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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 CVs for students and project descriptions for companies).

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.
- **[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 to enhance the matching.
- **[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

This section focuses on identifying the phenomena within the "Students&Companies" (S&C) domain, distinguishing between phenomena controlled by the world, by the machine, and those shared by both, thereby adopting the "World-Machine Approach." S&C is a platform designed to facilitate connections between university students and companies, supporting the entire cycle of internship offer management. The main actors interacting with the system are students, companies, and universities.

Students

Students use the platform to receive, search for, and apply to internships. They can explore the different available offers, submit applications, and receive notifications about opportunities that match their interests and profile. They can also receive feedback from the system to improve their resumes, making their profiles more attractive to companies.

Companies

Companies use the platform to post internship offers, receive relevant applications, and manage the entire selection process. They can view students' resumes, invite them for interviews, and provide evaluations upon the completion of the internship experience. They can also receive feedback from the system to improve the description of their job offers, helping them attract better talent.

Universities

Universities monitor the progress of internships and support students in their educational journey. Through the platform, universities can verify the correct conduct of internships, offer support to students, and manage any issues that arise during the work experience. For example, if a student reports difficulty adjusting to the assigned tasks, the university can intervene by coordinating with the company to provide additional guidance or adjust the workload.

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.).

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

- **[SP1]** Student creates a profile on the platform.
- **[SP2]** Company creates a profile on the platform.
- **[SP3]** Students upload their resumes on the platform.
- **[SP4]** Companies upload internship-related information (technical and contractual details) on the platform.
- **[SP5]** Students manually search for internship offers, using possible filter parameters (field, city, distance from a specific location, paid/unpaid).
- **[SP6]** Students manually view and select internship offers that interest them.
- **[SP7]** Students submit applications for relevant internships for himself/herself through the platform, which makes them visible to companies.
- **[SP8]** Universities have the option to terminate an internship due to severe conditions between students and companies, indicating the reason for such termination.

Machine controlled

- **[SP9]** The system sends notifications to students when new internship offers matching their interests are available.

- **[SP10]** The system sends notifications to companies when new candidates matching their interests are available.
- **[SP11]** Companies receive student applications through the platform.
- **[SP12]** The system provides a section for message exchange, for organizing meetings between companies and student candidates, as well as updating internship progress and reporting student complaints to universities.
- **[SP13]** The system facilitates the organization of interviews between students and companies: scheduling section (calendar).
- **[SP14]** The system facilitates the organization of interviews between students and companies: section for conducting interviews (video call platform).
- **[SP15]** The system requests students and companies to complete a questionnaire (multiple-choice and open-ended questions) to provide feedback on the internship experience (recommended or completed) to improve the recommendation system.
- **[SP16]** The system provides feedback to students and companies on their uploaded content (resumes and internship details) to obtain better matches and improve engagement.

1.2.3. Machine Phenomena

Machine-controlled phenomena are automatic operations performed by the system, which are crucial for its functioning. These phenomena occur without human intervention, and thus without being observed by the "world." They include:

- **[MP1]** The system processes student resume data and company internship offers to generate personalized recommendations.
- **[MP2]** The system collects statistics on offered internships and provided feedback, creating reports to improve recommendation processes.
- **[MP3]** The platform manages automatic notifications, sending updates to students, companies, or universities about new matches or messages, and reminding them of scheduled meetings.
- **[MP4]** The platform automatically verifies the completeness of student profiles and company offers, suggesting necessary corrections or additions.

1.3. Definitions, Acronyms, Abbreviations

1.4. Revision History

1.5. Reference Documents

1.6. Document Structure

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 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*
- *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 escalates 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 are tailored to 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*
- *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*
- *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

Here we include the most important requirements.

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 expertise 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

Here we include domain assumptions.

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 mock-ups, 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:

- **General Interfaces:** (From 1 to 3)
- **Student Interfaces:** (From 4 to 12)
- **Company Interfaces:**(From 1X–X)
- **University Tutor Interfaces:** (From X to X)

1/ Login/Sign-Up Interface .

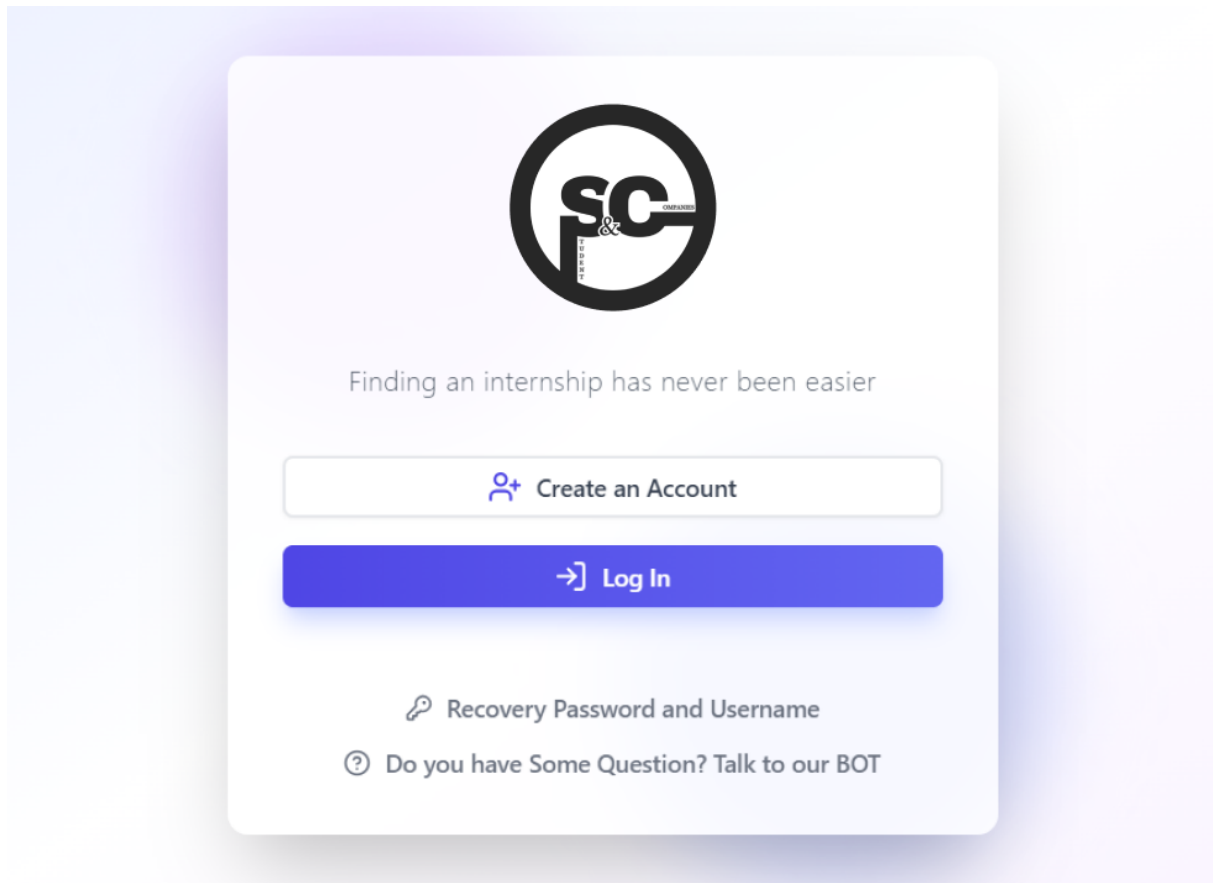


Figure 3.1: Login/Sign-Up Interface of the Students & Companies platform.

The Login/Sign-Up interface (Figure 3.1) acts as the primary access point to the **Students & Companies (S&C)** platform. This interface is carefully designed to be intuitive and straightforward, accommodating the diverse needs of its users, including students, recruiters, and university staff. At the top of the interface, the platform's logo and tagline, *"Finding an internship has never been easier"*, are prominently displayed, immediately conveying the platform's purpose and reinforcing its branding. Below, users are presented with two core actions: creating a new account or logging into an existing one. These actions are visually distinguished to ensure ease of use for both new and returning users.

