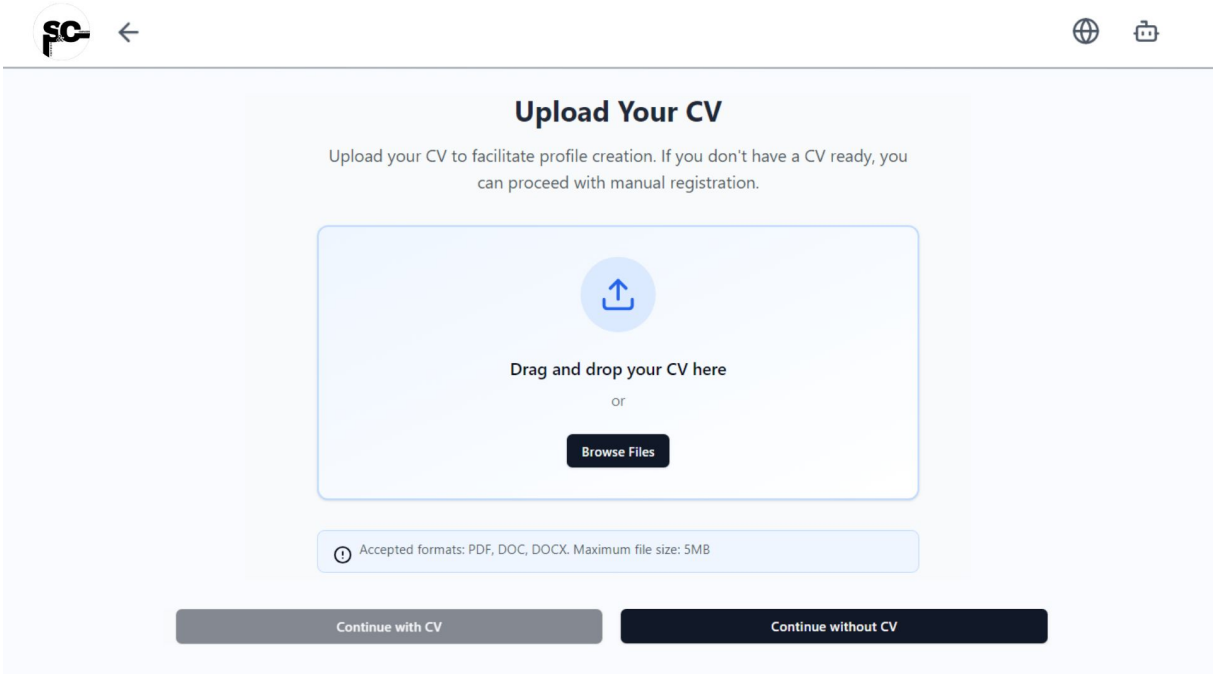

Figure 3.3: Interface to Upload the CV.

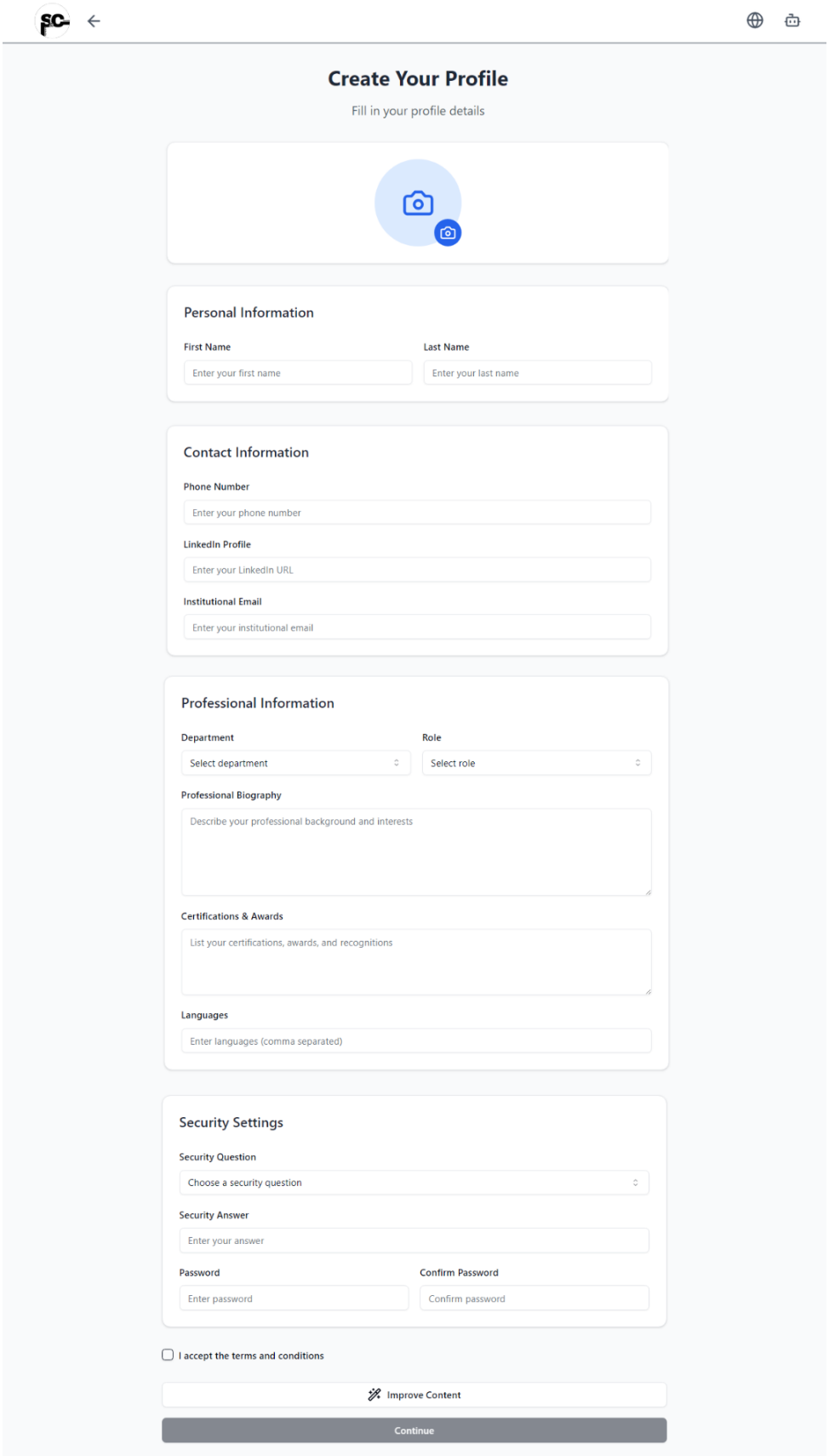

Figure 3.4: Personal Profile Creation Screen.

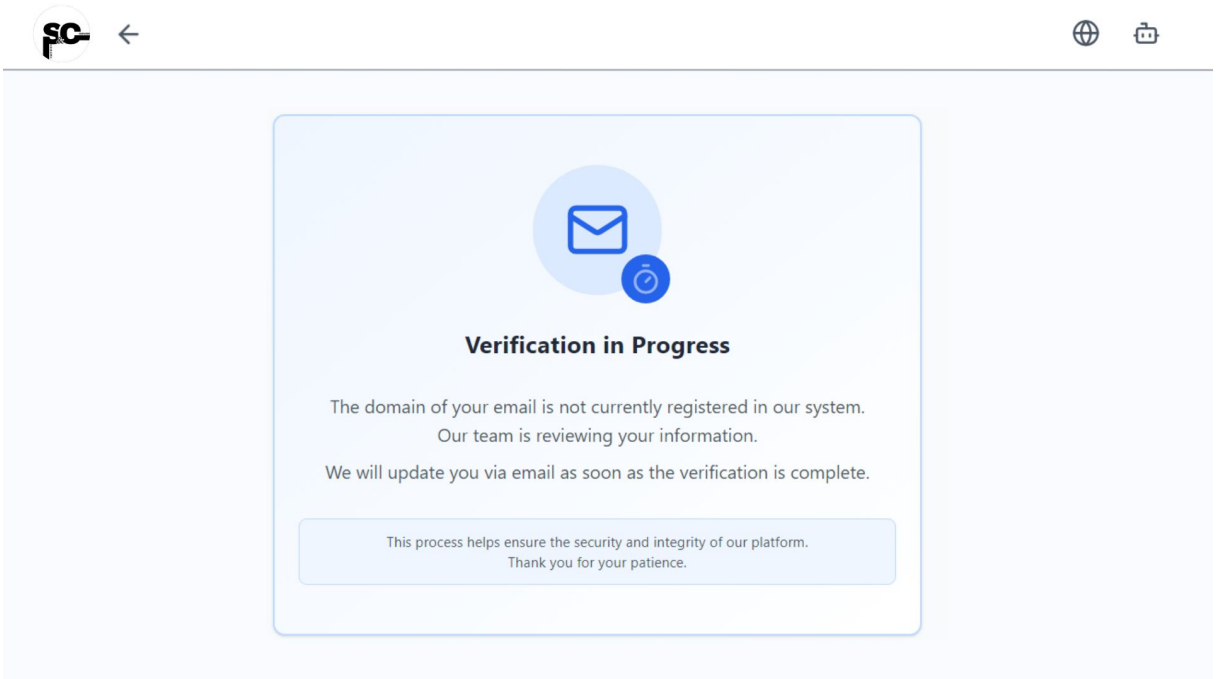

Figure 3.5: Ongoing Verification Notification Screen.