Additionally, the interface incorporates support options to assist users in resolving potential issues. For instance, links to recover forgotten credentials and access chatbot assistance provide reassurance and maintain accessibility.

Overall, the Login/Sign-Up interface sets the tone for the user experience by combining simplicity with essential functionality, ensuring that all users can quickly and efficiently engage with the platform.

2/ Log In Interface .

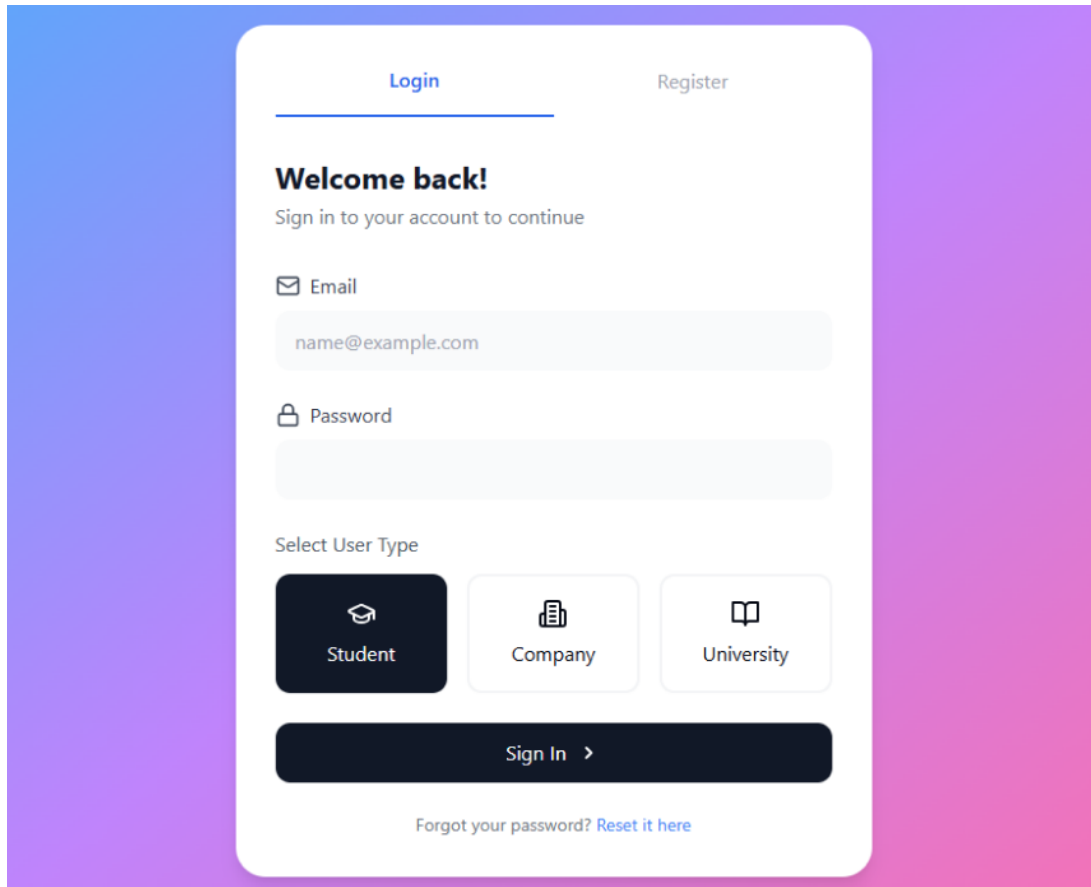


Figure 3.2: Log In Interface of the Students & Companies platform.

The Log In Interface (Figure 3.2) provides users with secure access to the **Students & Companies (S&C)** platform. Designed for clarity and functionality, it accommodates all user roles, including students, company staff, and university representatives, ensuring a seamless login process tailored to each user's needs.

The interface is structured to streamline access for returning users while guiding them to select the appropriate user role. The login form includes fields for securely entering email and password, paired with a user role selection that highlights three distinct categories: **Student**, **Company**, and **University**. By selecting their role, users ensure access to the features and data relevant to their specific needs.

The navigation tabs at the top of the page allow quick toggling between **Log In** and **Register**, providing clear pathways for both existing and new users. For those needing additional support, the interface includes a convenient link to reset forgotten passwords, maintaining accessibility for all. Overall, this page ensures that users can quickly and securely access the platform, with a simple, intuitive design that reflects the professionalism of the S&C system.

3/ Registration Page .

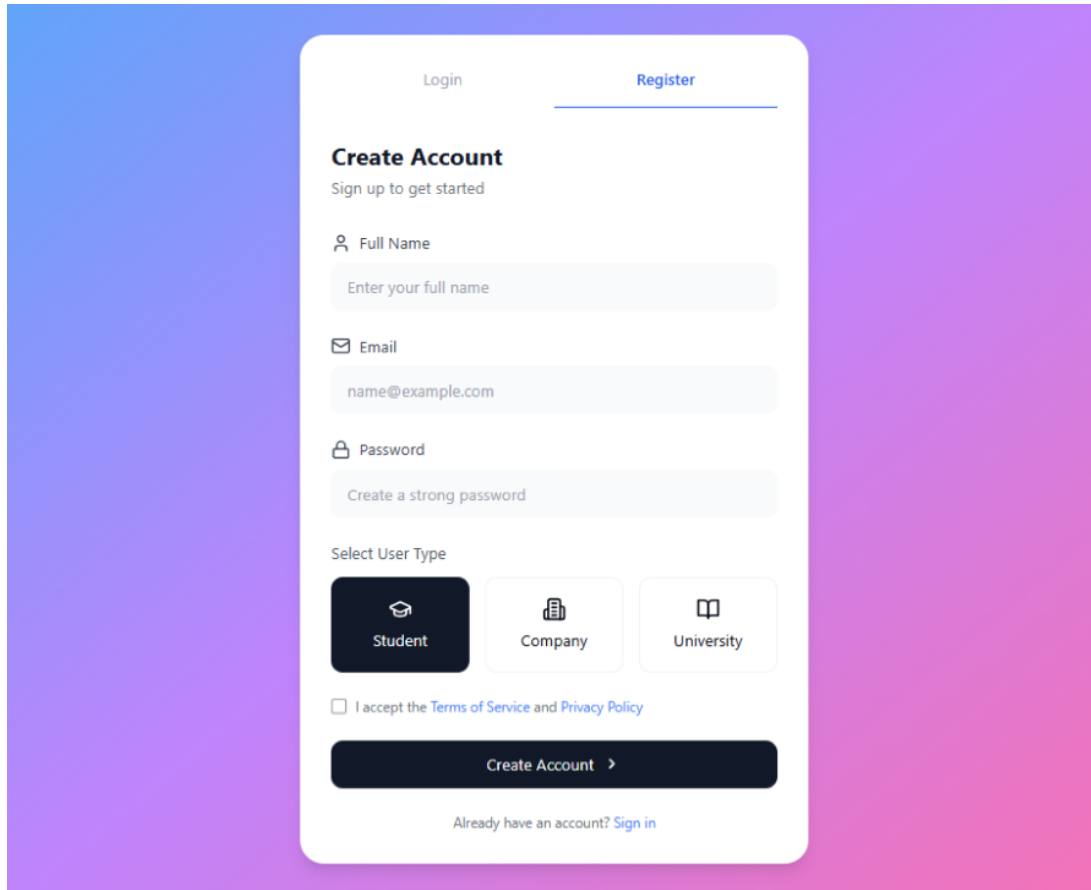
The image shows a mobile application registration screen. At the top, there are two tabs: 'Login' and 'Register', with 'Register' being the active tab. Below the tabs is a 'Create Account' section with the subtitle 'Sign up to get started'. The form includes three input fields: 'Full Name' with a person icon and placeholder 'Enter your full name', 'Email' with an envelope icon and placeholder 'name@example.com', and 'Password' with a lock icon and placeholder 'Create a strong password'. Below these is a 'Select User Type' section with three buttons: 'Student' (with a graduation cap icon), 'Company' (with a briefcase icon), and 'University' (with a book icon). The 'Student' button is highlighted. Below the buttons is a checkbox labeled 'I accept the Terms of Service and Privacy Policy'. At the bottom of the form is a large dark blue button labeled 'Create Account' with a right-pointing arrow. Below this button is a link that says 'Already have an account? Sign in'.

Figure 3.3: Registration Page of the Students & Companies platform.

The Registration Interface (Figure 3.3) enables new users to create an account on the **Students & Companies (S&C)** platform. Users enter their **full name**, **email address**, and a **password**, and select their role: **Student**, **Company Staff Member**, or **University Staff Member**. Role selection customizes their platform experience, guiding them to relevant functionalities.

After filling out the form, users are required to accept the **Terms of Service and Privacy Policy** enhancing protection.

The interface includes a simple **tab system**, allowing users to switch between **Registration** and **Login** pages for easy navigation. The process is finalized by clicking the **"Create Account"** button, ensuring a smooth and secure registration.

After this click the user will complete a security setup step by choosing a **security question** and providing an answer. This will be used if the user will lose his credentials.

4/ Student First Access Page .

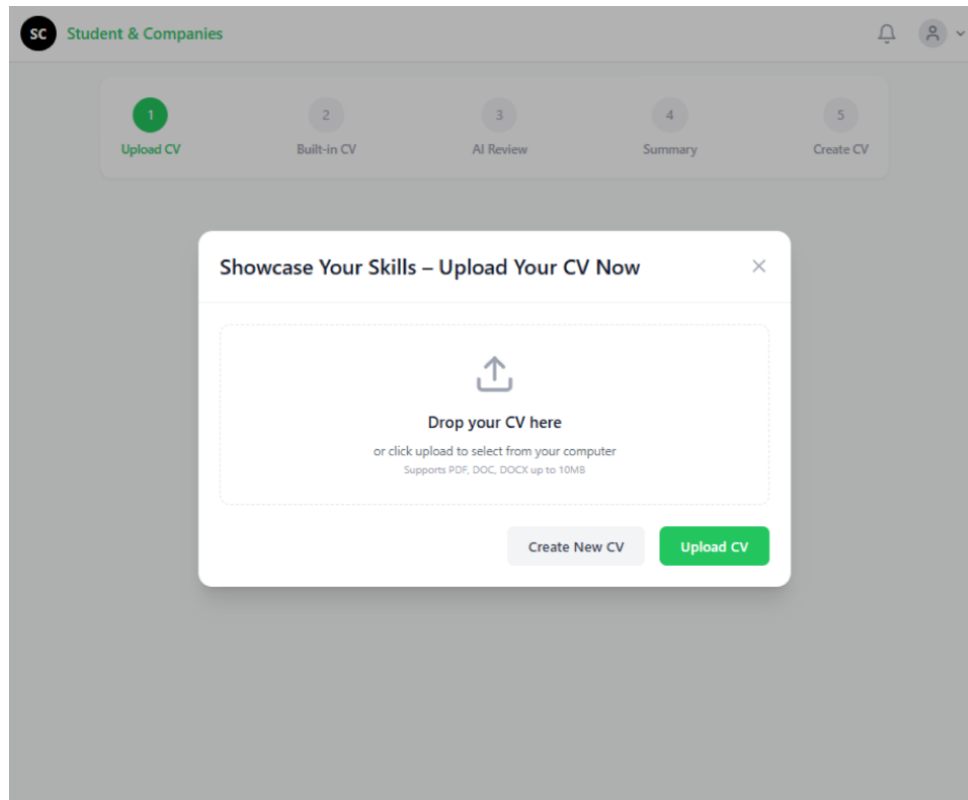
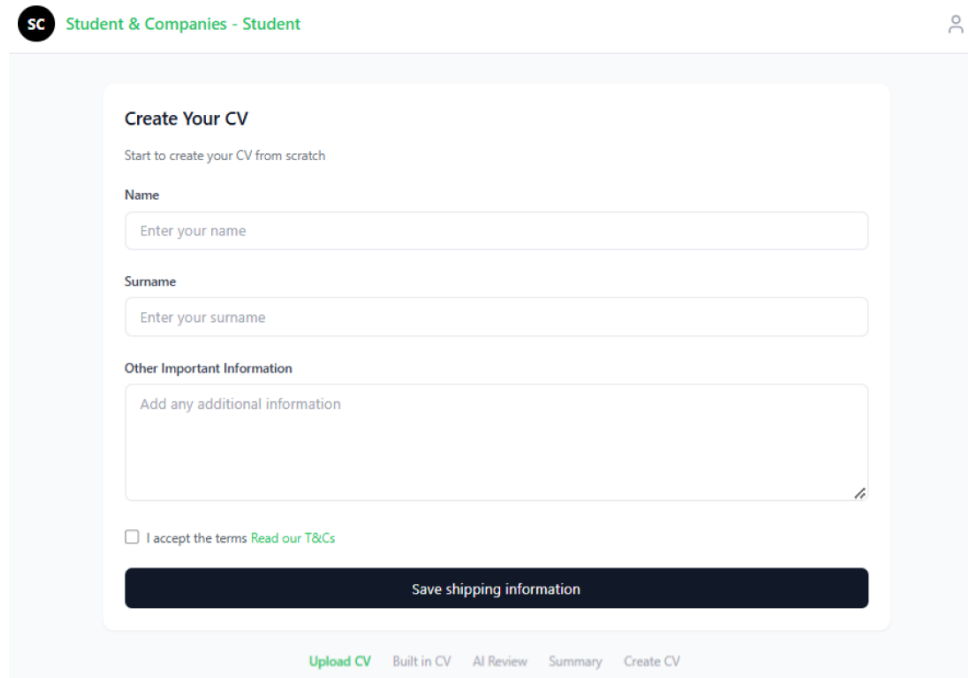


Figure 3.4: Student First Access Page of the Students & Companies platform.

The Student First Access Page (Figure 3.4) serves as the starting point for students after their initial login to the **Students & Companies (S&C)** platform. This interface plays a critical role in ensuring that students take the essential step of uploading or creating their CV, which is necessary to unlock the platform's core functionalities and begin exploring internship opportunities. The design of this page prioritizes simplicity and intuitive navigation. At the center of the interface, the title "Showcase Your Skills – Upload Your CV Now" prominently highlights the importance of completing this task. Students are presented with two primary options to proceed. They can either create a CV using the platform's integrated CV-building tool or upload an existing CV directly by dragging and dropping the file or selecting it from their device. This flexibility accommodates both students who already have a prepared CV and those who need assistance in crafting one.

A navigation bar displayed at the top of the page provides a clear visual representation of the steps involved in the CV management process. These steps include uploading or creating the CV, using the built-in CV editor, enhancing the CV through AI-powered suggestions, previewing the finalized document in the summary stage, and confirming its completion. This structured flow ensures that students are aware of their progress and the next steps required to finalize their profile.

5/ Create CV Page .



The screenshot shows the 'Create Your CV' page of the 'Student & Companies - Student' platform. The page has a light blue header with the 'SC' logo and the text 'Student & Companies - Student'. The main content area is a white box with a light blue border. It contains the following elements:

- Create Your CV**: The main title of the section.
- Start to create your CV from scratch**: A subtext encouraging students to start from scratch.
- Name**: A text input field with the placeholder 'Enter your name'.
- Surname**: A text input field with the placeholder 'Enter your surname'.
- Other Important Information**: A large text area with the placeholder 'Add any additional information'.
- ☐ **I accept the terms** [Read our T&Cs](#): A checkbox and a link to the terms and conditions.
- Save shipping information**: A dark blue button with white text.