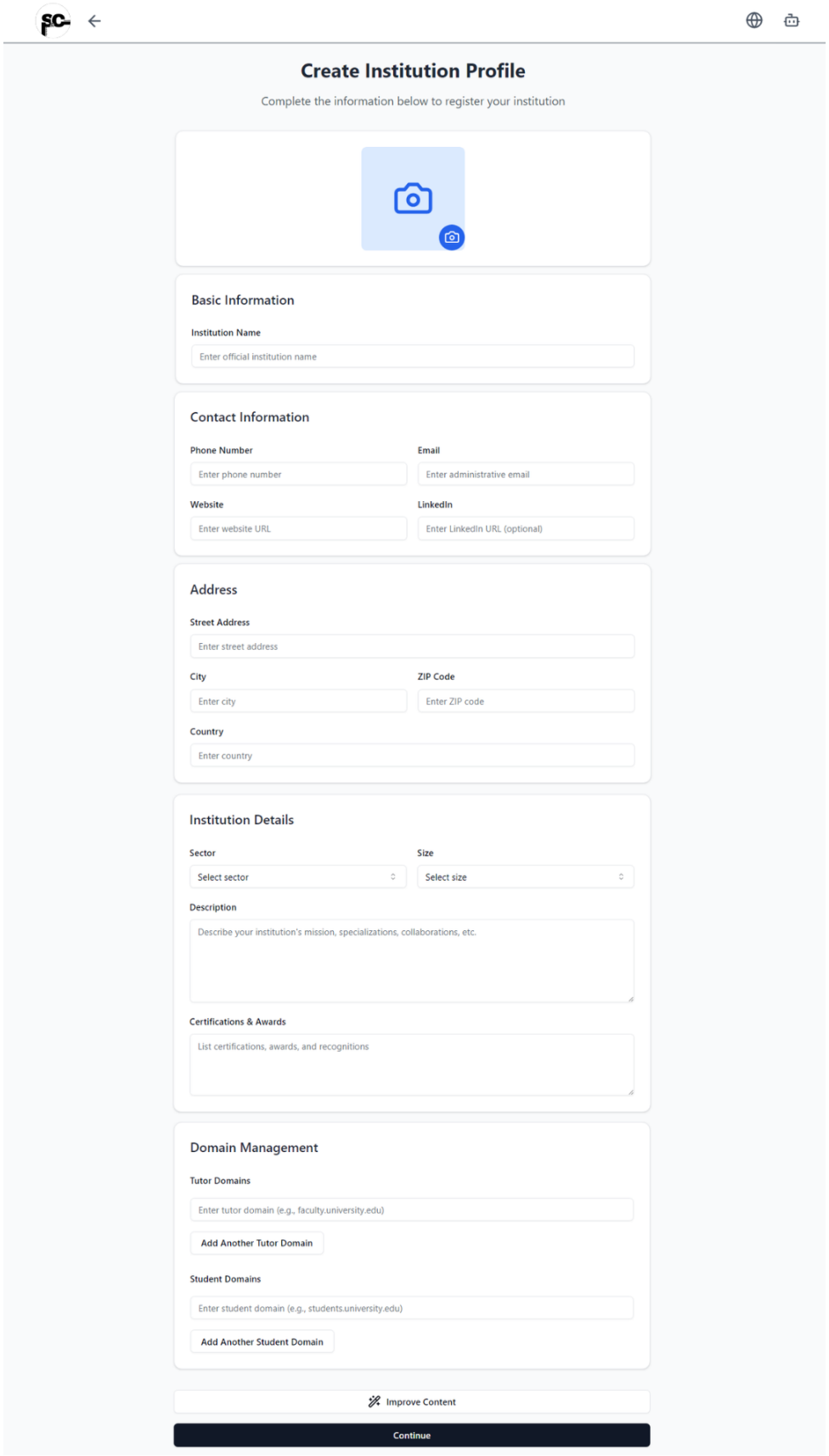

Figure 3.6: Institution Profile Creation Screen.

Login and Password Recovery Interfaces: The Login Screen allows users to securely access their accounts following successful registration and verification. This interface also handles situations where users have previously accessed the platform in incognito mode or after a prolonged period of inactivity, ensuring their credentials (email and password) are revalidated for secure access. The process is seamless, offering a straightforward pathway back into the system, ensuring security and session integrity and accommodating all user roles (students, company staff, and university tutors). This interface includes also a convenient link to reset forgotten passwords, maintaining accessibility for all.

The Password Recovery interface ensures that users who have forgotten their credentials can regain access through a secure process. To initiate recovery, users must correctly answer a the security question, whose answer was selected during the registration. This step acts as the first layer of verification. Once validated, the system sends a detailed email with step-by-step instructions to reset the password, guaranteeing both security and ease of use.

Together, these interfaces streamline the authentication journey while maintaining high security and user guidance.

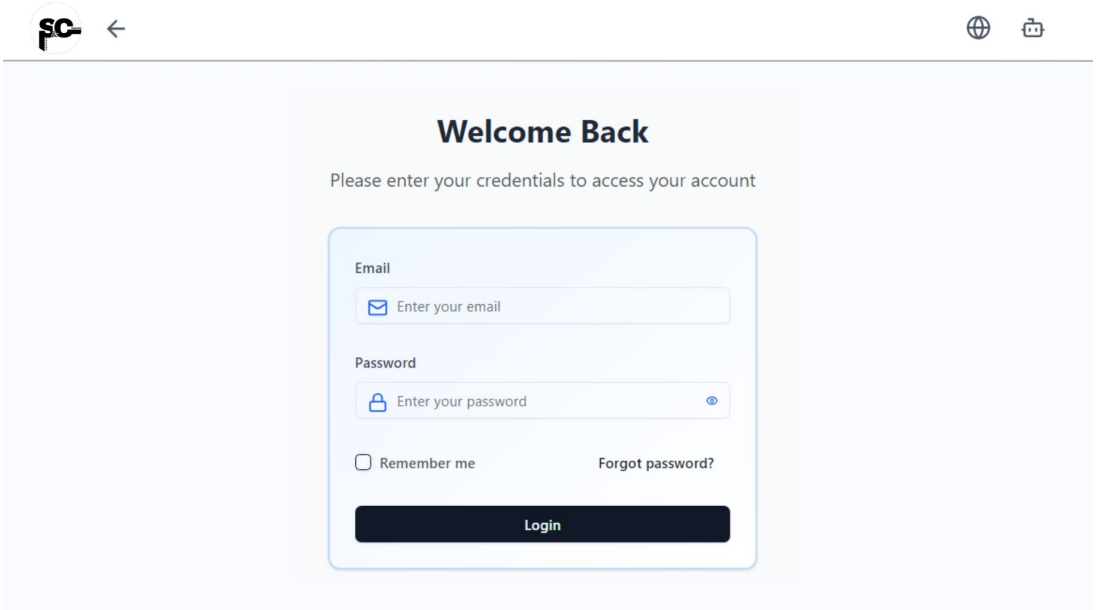

Figure 3.7: Log In Interface of the Students & Companies platform.

Homepage Interface

The homepages of the various users (student, company tutor, and academic tutor) share a common structure designed to provide intuitive navigation and quick access to key features. Each homepage is tailored to ensure a personalized experience, with central elements that cater to the specific needs of the user's role.

The left-hand side of the homepage is dedicated to the user profile, which includes the personal image, name, role, and personalization options such as settings, language change, and a chatbot assistant. These buttons, if selected, they bring to the relative interface (defined in the paragraph "General Interfaces"). This section acts as an immediate reference point for the user, facilitating access to essential functions.

In the central and right-hand parts of the homepage are the calendar and notifications. The calendar displays upcoming events, such as meetings, interviews, or workshops, while the notifications keep the user updated on relevant activities or potential issues. The information displayed in these sections is adapted to the specific role of the user: for example, a student will see events related to workshops or interviews, while company and academic tutors will receive updates on the management and supervision of internships.

The bottom navigation bar connects the platform's main features, allowing quick access to sections such as matchmaking (not available for the academic tutor), monitoring, calendar, and messages. This cohesive organization ensures that every user can interact with the platform efficiently and intuitively, maintaining a uniform experience across roles. This navigation bar is accessible from any screen (not just the homepage), enabling users to move quickly between sections and primary functions in a simple and intuitive manner.

Thanks to its flexibility, the homepage not only provides a personalized starting point but also ensures that each user can quickly access the key functionalities to maximize their productivity within the platform.

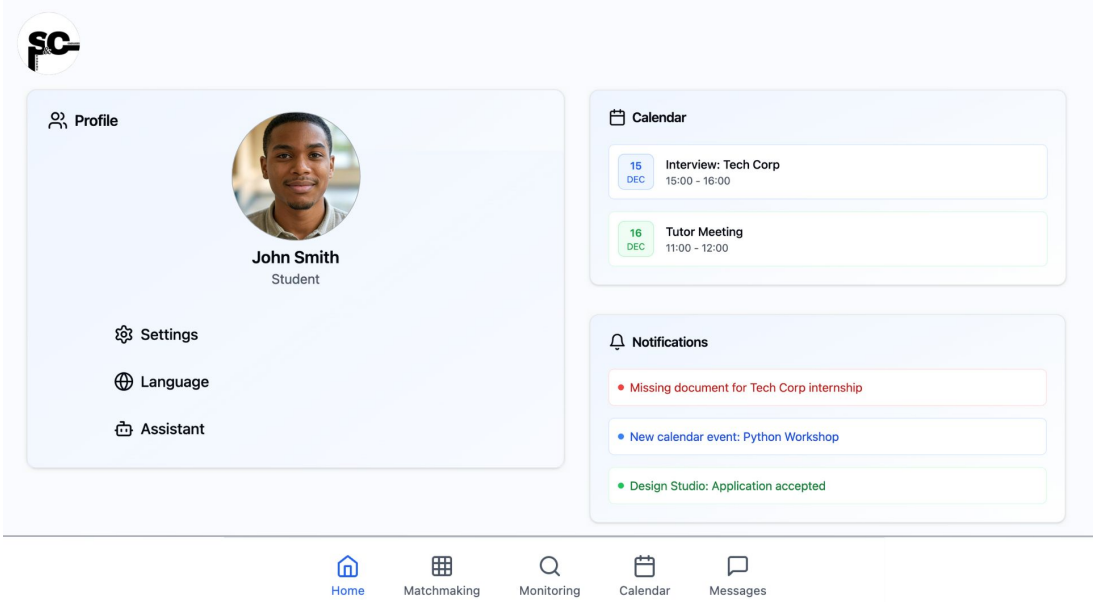

Figure 3.8: Homepage for a Student in S&C platform.

Matchmaking Interface

6] Review Extracted CV Page .

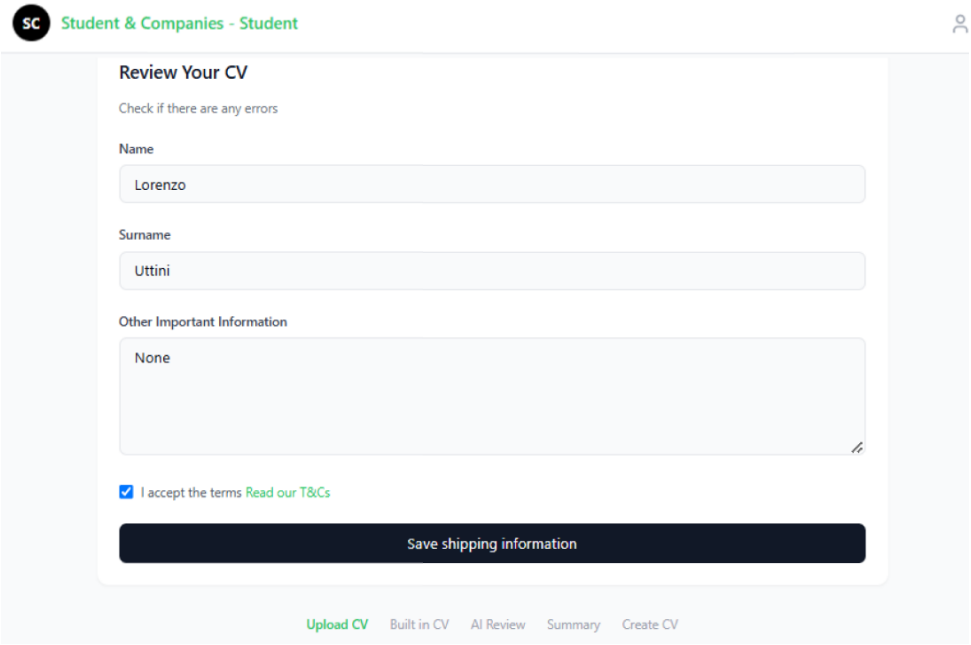

Figure 3.9: Review Extracted CV Page of the Students & Companies platform.