At the bottom of the page, there is a navigation bar with five tabs: **Upload CV**, **Built in CV**, **AI Review**, **Summary**, and **Create CV**. The 'Create CV' tab is currently selected and highlighted in green.

Figure 3.5: Create CV Page of the Students & Companies platform.

The **Create CV Page** (Figure 3.5) provides students with the ability to construct their CV directly within the **Students & Companies (S&C)** platform. Designed for those who prefer to start from scratch rather than uploading an existing document, this interface ensures flexibility and user accessibility. The page is structured to guide students step-by-step through the CV creation process, beginning with the header that prominently displays the title "*Create Your CV*" and a subtext encouraging students to "*Start to create your CV from scratch.*" This header clearly communicates the purpose of the interface.

Key input fields are provided for essential details, including **Name**, **Surname**, and a free-text field for **Other Important Information**, which allows students to include additional personal details or key skills. To proceed, students must accept the terms and conditions by checking the provided box, accompanied by a link to the full **Terms & Conditions** for transparency. A visually distinct button labeled "**Save shipping information**" allows students to save their input and advance to the next stage. Navigation tabs for features such as **Upload CV**, **Built-in CV**, **AI Review**, **Summary**, and **Create CV** are accessible, enabling seamless movement between the platform's various CV-related functionalities. This design ensures a straightforward and efficient user experience.

6/ Review Extracted CV Page

The screenshot displays the 'Review Your CV' interface. At the top left is the 'SC Student & Companies - Student' header. The main content area is titled 'Review Your CV' with a subtext 'Check if there are any errors'. Below this are three input fields: 'Name' containing 'Lorenzo', 'Surname' containing 'Uttini', and 'Other Important Information' containing 'None'. A checkbox labeled 'I accept the terms' is checked, with a link 'Read our T&Cs' next to it. A dark blue button labeled 'Save shipping information' is positioned below the checkbox. At the bottom of the page, a navigation bar contains five tabs: 'Upload CV' (highlighted in green), 'Built in CV', 'AI Review', 'Summary', and 'Create CV'.

Figure 3.6: Review Extracted CV Page of the Students & Companies platform.

The **Review Extracted CV Page** (Figure 3.6) 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 .

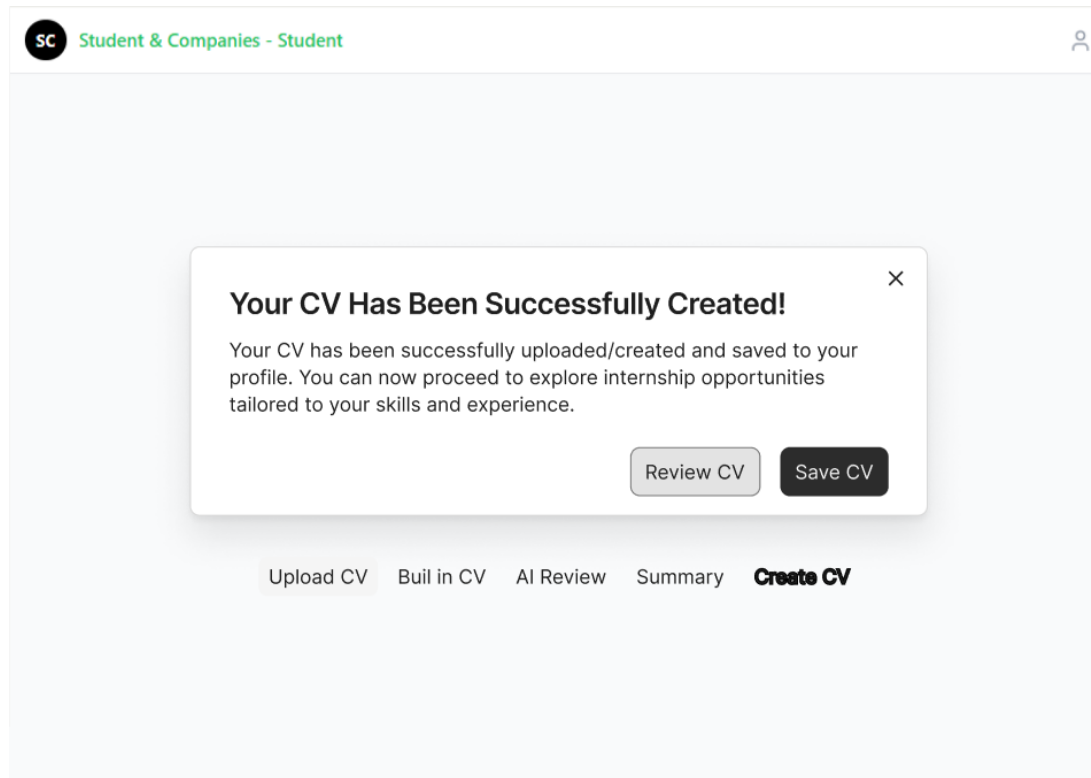


Figure 3.7: CV Creation Confirmation Page of the Students & Companies platform.

The **CV Creation Confirmation Page** (Figure 3.7) 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)

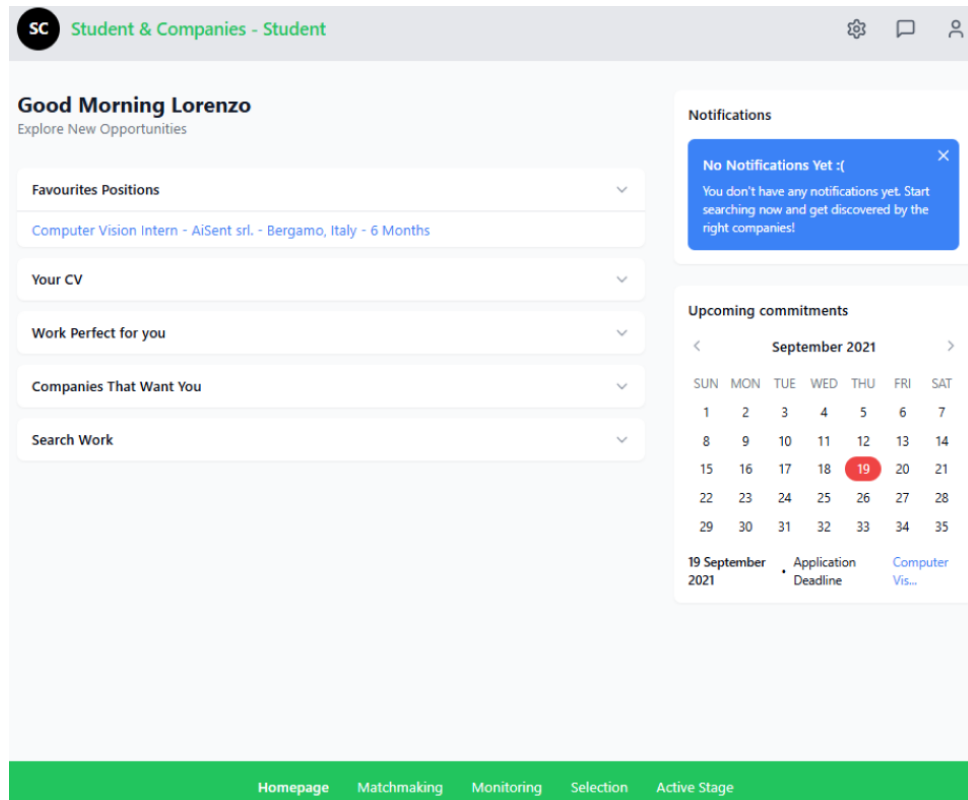


Figure 3.8: Homepage of the Students & Companies platform.