The **Review Extracted CV Page** (Figure 3.9) is the next step presented to students after they upload their CV to the **Students & Companies (S&C)** platform. Here, the system automatically extracts key details from the uploaded document and displays them for the student to review. This process ensures that all information is correct and provides an opportunity to make edits before proceeding.

The interface is intuitive and focuses on user verification. At the top, the header titled *"Review Your CV"* clearly directs the user to inspect the details. A subtext, *"Check if there is any error,"* emphasizes the importance of this step.

The main section of the page displays the extracted fields, including **Name**, **Surname**, and **Other Important Information**, such as a personal statement or additional details. All fields are editable, allowing students to correct inaccuracies or add any missing information.

To proceed, students must re-confirm their acceptance of the platform's terms and conditions by selecting the checkbox labeled *"I accept the terms."* A direct link to *"Read our T&Cs"* ensures transparency.

At the bottom of the page, the **"Save shipping information"** button allows students to finalize their edits and proceed to the next step. Additionally, a **Progress Tracker** with numbered steps (e.g., *1, 2, 3, ...*) keeps students informed about their current position in the process. Navigation tabs for functionalities like *Upload CV*, *Built-in CV*, *AI Review*,

Summary, and *Create CV* remain accessible, ensuring seamless navigation across the platform.

7] CV Creation Confirmation Page .

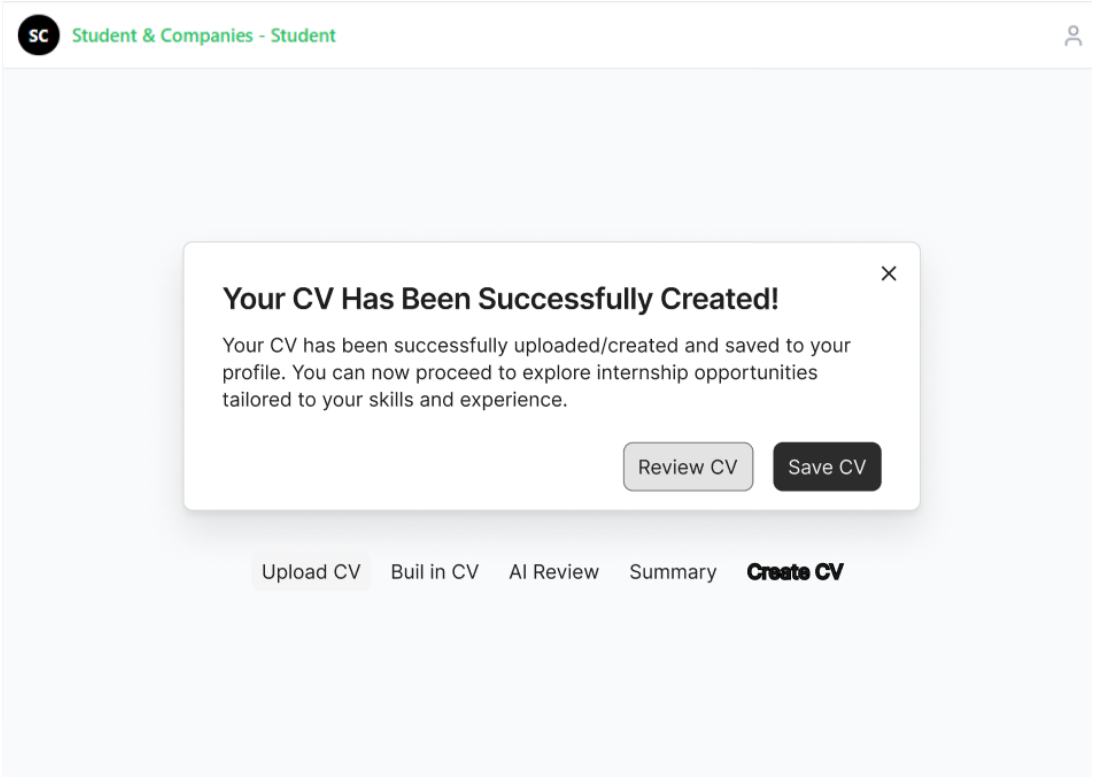

Figure 3.10: CV Creation Confirmation Page of the Students & Companies platform.

The **CV Creation Confirmation Page** (Figure 3.10) is presented to students once their CV has been successfully created or uploaded on the **Students & Companies (S&C)** platform. This page serves to confirm the completion of the CV process while offering actionable options to guide the next steps.

The interface prominently displays a confirmation message, titled *"Your CV Has Been Successfully Created!"*, reassuring the student that their CV is saved to their profile. Additional text provides further clarity, stating that the CV is now available for use in exploring internship opportunities tailored to their skills and experience.

The page includes two key action buttons for navigation: the **"Review CV"** button, which redirects the student to review the detailed content of their CV, and the **"Save CV"** button, which finalizes and saves the CV creation process. These options ensure that the student can either make final adjustments or proceed with their application process seamlessly.

At the bottom of the page, navigation tabs such as *Upload CV*, *Built-in CV*, *AI Review*, *Summary*, and *Create CV* remain accessible, allowing students to revisit any part of the

CV management journey or explore additional features as needed.

8] Homepage (Student Version) .

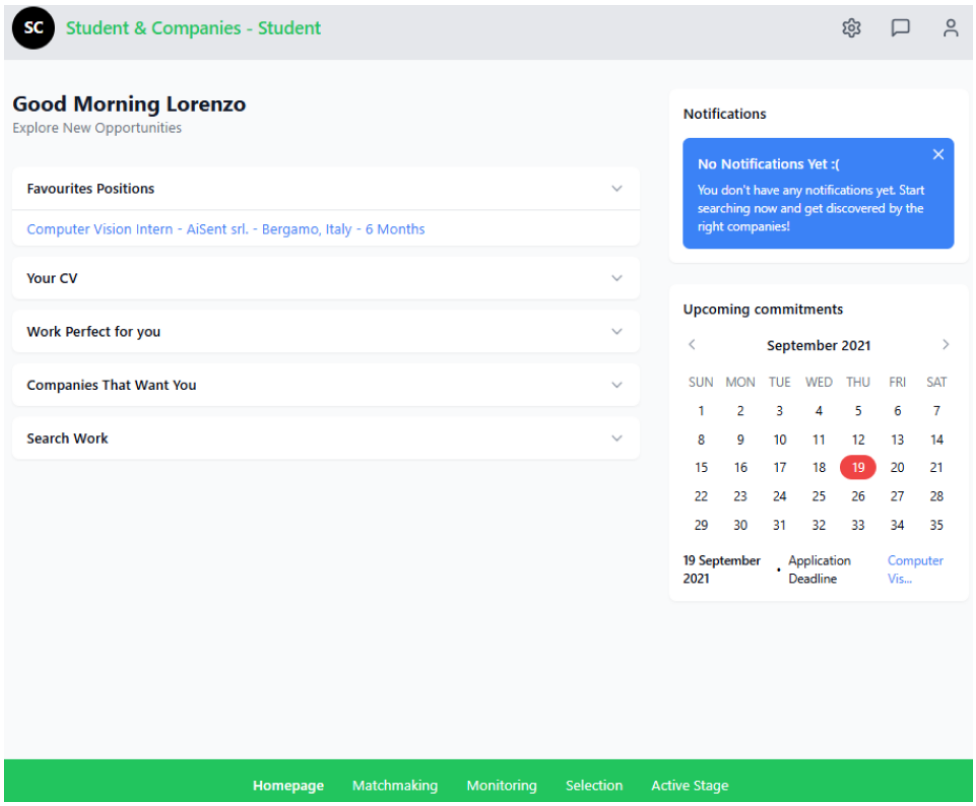

Figure 3.11: Homepage of the Students & Companies platform.

The **Homepage** (Figure 3.11) acts as the central dashboard for students on the **Students & Companies (S&C)** platform. This interface consolidates critical features and updates, providing students with an organized view of their profile, opportunities, and commitments.The homepage welcomes users with a personalized greeting, such as *"Good Morning Lorenzo"*, fostering engagement and interaction. Below the greeting, a series of expandable sections offer streamlined navigation to key areas. These include **Favourites Positions**, which highlights saved opportunities; **Your CV**, where students can review or update their CV; **Work Perfect for You**, presenting tailored internship recommendations; **Companies That Want You**, listing interested companies; and **Search Work**, enabling direct access to internship search features.

A notifications panel prominently displays recent updates or alerts. If no notifications are present, a placeholder message such as *"No Notifications Yet"* prompts the student to explore opportunities. Adjacent to the notifications panel is the **Upcoming Commitments** calendar widget, which showcases important dates and events, such as application deadlines, allowing students to stay on top of their schedules.At the bottom of the page, a navigation bar offers quick access to essential features, including **Homepage**, **Matchmaking** for personalized recommendations, **Monitoring** for tracking application

statuses, **Selection** for managing selection processes, and **Active Stage** for overseeing active internships.

9] Matchmaking Page .

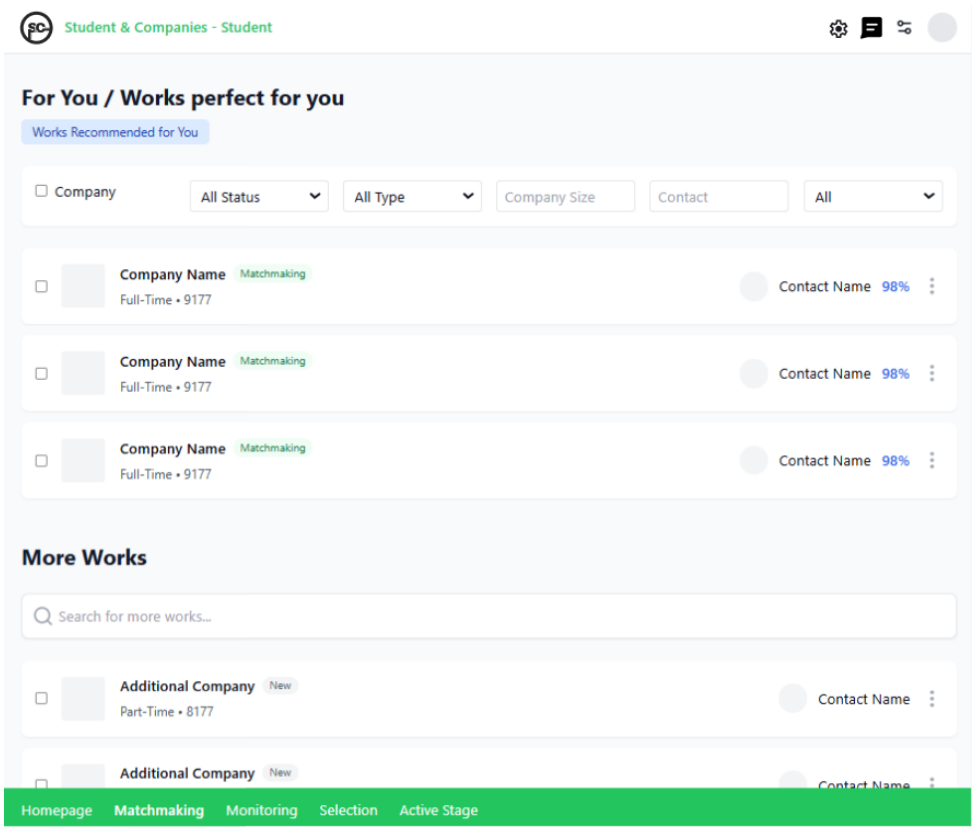

Figure 3.12: Matchmaking Page of the Students & Companies platform.