The **Homepage** (Figure 3.8) 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

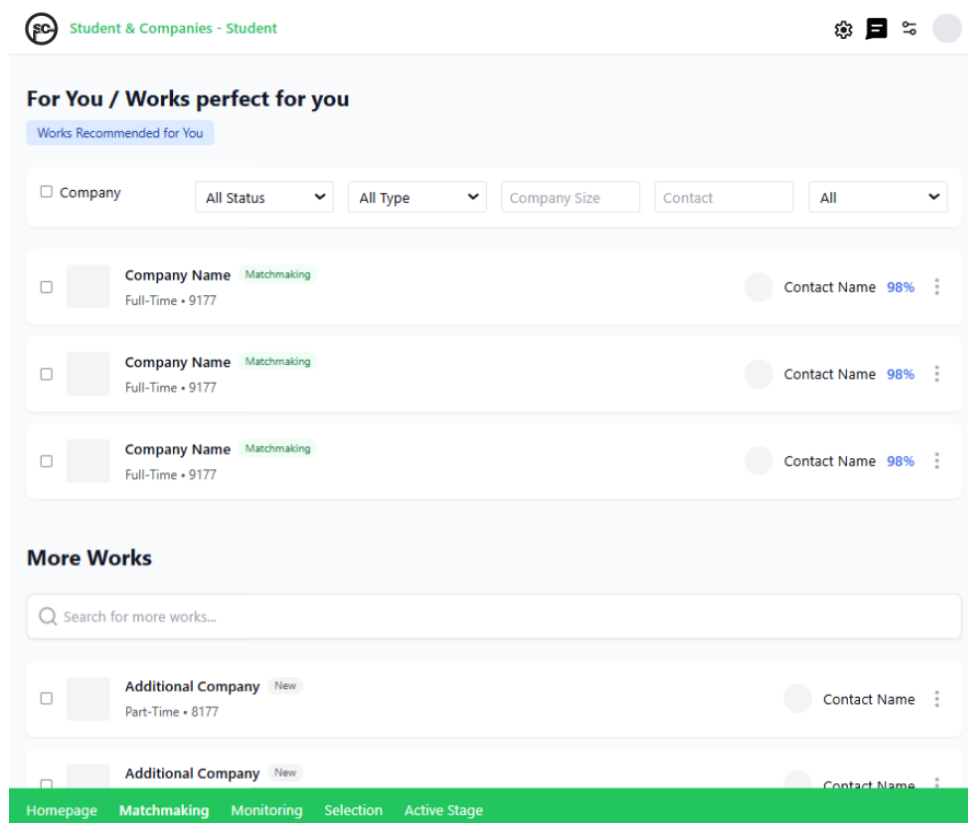


Figure 3.9: Matchmaking Page of the Students & Companies platform.

The **Matchmaking Page** (Figure 3.9) 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 3.10 and 3.11) 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.

The screenshot displays the 'Monitoring Page' under the 'YOUR APPLICATIONS' tab. The page title is 'Stay Updated on Your Applications' with a subtitle 'Don't miss the progress for the work you have applied'. Below the title are filter controls: 'Company' (checkbox), 'All Status' (dropdown), 'All Type' (dropdown), 'Company Size' (input), 'Contact' (input), and 'All' (dropdown). The main content is a table of applications:

Company	Status	Type	Recruiter	Compatibility
AISENT	Want you	Full-Time • 9177	David Recruiter	98%
Google	Want you	Full-Time • 3064	Arlene Wilson	90%
Starbucks	Applied	Full-Time • 9195	Jennie Cooper	87%
The Walt Disney	Want you	Part-Time • 3128	Philip Steward	85%
Mitsubishi	Rejected	Part-Time • 9892	Jorge Black	76%
IBM	Want you	Part-Time • 9011	Gladys Jones	60%

At the bottom, there is a navigation bar with links: Homepage, Matchmaking, Monitoring, Selection, and Active Stage. The page also shows '1 / 16' and 'Rows per page: 15'.

Figure 3.10: Monitoring Page - Stay Updated on Your Applications.

In the **Your Applications** section (Figure 3.10), 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.

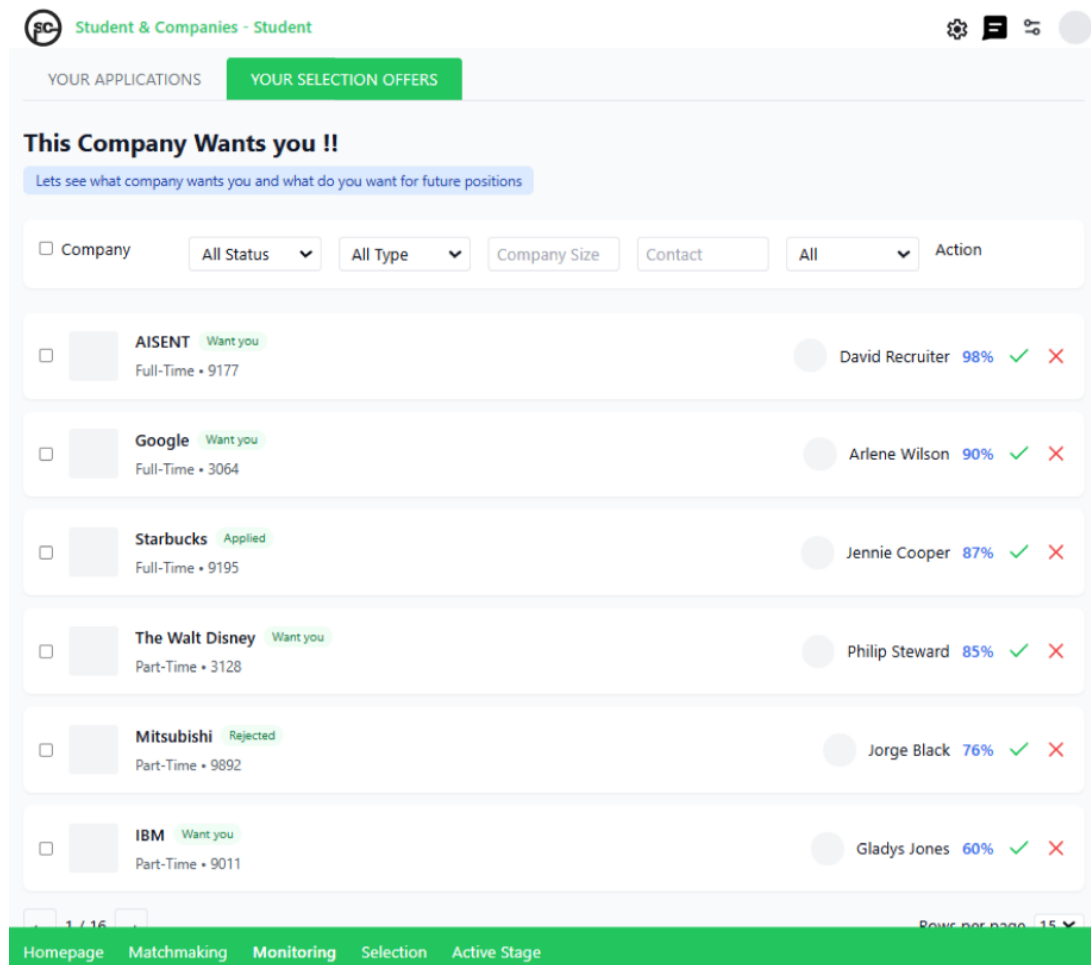


Figure 3.11: Monitoring Page - Your Selection Offers.

The **Your Selection Offers** section (Figure 3.11) 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.