The **Matchmaking Page** (Figure 3.12) serves as a personalized interface for students to explore recommended internship opportunities. This page leverages the student's profile, skills, and preferences to connect them with positions most suitable to their background, streamlining the job search process.At the top of the page, the header *"For You / Works perfect for you"* establishes the purpose of the section, focusing on curated opportunities. The interface presents a dynamically updated list of positions, where each entry includes essential details such as the company name, type of position (*Full-Time* or *Part-Time*), company size, and a compatibility score (e.g., **98%**), which quantifies the alignment between the student's profile and the job requirements. Additionally, the contact information of a recruiter or company representative is displayed to facilitate communication.

Students can interact with each listing through an integrated action menu, which allows them to save positions for later review or proceed with an application. A comprehensive filter and search panel supports students in narrowing down their recommendations. Filters include criteria such as job type, industry keywords (e.g., *AI, NLP, Computer*

Vision), and company size. The search bar enhances the ease of locating specific companies or roles.At the bottom of the interface, pagination tools provide seamless navigation through multiple pages of recommendations. This ensures students can thoroughly explore all suitable opportunities.

10] Monitoring Page .
The **Monitoring Page** (Figures 3.13 and 3.14) provides students with a centralized platform to oversee the progress of their internship applications and manage company offers. This page is divided into two main sections: **Your Applications** and **Your Selection Offers**, offering detailed insights into the various stages of the application process.

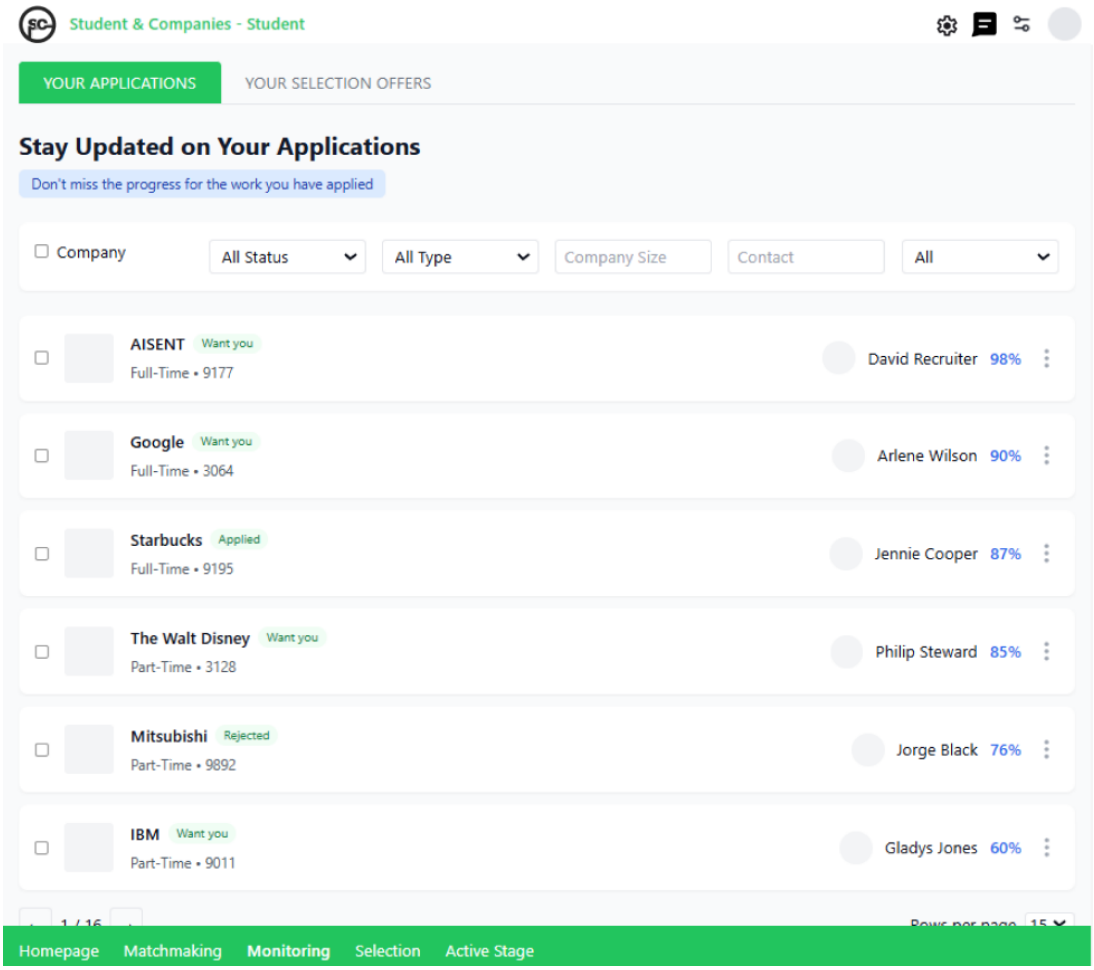

Figure 3.13: Monitoring Page - Stay Updated on Your Applications.

In the **Your Applications** section (Figure 3.13), students can track the status of their submitted applications. The interface includes a title, *"Stay Updated on Your Applications"*, which emphasizes the importance of maintaining awareness of application progress. A detailed table presents key information about each application, including the company name, the application status (such as *Not Seen, Seen*, or *Refused*), and the type of position, which may be either *Full-Time* or *Part-Time*. Additionally, the table displays the

name of the recruiter or company contact managing the position and includes a compatibility percentage that indicates how well the student's profile aligns with the job requirements. The table also provides actionable options, allowing students to withdraw their application or explore further details about the position.

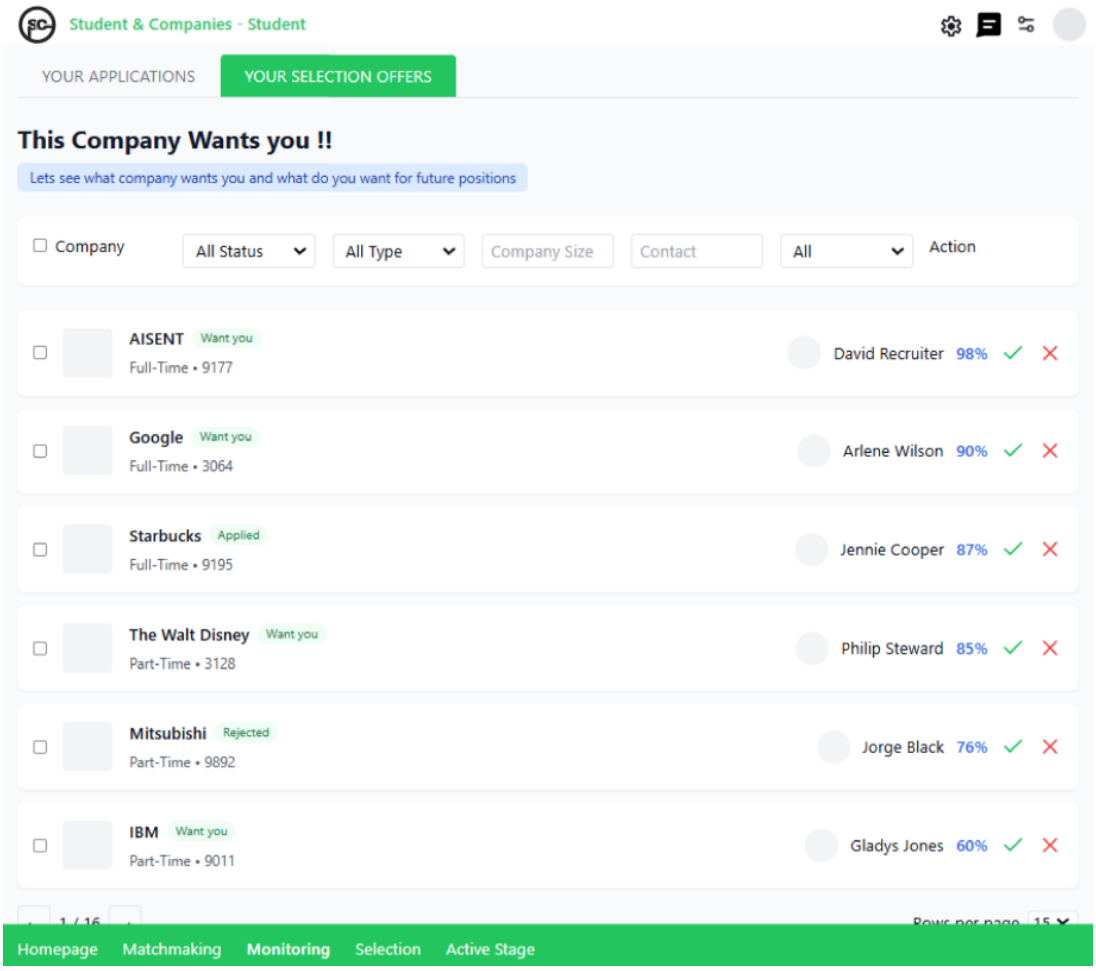

Figure 3.14: Monitoring Page - Your Selection Offers.

The **Your Selection Offers** section (Figure 3.14) highlights companies that have expressed interest in the student's profile. The header, *"This Company Wants You!!"*, is designed to encourage students to engage with tailored opportunities. A comprehensive table provides details about the interested companies, including their names, the status of the interaction (such as *Want You, Applied, Rejected*), and the type of position offered.

The table also specifies the recruiter or company staff member involved and provides a compatibility percentage that helps students evaluate the fit of each opportunity. Students can accept or decline offers directly from this page, facilitating quick and informed decision-making.

This page ensures that students remain informed and organized throughout their internship search, enabling them to respond effectively to both applications and offers while keeping track of their progress in a structured and user-friendly manner.

11] Selection Page .