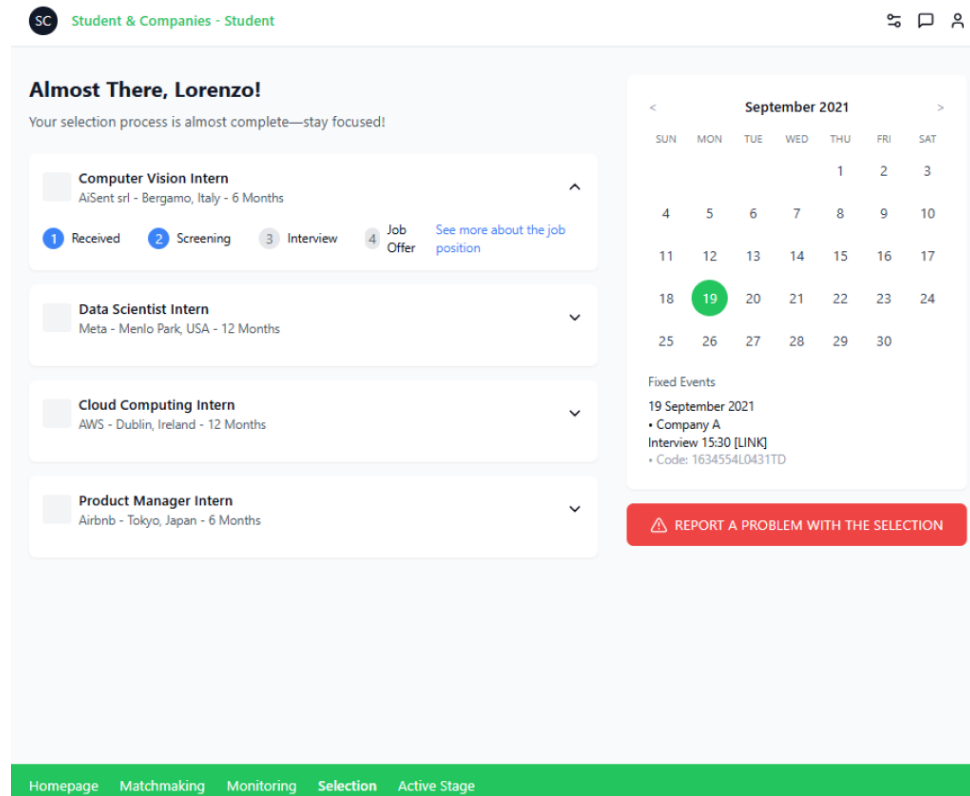


Figure 3.12: Selection Page of the Students & Companies platform.

The **Selection Page** (Figure 3.12) 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*.

SC Student & Companies - Student

Computer Vision Intern
AiSent

Name of the position
Computer Vision Intern - AiSent srl. - Bergamo, Italy - 6 Months

Position Detail

Company Detail

Your University Tutor

Your Contract

QUESTIONNAIRE Week 1

QUESTIONNAIRE Week 2

QUESTIONNAIRE Week 3

QUESTIONNAIRE ...

REPORT A PROBLEM WITH THE STAGE

Homepage Matchmaking Monitoring Selection Active Stage

Figure 3.13: Active Stage Page of the Students & Companies platform.

The **Active Stage Page** (Figure 3.14) 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 3.14) 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.

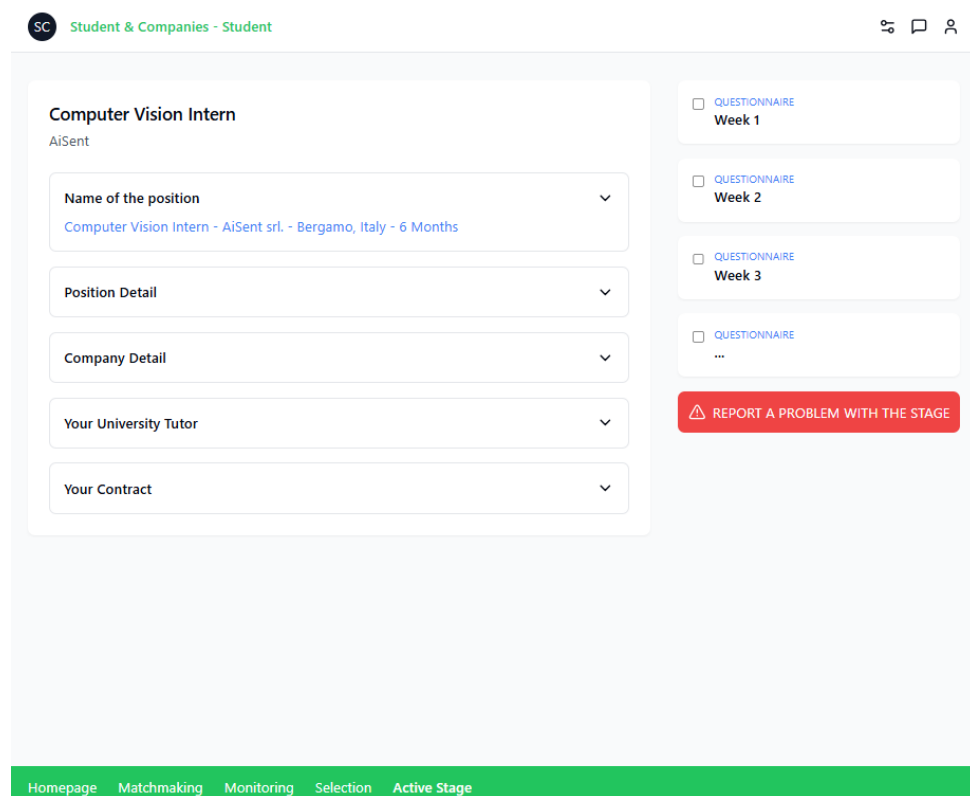


Figure 3.14: Active Stage Page of the Students & Companies platform.

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 3.15) 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.

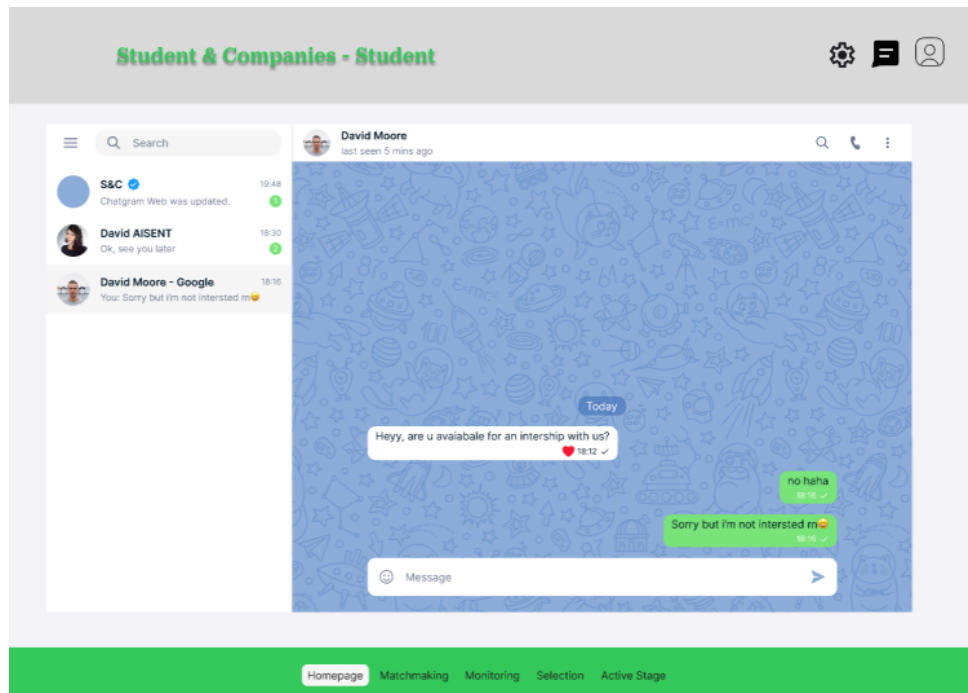


Figure 3.15: Messaging Page of the Students & Companies platform.

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 simultaneously, such as two or more students applying for an internship 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 avoids inconsistency to be propagated.