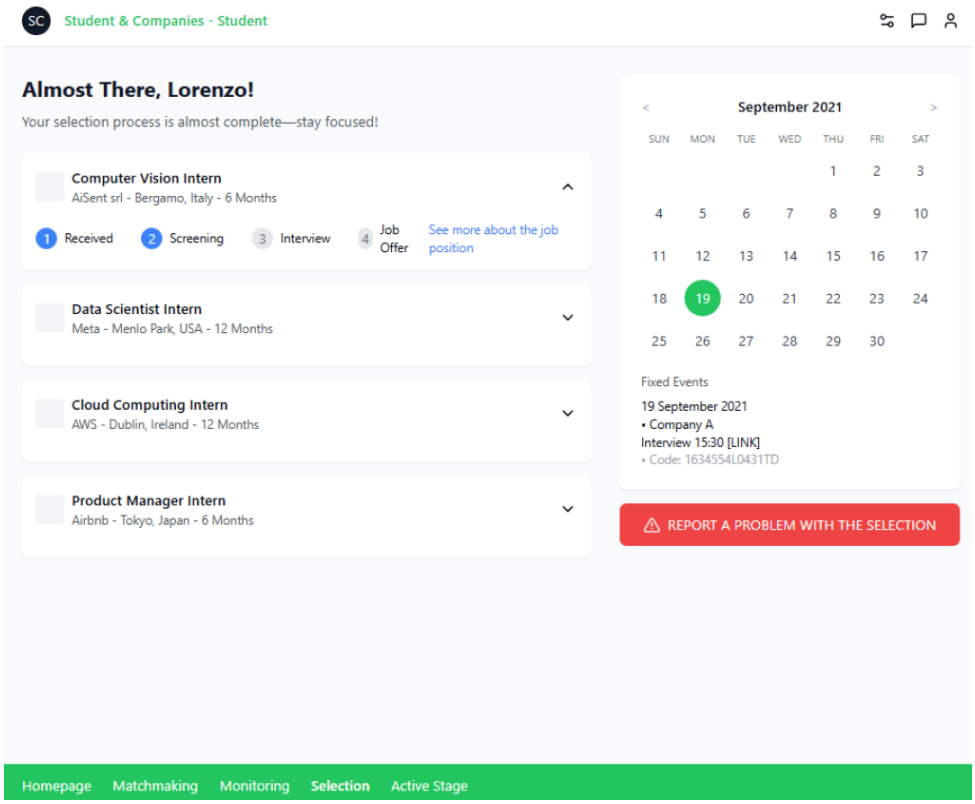

Figure 3.15: Selection Page of the Students & Companies platform.

The **Selection Page** (Figure 3.15) provides students with an organized and comprehensive view of their ongoing selection processes for internships. This page ensures that students are fully informed about their application progress and any upcoming events, helping them stay proactive throughout the recruitment stages. The interface begins with a motivational header, *"Almost There, Lorenzo!"*, accompanied by the subheading, *"Your selection process is almost complete—stay focused!"*, which reinforces the importance of perseverance at this stage. Below this, the page features a visual timeline that tracks the selection stages for each application. The stages—**Received**, **Screening**, **Interview**, and **Job Offer**—are clearly marked, with the current stage highlighted in blue for quick reference.

The main section lists all active applications, displaying key details about each position, such as the title and location. Each entry can be expanded to reveal additional information or provide navigation to the job description. A calendar widget is positioned on the right, displaying upcoming deadlines and events, such as interview schedules, with clickable links for quick access.To ensure that any concerns are promptly addressed, a prominent red action button labeled *"Report a Problem with the Selection"* allows students to communicate issues directly to the platform support team. At the bottom, a navigation bar facilitates seamless movement between the platform's core functionalities, such as *Homepage*, *Matchmaking*, *Monitoring*, and *Active Stage*.

12] Active Stage Page .

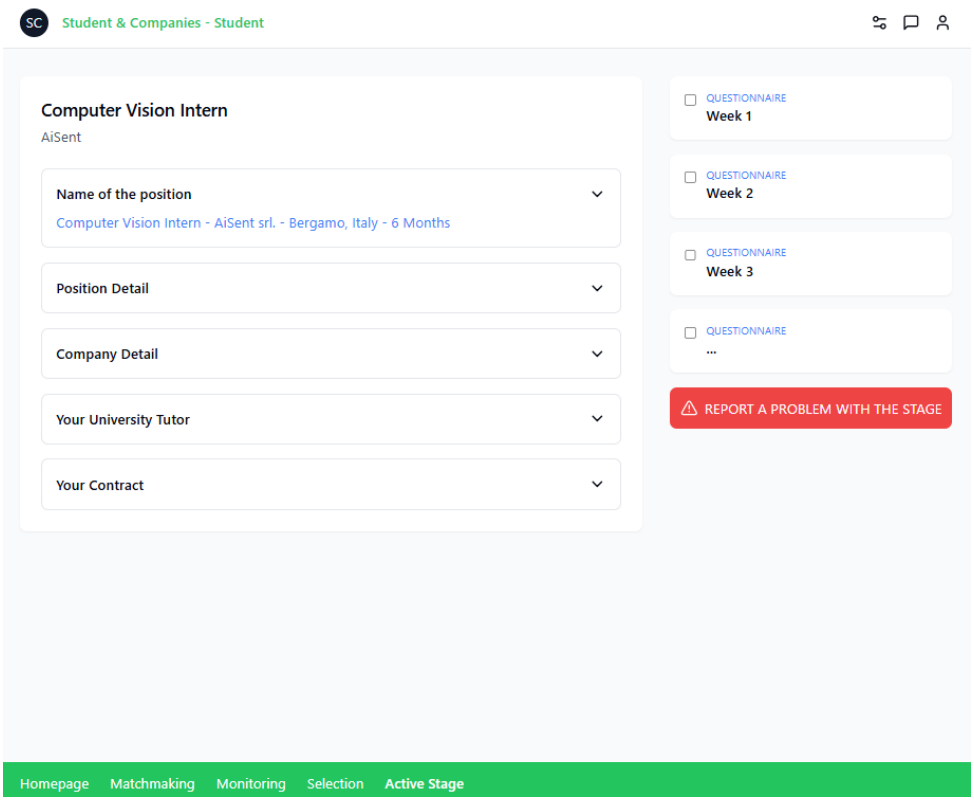

Figure 3.16: Active Stage Page of the Students & Companies platform.

The **Active Stage Page** (Figure 3.17) provides students with essential tools and detailed information to effectively manage their ongoing internships. By centralizing progress tracking, communication, and problem reporting, this page ensures a seamless and transparent experience for students, companies, and academic tutors.

This interface begins with a clear header displaying the title of the internship, such as *"Computer Vision Intern"*, along with the associated company name (*"AISent"*), providing an immediate context for the user. Expandable sections allow students to view key internship details, including the name of the position, specific responsibilities, and objectives, as well as detailed contact information for the company and the assigned academic tutor. The **Your Contract** section displays the terms and conditions of the internship, ensuring legal clarity and transparency.

A checklist for weekly questionnaires is prominently featured, enabling students to report their progress systematically. Each week is represented by a labeled box (e.g., *"Week 1," "Week 2," "Week 3"*), ensuring consistency in progress reporting throughout the internship duration. To address challenges, a bold red action button labeled *"Report a Problem with the Stage"* provides students with an immediate means to raise concerns directly through the platform. This ensures swift resolution of any issues that may arise during the internship.

13] Profile Settings Page .
The **Active Stage Page** (Figure 3.17) provides students with essential tools and detailed information to effectively manage their ongoing internships. By centralizing progress tracking, communication, and problem reporting, this page ensures a seamless and transparent experience for students, companies, and academic tutors.

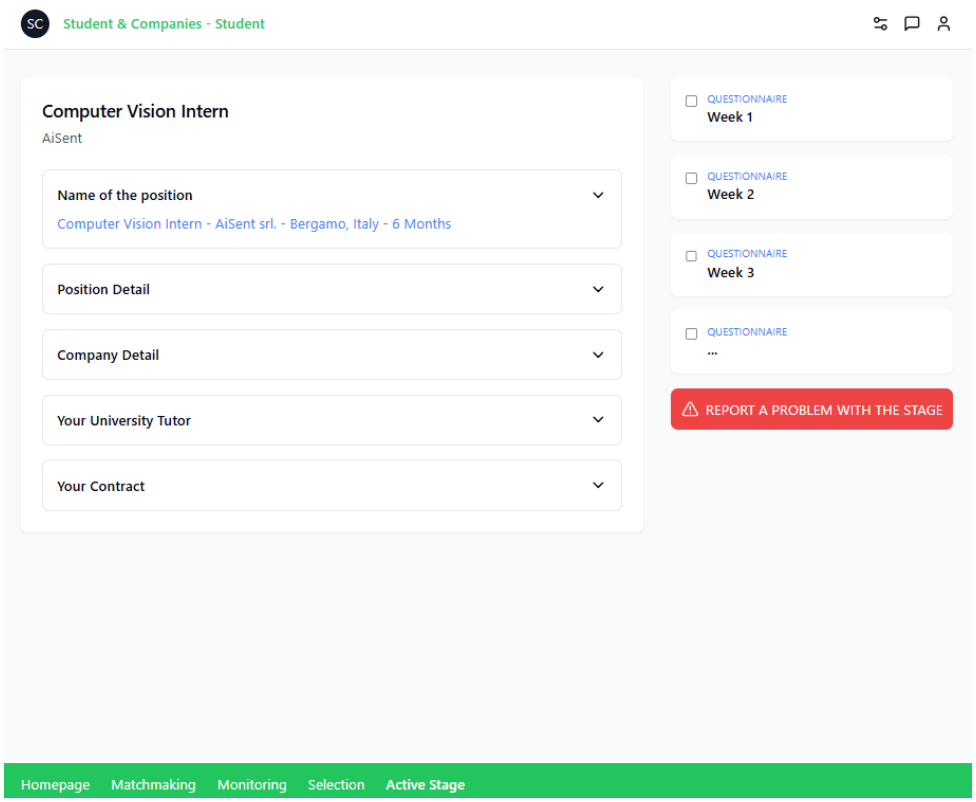

Figure 3.17: Active Stage Page of the Students & Companies platform.

This interface begins with a clear header displaying the title of the internship, such as *"Computer Vision Intern"*, along with the associated company name (*"AISent"*), providing an immediate context for the user. Expandable sections allow students to view key internship details, including the name of the position, specific responsibilities, and objectives, as well as detailed contact information for the company and the assigned academic tutor. The **Your Contract** section displays the terms and conditions of the internship, ensuring legal clarity and transparency.

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To address challenges, a bold red action button labeled *"Report a Problem with the Stage"* provides students with an immediate means to raise concerns directly through the platform. This ensures swift resolution of any issues that may arise during the internship.

At the bottom of the page, a navigation bar links to other core functionalities of the plat-

form, such as the *Homepage*, *Matchmaking*, *Monitoring*, and *Selection*, allowing students to navigate effortlessly between different sections of the platform.