Durability guarantees that once a transaction is successfully completed the changes produced 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 ensures 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 requires complex database mechanisms 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 mechanisms. Also the APIs of the services that interact with S&C need 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 communication. 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 meetings 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 section should include a brief presentation of the main objectives driving the formal modeling activity, as well as a description of the model itself, what can be proved with it, and why what is proved is important given the problem at hand. To show the soundness and correctness of the model, this section can show some worlds obtained by running it, and/or the results of the checks performed on meaningful assertions.

```

1 // ----- SIGNATURES
2 // -----
3 //abstract sig User {} // generic user (used for people:
4 //    Student, CompanyTutor and Professor)
5 abstract sig User {
6     communicate: set User // Users can communicate with a set of
7     other Users
8 }
9
10 // STUDENT
11 sig Student extends User {
12     belongsTo: one University, // must be enrolled in exactly
13     one university
14     cv: one CV, // must have exactly one CV
15     personalMail: one Email, // must have exactly a personal mail
16     universityMail: one Email, // must have exactly a
17     university mail
18     visualize: set Internship, // can visualize the internships
19     applies: set Internship, // can apply to internships
20 }
21
22 // COMPANYTUTOR
23 sig CompanyTutor extends User {
24     workFor: one Company, // must work for exactly one company
25     manages: some Internship, // manage 0, 1 or more internships
26     read: set CV, // can read students cv
27     evaluations: set Evaluation // can evaluate students
28 }
29
30 // PROFESSOR

```

```

29 sig Professor extends User {
30     worksFor: one University // must work for exactly one
        univeristy
31 }
32
33
34 // COMPANIES
35 sig Company {
36     representBy: some CompanyTutor, // is represented by 0,1 or
        more companyTutor
37     offerInternships: set Internship // can offers internships
        on the platform
38 }
39
40
41 // INTERNSHIPS
42 sig Internship {
43     offeredBy: one CompanyTutor, // each internship is offered
        by exactly one companyTutor
44     offeredFor: one Company, // each internships is offered for
        exactly one company
45     haveInternshipInformation: one InternshipInformation // each
        internship have some informations (not defined)
46 }
47
48
49 // CV
50 sig CV {
51     owner: one Student // each cv belongs to one student only
52 }
53
54
55 // UNIVERSITIES
56 sig University {
57     hasStudents: set Student, // each university have some
        students
58     haveUniversityInformation: one UniversityInformation, // each
        university have some informations (not defined)
59     employsProfessors: set Professor, //each university empolys
        some professors
60     monitor: set Student, // university monitor students
61     see: set Problem // a universty can see the problems (reported
        by their students about an internship)
62 }
63
64
65 // EVALUATION
66 sig Evaluation {
67     tutor: one CompanyTutor, // en evaluation have one tutor

```

```

        (who accept or not the internship)
68     internship: one Internship, // the evaluation focus on one
        specific internship
69     student: one Student, // each evaluation focus on one
        specific student
70     result: one EvalResult, // each evaluation must have a result
71     universityTutor: lone Professor // If result is positive,
        assign a professor of the student's university
72 }
73 abstract sig EvalResult {}
74 one sig Positive extends EvalResult {} // the results of an
        evaluation of an internship can be positive...
75 one sig Negative extends EvalResult {} // ... or negative
76
77
78 // MISCELLANEOUS
79 sig Email {managedBy: lone University} // a mail can be managed
        by a person or by the Univeristy (in case it is an
        universitymail)
80 sig InternshipInformation {}
81 sig UniversityInformation {
82     describesUni: one University
83 }
84
85
86 // COMPLAINT
87 sig Complaint {
88     referredComplaintTo: one Internship, // the internship
        the complaint is about
89     managedComplaintBy: one University // the university
        that manages the complaint
90 }
91
92
93 // FEEDBACK INTERNSHIP
94 sig FeedbackInternship {
95     feedbackInternshipFor: one Company, //
        feedback for exactly one company
96     feedbackInternshipOn: one Internship, //
        feedback on exactly one internship
97     feedbackInternshipAbout: one InternshipInformation //
        feedback about exactly one internship information
98 }
99
100
101 // FEEDBACK STUDENT
102 sig FeedbackStudent {
103     feedbackStudentAbout: one CV, // The CV being reviewed
104     feedbackStudentFor: one Student // The student receiving

```

```

        the feedback
105 }
106
107
108 // PROBLEM REPORTING
109 sig Problem {
110     reportedBy: one Student,           // Each problem is reported
        by exactly one student
111     aboutInternship: one Internship    // Each problem is about
        exactly one internship
112 }
113
114 // ----- FACTS
        -----
115
116
117 // each CompanyTutor works for exactly one company
118 // and each CompanyTutor manages internships offered by their
        company
119 fact OneCompanyTutorToOneCompany {
120     all c: Company | all r: c.representBy | r.workFor = c
121     all cr: CompanyTutor | one cr.workFor
122     all cr: CompanyTutor | cr.manages in
        cr.workFor.offerInternships
123 }
124
125
126 // each internship is offered by the correct company
127 fact companyToInternship {
128     all c: Company | all i: c.offerInternships | i.offeredFor = c
129 }
130
131
132 // each internship is managed by the correct companyTutor
133 fact companyRepToInternship {
134     all cr: CompanyTutor | all i: cr.manages | i.offeredBy = cr
135 }
136
137
138 // guarantees that each internship offered for a company is the
        same company for which the companyTutor work for
139 fact InternshipOfferedByCorrectCompanyTutor {
140     all i: Internship | i.offeredFor = i.offeredBy.workFor
141 }
142
143
144 // each email is assigned to at most one student
145 fact EmailsAssignedToOnlyOneStudent {
146     all e: Email | lone s: Student | e = s.personalMail or e =

```

```

147         s.universityMail
148     }
149
150     // no student can have the same personal email
151     fact UniquePersonalMails {
152         all disj s1, s2: Student | s1.personalMail != s2.personalMail
153     }
154
155
156     // no student can have the same univeristy mail
157     fact UniqueUniversityMails {
158         all disj s1, s2: Student | s1.universityMail !=
159             s2.universityMail
160     }
161
162     // personal mail and university mail must not be the same for
163     // each student
164     fact DifferentMailsPerStudent {
165         all s: Student | s.personalMail != s.universityMail
166     }
167
168     // every mail is either personal or university
169     // university mail are managed by the university to which the
170     // student belongs
171     // personal mail are not managed by the university (but by the
172     // student himself)
173     fact EmailManager {
174         all e: Email | some s: Student | e = s.personalMail or e =
175             s.universityMail
176         all s: Student | s.universityMail.managedBy = s.belongsTo
177         all s: Student | no s.personalMail.managedBy
178     }
179
180     // each internship have some unique information
181     fact UniqueInternshipInformation {
182         all disj i1, i2: Internship | i1.haveInternshipInformation !=
183             i2.haveInternshipInformation
184     }
185
186     // there can not exists an internshipInformation not linked to an
187     // intership
188     fact AllInformationsLinked {
189         all d: InternshipInformation | some i: Internship |
190             i.haveInternshipInformation = d

```

```

187 }
188
189 // each student own only one cv
190 // a cv is owned by only one student
191 fact StudentOwnsTheirCV {
192     all s: Student | s.cv.owner = s
193     all disj c1, c2: CV | c1.owner = c2.owner implies c1 = c2
194 }
195
196
197 // a student first needs to visualize an internship, and only then
    he/she can apply to it
198 fact ApplicationRequiresVisualization {
199     all s: Student, i: Internship |
200         i in s.applies implies i in s.visualize
201 }
202
203
204 // each university have a unique universityInformation
205 // and each universityInformation describes exactly one university
206 fact OneToOneUniversityAndUniversityInformation {
207     all disj u1, u2: University | u1.haveUniversityInformation !=
        u2.haveUniversityInformation
208     all d: UniversityInformation |
        d.describesUni.haveUniversityInformation = d
209 }
210
211
212 //a professor work for exactly one university
213 // if a professor work for an university then he/she is employed
    by it
214 fact ProfessorWorksForUniversity {
215     all p: Professor | p.worksFor in University
216     all p: Professor | p in p.worksFor.employsProfessors
217 }
218
219
220 // each professor is employed by exactly one university
221 fact EachProfessorEmployedByOnlyOneUniversity {
222     all p: Professor | one u: University | p in
        u.employsProfessors
223 }
224
225
226 // eventually, every internship application will be evaluated by
    the companyTutor
227 fact EventuallyEvaluated {
228     all s: Student, i: Internship |
229         i in s.applies implies

```

```

230     eventually (
231         some eval: Evaluation |
232             eval.internship = i and
233             eval.tutor in i.offeredBy and
234             eval.student = s
235     )
236 }
237
238
239 // an evaluation for an internship application can be done only
240 // the the companyTutor that manages that intership
241 fact ValidEvaluation {
242     all eval: Evaluation |
243         eval.internship in eval.tutor.manages and
244         eval.internship in eval.student.applies
245 }
246
247 // to evaluate an internship, first the companyTutor needs to
248 // read the student cv
249 fact IfEvaluatedThenReadCV {
250     all eval: Evaluation |
251         eval.student.cv in eval.tutor.read
252 }
253
254 // every university have at least one professor
255 // (otherwise a student for university X that is accepted for an
256 // internship might not have a universityTutor)
257 fact EveryUniversityHasAtLeastOneProfessor {
258     all u: University | some u.employsProfessors
259 }
260
261 //an evaluation for an internship can either be positive or
262 // negative
263 fact EvaluationResultValidity {
264     all eval: Evaluation | eval.result in EvalResult
265 }
266
267 // the tutor that evaluates the internship must be the one who
268 // offered the same internship
269 fact EvaluationTutorMustBeInternshipOwner {
270     all e: Evaluation | e.tutor = e.internship.offeredBy
271 }
272
273 //bidirectional between companyTutor and the evaluations

```

```

274 fact CompanyTutorEvaluationsBidirectional {
275     all ct: CompanyTutor | ct.evaluations = { e: Evaluation |
276         e.tutor = ct }
277 }
278
279 // every internship application of a student must have a
280 // corresponding evaluation (1-to-1)
281 fact EveryApplicationHasEvaluation {
282     all s: Student, i: Internship |
283         i in s.applies implies some e: Evaluation | e.student = s
284         and e.internship = i
285 }
286
287 // ensures a companyTutor can only read CVs of students they have
288 // evaluated
289 fact ReadOnlyEvaluatedCVs {
290     all ct: CompanyTutor | ct.read = ct.evaluations.student.cv
291 }
292
293 // If evaluation result is Positive, a suitable professor (from
294 // the student's university) must be assigned.
295 // If evaluation result is Negative, no universityTutor is
296 // assigned.
297 fact UniversityTutorAssignment {
298     all eval: Evaluation |
299         ((eval.result = Positive) =>
300             (some eval.universityTutor and eval.universityTutor
301                 in eval.student.belongsTo.employsProfessors))
302         and
303         ((eval.result = Negative) => no eval.universityTutor)
304 }
305
306 // define when a University monitors a Student
307 fact UniversityMonitorsStudent {
308     all u: University, s: Student |
309         s in u.monitor iff (
310             s.belongsTo = u and
311             some i: Internship | i in s.applies and
312             some eval: Evaluation |
313                 eval.internship = i and
314                 eval.student = s and
315                 eval.result = Positive
316         )
317 }

```



```

316
317 // a internship can have at most one complaint
318 fact AtMostOneComplaintPerInternship {
319     all disj c1, c2: Complaint | c1.referredComplaintTo !=
320         c2.referredComplaintTo
321 }
322
323 // complaints only arise for "active" internships.
324 // an internship is "active" if there is at least one positive
325 // evaluation
326 // for a student that applied to it. The complaint is managed by
327 // the
328 // same university that the accepted student belongs to.
329 fact ComplaintsMustReferToActiveInternships {
330     all c: Complaint | {
331         let i = c.referredComplaintTo |
332             // i must have a positive evaluation
333             some eval: Evaluation | (eval.internship = i and
334                 eval.result = Positive) and
335             // The complaint must be managed by the same
336             // university
337             // that the positively evaluated student belongs to.
338             some eval2: Evaluation | eval2.internship = i and
339                 eval2.result = Positive and c.managedComplaintBy =
340                 eval2.student.belongsTo
341     }
342 }
343
344 // internship mentioned in the feedback is actually offered by
345 // the company in "feedbackFor"
346 fact FeedbackMatchesCompanyOffer {
347     all f: FeedbackInternship | f.feedbackInternshipOn in
348         f.feedbackInternshipFor.offerInternships
349 }
350
351 // feedbackAbout internship information matches the internship's
352 // information
353 fact FeedbackMatchesInternshipInformation {
354     all f: FeedbackInternship | f.feedbackInternshipAbout =
355         f.feedbackInternshipOn.haveInternshipInformation
356 }
357
358 // at most one feedback per internship
359 fact AtMostOneFeedbackPerInternship {
360     all disj f1, f2: FeedbackInternship | f1.feedbackInternshipOn
361         != f2.feedbackInternshipOn
362 }

```

```

353
354
355
356 fact FeedbackStudentCorrespondence {
357     // FeedbackStudent is about the CV of the student it is for
358     all fs: FeedbackStudent | fs.feedbackStudentAbout =
        fs.feedbackStudentFor.cv
359
360     // a student has exactly one FeedbackStudent
361     all s: Student | one fs: FeedbackStudent |
        fs.feedbackStudentFor = s
362 }
363
364
365 // for each internship at most one positive evaluation
366 // no internship can have two applications that are positive
367 fact OnlyOnePositiveEvaluationPerInternship {
368     all i: Internship | lone e: Evaluation | e.internship = i and
        e.result = Positive
369 }
370
371
372 // FACTS
373 fact OnlyStudentsWithPositiveEvaluationCanReportProblem {
374     all p: Problem |
375         some eval: Evaluation |
376             eval.student = p.reportedBy and
377             eval.internship = p.aboutInternship and
378             eval.result = Positive
379 }
380
381
382 // a university can see all the problems reported by their
    students
383 fact UniversityCanSeeReportedProblems {
384     all u: University |
385         u.see = { p: Problem | p.reportedBy.belongsTo = u }
386 }
387
388
389 // communicate only if the evaluation is poistive
390 fact PositiveEvaluationCommunications {
391     all eval: Evaluation |
392         eval.result = Positive implies (
393             let s = eval.student,
394                 t = eval.tutor,
395                 p = eval.universityTutor |
396
397                 // communication between student and companytutor

```

```

398         s in t.communicate and
399         t in s.communicate and
400
401         // communication between student and
402         universitytutor
403         s in p.communicate and
404         p in s.communicate and
405
406         // communication between compnay tutor and
407         universitytutor
408         t in p.communicate and
409         p in t.communicate
410     )
411 }
412
413 // ----- TESTING FACTS
414 -----
415
416 // there should be at least one visualization of an internship
417 made by a student
418 fact AtLeastOneVisualization {
419     some s: Student | some i: Internship | i in s.visualize
420 }
421
422 // there exists at least some internship application
423 fact AtLeastOneApplication {
424     some s: Student | some i: Internship | i in s.applies
425 }
426
427
428 // minimum count for some signatures
429 fact {
430     #Student > 2
431     #Company > 1
432     #CompanyTutor > 1
433     #University > 1
434     # Professor > 2
435     # Evaluation >2
436     # Problem >2
437 }
438
439
440 //at least one positive evaluation
441 fact AtLeastOnePositiveEvaluation {
442     some e: Evaluation | e.result = Positive

```

```
443 }
444
445
446
447
448 // ----- RUN COMMAND
449 -----
449 run {} for 10 but 2 Company, 4 CompanyTutor, 5 Internship, 5 CV,
    2 University, 10 Email, 10 InternshipInformation, 4
    Evaluation, 2 EvalResult
```

5 | Effort Spent

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

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