14] Messaging Page .
The Messaging Page (Figure 3.18) enables direct communication between students, company representatives, and the platform's support team. This interface is essential for fostering effective dialogue throughout the internship search and application process.

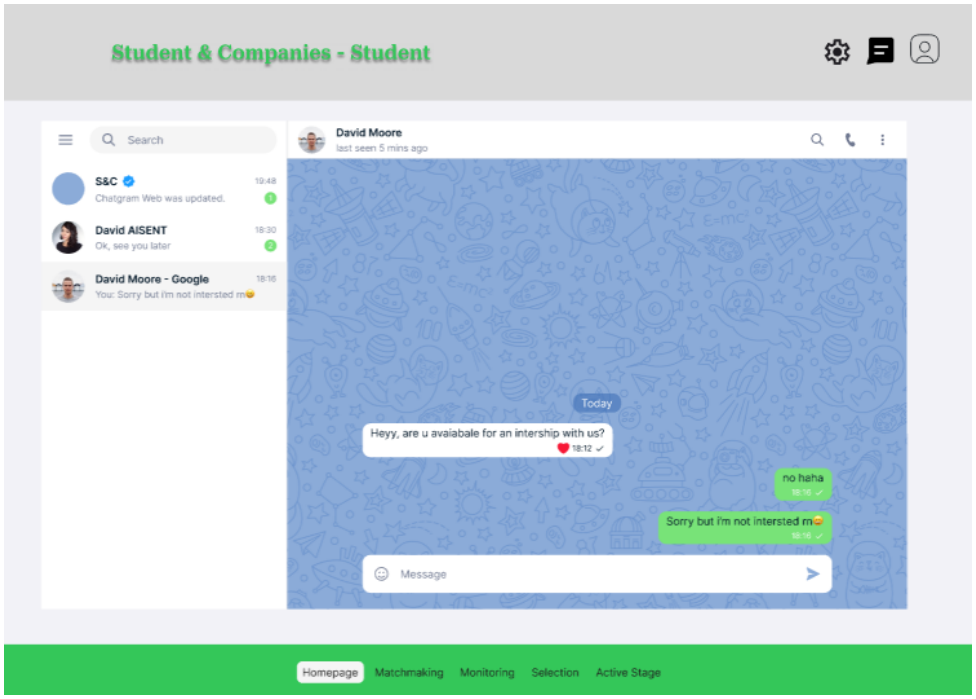

Figure 3.18: Messaging Page of the Students & Companies platform.

This page is designed to simplify communication, ensure clarity in messaging, and promote efficient interaction between all parties. Below is a breakdown of its components:

- **Chat List:** A panel on the left side displays all active conversations, including:
  - Messages from the platform's support team (*e.g., S&C Verified*).
  - Conversations with recruiters (*e.g., David Moore – Google*).
  - Timestamp indicators for the most recent messages.
- **Active Chat Window:** The main chat area features:
  - Messages exchanged between the student and the selected contact.
  - Visual indicators for read receipts (e.g., checkmarks) and message reactions (e.g., heart icon).
  - A toolbar at the top for additional actions such as searching within the conversation, initiating a call, or blocking the user.

- **Message Input Field:** A text box at the bottom allows students to type and send new messages.
- **Navigation Bar:** Located at the bottom of the page, linking to key sections such as *Homepage, Matchmaking, Monitoring, Selection,* and *Active Stage*.

User Actions: From this page, students can:

- Engage in real-time communication with company representatives or the platform's support team.
- Use message reactions to provide quick feedback.
- Search through past messages or escalate issues through the platform's messaging system.

3.1.2. Hardware Interfaces

S&C platform is designed to a web-based application that is accessible from a variety of devices. As such, it should not require any specialized hardware beyond standard computing devices.

A user that want to access the platform must have a reliable connection (either Wi-Fi or mobile data) and it should be able to access the platform using any desktop or laptop computer regardless of the operating system (Windows, MAC or Linux). Additionally, any user should be able to access the platform from smartphones and tables running on iOS or Android operating system.

The platform must also be compatible with the most used web browsers such as Google Chrome, Microsoft Edge or Safari without massive differences in terms of performance.

Lastly the platform should be hosted on cloud-based servers that ensure scalability and reliability. There should be also data redundancy on different servers to be used as backup and to deal with some errors that might happens.

S&C should also posses all the ACID properties to ensure atomicity, consistency, isolation and durability.

Atomicity ensure that a transaction is completed fully or not at all. The idea behind atomicity is that if a transaction fails midway, the system will acknowledge that the transaction was not complete and it will either undo all intermediate changes or retry the operation. As an example, if a student applies for an internship, the system must ensure that all relevant updates either happen entirely or are completely rolled back if an error occurs.

Consistency state that a transaction must transform the system from one valid state to another while preserving the data integrity. For example, consistency ensure that there can not be two students with same email, or a professor can not work for two universities. Consistency guarantees the correctness of the data: if the data is consistent before a transaction it will be consistent after a transaction too.

Isolation ensure that two transactions do not interfere with one another. This is fundamental since in a platform such as S&C multiple transactions may occur simulations, such as two or more students applying for an internships at the same time. The idea behind isolation is that a transaction is not affected by the behavior of other concurrent transactions and so it avoid inconsistency to be propagated.

Durability guarantees that once a transaction is successfully completed the changes produces by the transaction are permanent and stored reliably even if there are failures (such as a crash of the system). Durability with redundancy of data ensure that the data is not lost if a server fails. The effect of a transaction that has successfully committed will last "forever" independent of any system fault.

Of course, there is a trade-off since the implementation of the ACID properties require complex database mechanism that may increase operational costs.

3.1.3. Software Interfaces

S&C platform needs to interact with different external software systems and services. It is mandatory to ensure that all integrations comply with security and they include encryption of data with secure authentication mechanism. Also the APIs of the services that interact with S&C needs to handle increasing numbers of users without performance degradation.

University Verification API: a student needs to authenticate and verify if he/she is enrolled to a university. S&C connects with the university and institutional portals through their respective APIs to confirm that a user is a currently enrolled student.

Email Service API: used to facilitate commutation. It uses a service to send email such as registration confirmations, interview invitations and other notifications about new opportunities or updates.

Calendar integration APIs: used to synchronize internship-related events with user's personal calendars. S&C needs to be integrated with popular calendar services such as Google Calendar or Apple Calendar with the respective APIs. This is needed so that the user can add interview schedules, deadlines and other important events on his personal calendar.

Video Conferencing API: to facilitate online interviews and virtual meeting between the users of the platform. The API integration with Google Meet should allow automatic generation of meeting links and embedding of conferencing features within the S&C platform.

Feedback and Survey API: used to collect feedback from students and companies about the internship. It should be integrated with survey tools such as SurveyMonkey to distribute questionnaires and gather responses about internship experiences.

Since S&C platform is expected to operate primarily in Europe, where the majority of students seeking internships and companies looking to hire interns are expected to be located, it must comply with EU data protection regulations. Those rules apply to both companies in the EU and those based outside the EU who offer goods or services in the EU.

The General Data Protection Regulation (GDPR), describe different situations where a company is allowed to collect or reuse personal information. It is important to implement a mechanisms to obtain explicit consent from users for data processing activities and to provide functionalities that allow users to access their data and request deletion.

3.1.4. Communication Interfaces

To ensure a secure data transmission between the user and the server, S&C must obey the HTTPS protocol. All the data exchanged must be encrypted to guarantee privacy and protect sensitive information (credentials, personal information, company data...) from unauthorized access. Also is important to perform regular security updates and monitory to maintain compliance with the standards and to address any emerging threats. Lastly, S&C must follow up with relevant legal and regulatory requirements, such as GDPR or other data protection laws. The platform should regularly review and update its policies and security measures to stay aligned with any changes in legislation. In the event of legal updates or new regulations, S&C must adapt its systems and processes as soon as possible to remain compliant and protect user data effectively.

3.2. Functional Requirements

Definition of use case diagrams, use cases and associated sequence/activity diagrams, and mapping on requirements.

3.3. Performance Requirements

Performance is an important factor for any platform. Student&Companies is no different. In order for S&C to stand out from other possible competing platforms and to create a positive user experience, it is fundamental to have a high standard to increase the number of users and keep them loyal to the platform. Delays or slow interactions are correlated with frustration and a poor user experience. Therefore, it is important to have a responsible and reliable platform where both students, companies and professors can have a positive interaction and thus create a robust and active community.

A fast response time is crucial to improve the user experience: it ensures that a student can efficiently search and apply for an internship or get a timely recommendation for an internship. At the same time, a company can quickly communicate with students and review applications without wasting time waiting for a response from the platform.

Since there are different types of interactions a user can have with the S&C platform, it is useful to categorize them based on their complexity.

For basic interactions such as loading the screen, uploading a resume, navigating through different sections, it would be important to have a target response time of at most one second per request. This is because for actions that seem obvious, the user might expects a very fast response time, and if there is a delay, the user may be discouraged from continuing to use the platform.

Instead, for more complex interactions, such as searching for an internship with keywords or receiving personalized generated recommendations, the target response time should be at most three seconds per request. These interactions are more complex and the user may have to wait a little longer than expected because they require more data-intensive operations to complete.

It is also important to remember that the users of the S&C platform may be distributed in different regions, so it is essential to take into account geographical latency to maintain a positive user experience regardless of where the user is located. The servers of the platform should be located in key geographical areas where the traffic can be more intense (close to the main cities and the largest universities).

A problematic period would obviously be when there is a high traffic to the website. An example could be when a company launches a large recruitment campaign or when a university collaborates with companies to promote internships, leading to many students accessing the platform simultaneously. To mitigate the risk of slowing down the response rate of the platform, it would be highly advisable to distribute the traffic across multiple servers, thus preventing a single server from being overwhelmed. In addition, it would be advisable to cache frequently accessed data by using in-memory caching systems.

Scalability is an important performance requirement that should be implemented by S&C. There should be the ability to add more servers to handle increased load without significant downtime and to ensure that the system can scale resources (CPU, memory) on existing servers as needed.

Lastly, to keep the platform in good health, it is important to continually monitor the platform and to do some performance testing. It is important to track key performance indicators such as response time, CPU usage, memory usage and error rates to assess the health of the system. It is also important to regularly test the performance of the platform under heavy load or traffic to identify and address bottlenecks. By simulating real-world scenarios, you can anticipate potential problems and improve the user experience.

3.4. Design Constraints

3.4.1. Standards Compliance

3.4.2. Hardware Limitations

3.4.3. Any Other Constraint

3.5. Software System Attributes

3.5.1. Reliability

3.5.2. Availability

3.5.3. Security

3.5.4. Maintainability

3.5.5. Portability

4 | Formal Analysis Using Alloy

This chapter represent an abstract model of the S&C platform and it mainly focus on the structural elements of the platform and the relationships between them. Due to the complexity of the platform and time constraint, it was not possible to express all the functionalities and characteristics. Some components (such as calendars, drafts of internships, direct messaging, questionnaires and meeting managements) are not included.

This code is divided in three subsections:

- **Signatures**: defines all the signatures (Students, Companies, Internships,...).
- **Facts**: impose constraints to ensure that the model reflects valid states of the system.
- **Testing Facts**: contains additional facts for testing the alloy code. They can be commented since they do not directly affects the constraints of the S&C platform.

```
1  // ---------------------------------  SIGNATURES
       ---------------------------------
2
3  // USERS  // generic user (used for people: Student, CompanyTutor
       and Professor)
4  abstract sig User {
5      communicate: set User  // users can communicate with a set of
           other users
6  }
7
8  // STUDENT
9  sig Student extends User {
10     belongsTo: one University,  // must be enrolled in exactly
           one university
11     haveStudentInformation: one StudentInformation_CV,  // must
           have exactly one StudentInformation_CV
12     universityMail: one Email,  // must have exactly one
           university mail
13     visualize: set Internship,  // can visualize the internships
14     applies: set Internship,  // can apply to internships
15     seeCompanyProblem: set ProblemOfCompany // can see the
           companyProblem
16 }
17
```

```
// COMPANYTUTOR
sig CompanyTutor extends User {
    workFor: one Company,  // must work for exactly one company
    manages: some Internship,   // manage 0, 1 or more internships
    read: set StudentInformation_CV,  // can read students' StudentInformation_CV
    evaluations: set InternshipStatus,  // can evaluate students
    see: set ProblemOfStudent,  // can see reported problems
    seeCompanyProblem: set ProblemOfCompany, // new field
    manageProblemOfCompany: set ProblemOfCompany // new field
}

// PROFESSOR
sig Professor extends User {
    worksFor: one University,  // must work for exactly one university
    see: set ProblemOfStudent, //  each professor has a set of problemsOfStudents they can see
    seeCompanyProblem: set ProblemOfCompany,  // each professor has a set of problemsOfSComapny they can see
    manageProblemOfStudent: set ProblemOfStudent // professors manage problems
}

// COMPANIES
sig Company {
    representBy: some CompanyTutor,  // is represented by 0,1 or more companyTutor
    offerInternships: set Internship,  // can offers internships on the platform
    haveCompanyInformation: one CompanyInformation  // each company has one and only one CompanyInformation
}

// INTERNSHIPS
sig Internship {
    offeredBy: one CompanyTutor,  // each internship is offered by exactly one companyTutor
    offeredFor: one Company, // each internship is offered for exactly one company
    haveInternshipInformation: one InternshipInformation, // each internship has some information
     terminated: lone Positive  // each internship will eventually terminate
}

// UNIVERSITIES
sig University {
    hasStudents: set Student, // each university has some students
```

```
55      haveUniversityInformation: one UniversityInformation, // each
            university has some information
56      associatedToUni: set Professor,  //each university employs
            some professors
57      monitor: set Student  // university monitor students
58  }
59
60  // INTERNSHIPSTATUS
61  sig InternshipStatus {
62      companyTutor: one CompanyTutor,  // an internshipStatus has
            one companyTutor (who accepts or not the internship)
63      internship: one Internship,  // the internshipStatus focuses
            on one specific internship
64      student: one Student,  // each internshipStatus focuses on
            one specific student
65      result: one EvalResult, // each internshipStatus must have a
            result
66      universityTutor: lone Professor // If result is positive,
            assign a professor of the student's university
67  }
68
69  // FEEDBACK INTERNSHIP
70  sig FeedbackToInternship {
71      feedbackInternshipFor: one Company,   // feedback for exactly
            one company
72      feedbackInternshipOn: one Internship,        // feedback on
            exactly one internship
73      feedbackInternshipAbout: one InternshipInformation  //
            feedback about exactly one internship information
74  }
75
76  // FEEDBACK STUDENT
77  sig FeedbackToStudent {
78      feedbackStudentAbout: one StudentInformation_CV,       // The
            StudentInformation_CV being reviewed
79      feedbackStudentFor: one Student      // The student receiving
            the feedback
80  }
81
82  // PROBLEM OF STUDENT
83  sig ProblemOfStudent {
84      reportedBy: one Student,           // Each problem is
            reported by exactly one student
85      aboutInternship: one Internship,   // Each problem is about
            exactly one internship
86      terminateInternship: one (Positive + Negative) //
            terminateInternship points to either Positive or Negative
87  }
88
```

```
// PROBLEM OF COMPANY
sig ProblemOfCompany {
    reportedBy: one CompanyTutor,    // reported by exactly one CompanyTutor
    aboutInternship: one Internship,       // about exactly one internship
    terminateInternship: one (Positive + Negative) // the problem leads to a positive or negative termination
}

// ALGORITHM
// is the one suggesting all the feedbacks to students and internships
one sig Algorithm {
    suggestoToStudent: set FeedbackToStudent,
    suggestoToInternship: set FeedbackToInternship
}

// MISCELLANEOUS
sig Email {associatedTo: lone University}
sig InternshipInformation {}
sig CompanyInformation {}
sig UniversityInformation {
    describesUni: one University
}
sig StudentInformation_CV {
    owner: one Student // each haveStudentInformation belongs to one student only
}
abstract sig EvalResult {}
one sig Positive extends EvalResult {}  // the result of an evaluation can be positive
one sig Negative extends EvalResult {}  // or negative




// ---------------------------------  FACTS
    ---------------------------------



// each CompanyTutor works for exactly one company
// and each CompanyTutor manages internships offered by their company
fact OneCompanyTutorToOneCompany {
    all c: Company | all r: c.representBy | r.workFor = c
    all cr: CompanyTutor | one cr.workFor
```

```
130     all cr: CompanyTutor | cr.manages in
            cr.workFor.offerInternships
131 }
132
133 // each internship is offered by the correct company
134 fact companyToInternship {
135     all c: Company | all i: c.offerInternships | i.offeredFor = c
136 }
137
138 // each internship is managed by the correct companyTutor
139 fact companyRepToInternship {
140     all cr: CompanyTutor | all i: cr.manages | i.offeredBy = cr
141 }
142
143 // guarantees that each internship offered for a company is the
        same company for which the companyTutor works
144 fact InternshipOfferedByCorrectCompanyTutor {
145     all i: Internship | i.offeredFor = i.offeredBy.workFor
146 }
147
148 // each email is assigned to at most one student and must be the
        student's university mail
149 fact EmailsAssignedToOnlyOneStudent {
150     all e: Email | lone s: Student | e = s.universityMail
151 }
152
153 // no student can have the same university mail
154 fact UniqueUniversityMails {
155     all disj s1, s2: Student | s1.universityMail !=
            s2.universityMail
156 }
157
158 // every mail is either a student's university mail
159 // and university mail are managed by the university to which the
        student belongs
160 fact EmailManager {
161     all e: Email | some s: Student | e = s.universityMail
162     all s: Student | s.universityMail.associatedTo = s.belongsTo
163 }
164
165 // each internship has unique information
166 fact UniqueInternshipInformation {
167     all disj i1, i2: Internship | i1.haveInternshipInformation !=
            i2.haveInternshipInformation
168 }
169
170 // there can not exist an InternshipInformation not linked to an
        internship
171 fact AllInformationsLinked {
```

```
172     all d: InternshipInformation | some i: Internship |
            i.haveInternshipInformation = d
173 }
174
175 // a student has exactly one StudentInformation_CV, and it
        belongs only to that student
176 fact StudentOwnsTheirStudentInformation_CV {
177     all s: Student | s.haveStudentInformation.owner = s
178     all disj c1, c2: StudentInformation_CV | c1.owner = c2.owner
            implies c1 = c2
179 }
180
181 // a student first needs to visualize an internship before
        applying
182 fact ApplicationRequiresVisualization {
183     all s: Student, i: Internship |
184         i in s.applies implies i in s.visualize
185 }
186
187 // each university has a unique universityInformation
188 fact OneToOneUniversityAndUniversityInformation {
189     all disj u1, u2: University | u1.haveUniversityInformation !=
            u2.haveUniversityInformation
190     all d: UniversityInformation |
            d.describesUni.haveUniversityInformation = d
191 }
192
193 // a professor works for exactly one university and is employed
        by it
194 fact ProfessorWorksForUniversity {
195     all p: Professor | p.worksFor in University
196     all p: Professor | p in p.worksFor.associatedToUni
197 }
198
199 // each professor is employed by exactly one university
200 fact EachProfessorEmployedByOnlyOneUniversity {
201     all p: Professor | one u: University | p in u.associatedToUni
202 }
203
204 // eventually, every internship application will be evaluated by
        the companyTutor
205 fact EventuallyEvaluated {
206     all s: Student, i: Internship |
207         i in s.applies implies
208         eventually (
209             some eval: InternshipStatus |
210                 eval.internship = i and
211                 eval.companyTutor in i.offeredBy and
212                 eval.student = s
```

```
        )
}

// an evaluation for an internship application can be done only by the companyTutor that manages that internship
fact ValidInternshipStatus {
    all eval: InternshipStatus |
        eval.internship in eval.companyTutor.manages and
        eval.internship in eval.student.applies
}

// to evaluate an internship, the companyTutor needs to read the student's StudentInformation_CV first
fact IfEvaluatedThenReadStudentInformation_CV {
    all eval: InternshipStatus |
        eval.student.haveStudentInformation in
           eval.companyTutor.read
}

// every university has at least one professor
fact EveryUniversityHasAtLeastOneProfessor {
    all u: University | some u.associatedToUni
}

// an evaluation for an internship can either be positive or negative
fact InternshipStatusResultValidity {
    all eval: InternshipStatus | eval.result in EvalResult
}

// the companyTutor that evaluates the internship must be the one who offered the same internship
fact InternshipStatusTutorMustBeInternshipOwner {
    all e: InternshipStatus | e.companyTutor =
       e.internship.offeredBy
}

// bidirectional between companyTutor and the evaluations
fact CompanyTutorInternshipStatussBidirectional {
    all ct: CompanyTutor | ct.evaluations = { e: InternshipStatus
       | e.companyTutor = ct }
}

// every internship application of a student must have a corresponding evaluation (1-to-1)
fact EveryApplicationHasInternshipStatus {
    all s: Student, i: Internship |
        i in s.applies implies some e: InternshipStatus |
           e.student = s and e.internship = i
```

```
}

// ensures a companyTutor can only read StudentInformation_CVs of students they have evaluated
fact ReadOnlyEvaluatedStudentInformation_CVs {
    all ct: CompanyTutor | ct.read = ct.evaluations.student.haveStudentInformation
}

// If evaluation result is Positive, a suitable professor (from the student's university) must be assigned.
// If evaluation result is Negative, no universityTutor is assigned.
fact UniversityTutorAssignment {
    all eval: InternshipStatus |
        ((eval.result = Positive) =>
            (some eval.universityTutor and eval.universityTutor in eval.student.belongsTo.associatedToUni))
        and
        ((eval.result = Negative) => no eval.universityTutor)
}

// define when a University monitors a Student
fact UniversityMonitorsStudent {
    all u: University, s: Student |
        s in u.monitor iff (
            s.belongsTo = u and
            some i: Internship | i in s.applies and
            some eval: InternshipStatus |
                eval.internship = i and
                eval.student = s and
                eval.result = Positive
        )
}

// internship mentioned in the feedback is actually offered by the company in "feedbackFor"
fact FeedbackMatchesCompanyOffer {
    all f: FeedbackToInternship | f.feedbackInternshipOn in f.feedbackInternshipFor.offerInternships
}

// feedbackAbout internship information matches the internship's information
fact FeedbackMatchesInternshipInformation {
    all f: FeedbackToInternship | f.feedbackInternshipAbout = f.feedbackInternshipOn.haveInternshipInformation
}

```

```
// at most one feedback per internship
fact AtMostOneFeedbackPerInternship {
    all disj f1, f2: FeedbackToInternship |
       f1.feedbackInternshipOn != f2.feedbackInternshipOn
}

fact FeedbackToStudentCorrespondence {
    all fs: FeedbackToStudent | fs.feedbackStudentAbout =
       fs.feedbackStudentFor.haveStudentInformation
    all s: Student | one fs: FeedbackToStudent |
       fs.feedbackStudentFor = s     // a student has exactly one
       FeedbackToStudent
}

// for each internship at most one positive evaluation
fact OnlyOnePositiveInternshipStatusPerInternship {
    all i: Internship | lone e: InternshipStatus | e.internship =
       i and e.result = Positive
}

// only students with a positive evaluation for that internship
   can report a problem
fact OnlyStudentsWithPositiveInternshipStatusCanReportProblem {
    all p: ProblemOfStudent |
        some eval: InternshipStatus |
            eval.student = p.reportedBy and
            eval.internship = p.aboutInternship and
            eval.result = Positive
}

// communicate only if the evaluation is positive
fact PositiveInternshipStatusCommunications {
    all eval: InternshipStatus |
        eval.result = Positive implies (
            let s = eval.student,
                t = eval.companyTutor,
                p = eval.universityTutor |
                // communication between student and companytutor
                s in t.communicate and
                t in s.communicate and
                // communication between student and
                   universitytutor
                s in p.communicate and
                p in s.communicate and
                // communication between company tutor and
                   universitytutor
                t in p.communicate and
                p in t.communicate
        )
```

```
}

// all feedbacks are connected to the single algorithm
fact AllFeedbacksConnectedToAlgorithm {
    Algorithm.suggestoToStudent = FeedbackToStudent
    Algorithm.suggestoToInternship = FeedbackToInternship
}

// ensure that every CompanyInformation is linked to exactly one Company
fact AllCompanyInformationsLinked {
    all ci: CompanyInformation | one c: Company | c.haveCompanyInformation = ci
}

// ensure that no company shares the same CompanyInformation
fact UniqueCompanyInformationPerCompany {
    all disj c1, c2: Company | c1.haveCompanyInformation != c2.haveCompanyInformation
}

// an internship can have at most one problem (0 or 1) of student
fact AtMostOneProblemPerInternship {
    all i: Internship | lone p: ProblemOfStudent | p.aboutInternship = i
}

// restrict communications
fact RestrictCommunications {
    all u, v: User |
        u in v.communicate implies (
            some eval: InternshipStatus |
                eval.result = Positive and
                (
                    (eval.student = u and eval.companyTutor = v) or
                    (eval.companyTutor = u and eval.student = v) or
                    (eval.student = u and eval.universityTutor = v) or
                    (eval.universityTutor = u and eval.student = v) or
                    (eval.companyTutor = u and eval.universityTutor = v) or
                    (eval.universityTutor = u and eval.companyTutor = v)
                )
        )
}
```

```
373
374 // professor can see reported problems of students they tutor
375 fact ProfessorCanSeeReportedProblems {
376     all p: ProblemOfStudent | {
377         some eval: InternshipStatus | (
378             eval.internship = p.aboutInternship and
379             eval.student = p.reportedBy and
380             eval.result = Positive and
381             p in eval.universityTutor.see
382         )
383     }
384 }
385
386 // a companyTutor can see only the problems reported by the
    students about an internship they manage
387 fact CompanyTutorSeesOnlyManagedProblems {
388     all p: ProblemOfStudent | {
389         let ct = p.aboutInternship.offeredBy {
390             p in ct.see
391             all otherCT: CompanyTutor - ct | p not in otherCT.see
392         }
393     }
394 }
395
396 // companyTutor sees problems of managed internships
397 fact CompanyTutorSeesProblemsOfManagedInternships {
398     all p: ProblemOfStudent |
399         p in p.aboutInternship.offeredBy.see
400 }
401
402 // if a professor sees a problem, then the professor manages that
    problem
403 fact ProfessorSeesImplyManagesProblem {
404     all p: Professor, prob: ProblemOfStudent |
405         prob in p.see implies prob in p.manageProblemOfStudent
406 }
407
408 // there can be at most one ProblemOfCompany per internship
409 fact AtMostOneProblemOfCompanyPerInternship {
410     all i: Internship | lone p: ProblemOfCompany |
        p.aboutInternship = i
411 }
412
413 // only company tutors with a positive evaluation for an
    internship can report a ProblemOfCompany on that internship
414 fact
    OnlyCompanyTutorsWithPositiveInternshipStatusCanReportProblemOfCompany
    {
415     all p: ProblemOfCompany |
```

```
416         some eval: InternshipStatus |
417             eval.companyTutor = p.reportedBy and
418             eval.internship = p.aboutInternship and
419             eval.result = Positive
420 }
421
422 // professors, companyTutors and students associated with a
    positive evaluation see the ProblemOfCompany
423 fact VisibilityOfProblemOfCompany {
424     all p: ProblemOfCompany | {
425         some eval: InternshipStatus | (
426             eval.internship = p.aboutInternship and
427             eval.companyTutor = p.reportedBy and
428             eval.result = Positive and
429             p in eval.companyTutor.seeCompanyProblem and
430             p in eval.universityTutor.seeCompanyProblem and
431             p in eval.student.seeCompanyProblem
432         )
433     }
434 }
435
436 // if a CompanyTutor sees a company problem, they must also
    manage it
437 fact CompanyTutorSeesImplyManagesProblemOfCompany {
438     all ct: CompanyTutor, prob: ProblemOfCompany |
439         prob in ct.seeCompanyProblem implies prob in
               ct.manageProblemOfCompany
440 }
441
442 // if there is a problem and that problem requires the end of the
    internship
443 // then the internship will end
444 fact ProblemForcesTermination {
445   all ps: ProblemOfStudent |
446     (ps.terminateInternship = Positive) =>
          (ps.aboutInternship.terminated = Positive)
447   all pc: ProblemOfCompany |
448     (pc.terminateInternship = Positive) =>
          (pc.aboutInternship.terminated = Positive)
449 }
450
451 // eventually all internship must come to an end
452 fact EventuallyAllInternshipsTerminate {
453   all i: Internship | eventually (i.terminated = Positive)
454 }
455
456
457
458 // ---------------------------------  TESTING FACTS
```

```
    ----------------------------------

// there should be at least one visualization of an internship
   made by a student
fact AtLeastOneVisualization {
    some s: Student | some i: Internship | i in s.visualize
}

// there exists at least some internship application
fact AtLeastOneApplication {
    some s: Student | some i: Internship | i in s.applies
}

// minimum count for some signatures
fact {
    #Student > 1
    #Company > 1
    #CompanyTutor > 1
    #University > 1
    #Professor > 1
    #InternshipStatus >1
    #ProblemOfStudent >1
    #FeedbackToStudent > 1
    #FeedbackToInternship > 1
    #CompanyInformation > 1
    #ProblemOfCompany > 1
}

// at least one positive evaluation
fact AtLeastOnePositiveInternshipStatus {
    some e: InternshipStatus | e.result = Positive
}

//fact AtMostTwoPositiveEvaluations {
//    # { i: InternshipStatus | i.result = Positive } <= 2
//}

// Each student can have at most one InternshipStatus with a
   Positive result
fact OnePositiveInternshipStatusPerStudent {
    all s: Student | lone e: InternshipStatus | e.student = s and
       e.result = Positive
}

// ---------------------------------- RUN COMMAND
   ----------------------------------
run {} for 10 // but 2 Company, 4 CompanyTutor, 5 Internship, 5
   StudentInformation_CV, 2 University, 10 Email, 10
   InternshipInformation, 4 InternshipStatus, 2 EvalResult
```

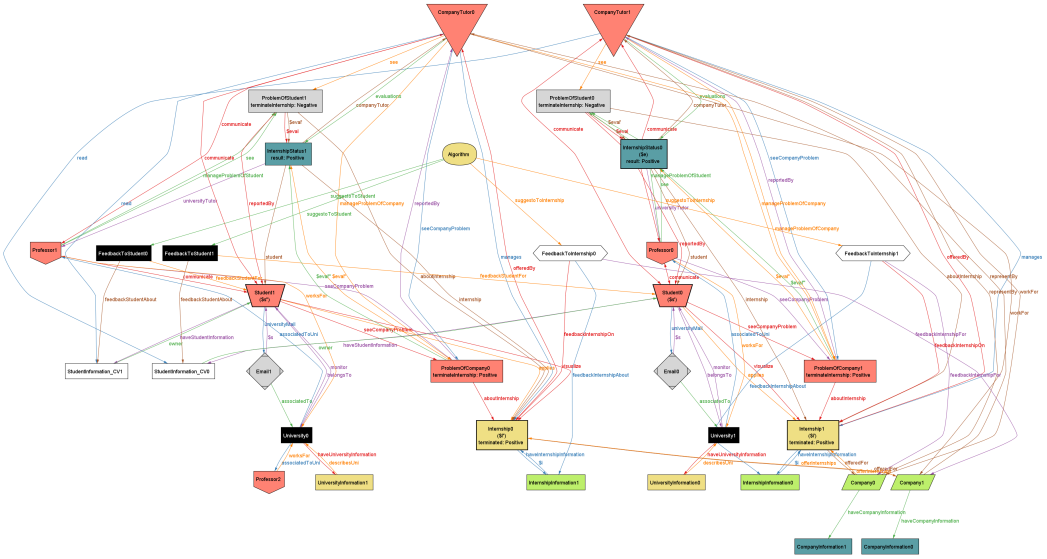

Figure 4.1: Enter Caption

5 | Effort Spent

In this section you will include information about the number of hours each group member has worked for this document.

Acquadro Patrizio

chapter	Effort (In hours)
1	0
2	0
3	0
4	0

Colosio Giacomo

chapter	Effort (In hours)
1	0
2	0
3	0
4	0

Drugman Tito Nicola

chapter	Effort (In hours)
1	0
2	0
3	0
4	0

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List of Figures

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