POLITECNICO DI MILANO

SOFTWARE ENGINEERING II

S&C PLATFORM

REQUIREMENTS ANALYSIS AND SPECIFICATION DOCUMENT

Version 1.0

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Indice

1. Introduction

1.1 Purpose

In today's competitive job market, securing a relevant internship is crucial for university students seeking to enhance their skills and gain practical experience in their chosen fields. Simultaneously, companies are constantly on the lookout for fresh talent that can bring new perspectives and ideas to their teams. The Students & Companies (S&C) platform addresses this mutual need by acting as a dynamic bridge between students and organizations, facilitating the internship search and recruitment process.

Goal	Description
G1	Allows companies to advertise the internship that they offer.
G2	Allows students to look and apply for internship positions.
G3	Matching between suitable students and companies.
G4	Allows students and companies to complaint about an ongoing internship.

1.2 Scope

The scope of this project encompasses the development and implementation of the Students & Companies (S&C) platform, a digital system designed to streamline the process of matching university students seeking internships with companies offering them. The platform operates within the domain of higher education and the internship market, addressing the needs of students who wish to gain practical experience and companies seeking skilled talent for their projects. S&C provides functionalities to facilitate the entire process, including allowing students to upload CVs, browse and apply for internships, and receive tailored recommendations based on their skills, experiences, and preferences. For companies, the platform enables advertising internship opportunities, discovering suitable candidates, and managing the interview and selection process efficiently. To enhance recommendations and overall functionality, the system incorporates advanced mechanisms such as statistical analyses and feedback collection from users. By bridging the gap between students and companies, S&C not only enhances the internship experience for both parties but also contributes to the broader goals of talent acquisition and recruitment technology in the professional and educational landscape.

S&C will support the work of two types of actors:

- Students
- Companies

1.2.1 World Phenomena

World phenomena refer to events that occur in the real world and are not directly detectable by the machine.

Identifier	Description
WP1	Students prepare their CVs
WP2	Companies prepare internship details information, including application domains, tasks, and terms.
WP3	Students show interest in a certain internship position.
WP4	The physical or virtual process of companies interviewing students
WP5	Companies HRs rating each student's performance.

1.2.2 Shared Phenomena

Shared phenomena refers to events that occur within the machine.

- Phenomena controlled by the world and observed by the machine:

Identifier	Description
SP1	Students uploading their CVs to the platform
SP2	Companies posting internship details on the platform
SP3	Students indicating preferences for internships.
SP4	Companies providing feedback on the internship process
SP5	Students sharing experiences or suggestion about the internships.
SP6	Companies selecting students after interviews.
SP7	Students applying for internships through the platform.
SP8	Companies sharing experiences or suggestions about internships.

- Phenomena controlled by the machine and observed by the World:

Identifier	Description
SP9	S&C sends notifications to students about internships.
SP10	S&C sends notifications to companies about suitable candidates.

SP11	Updates to both parties about progress or changes in the selection process
SP12	Platform-assisted scheduling and organization of interviews

1.3 Definitions, Acronyms, Abbreviations

1.3.1 Definitions

- **Student**: An individual engaged in learning or academic activities, typically enrolled in an educational institution or a course. In a model, a Student might have attributes like name, email, titles.

- **Company**:A company is a legal entity formed by a group of individuals to engage in and operate a business enterprise, with the purpose of generating profit, providing goods or services, or pursuing other specific objectives. In a model, a company might have attributes like name, contact email, internship positions.

- **Internship**: An internship is a structured, often temporary work experience offered by an organization to individuals, typically students or recent graduates, to provide practical exposure to a specific field or industry.

1.3.2 Acronyms

- **[S&C]**:Students&Companies
- **[UI]**: User Interface
- **[UML]**: Unified Modelling Language
- **[RASD]**: Requirement Analysis and Specification Document
- **[HR]**: Human Resource

1.4 Revision History

- **Version 1.0** (22 December 2024)

1.5 Reference Documents

- The specification of the RASD and DD assignment of the Software Engineering II course, held by Professor Matteo Rossi, Elisabetta Di Nitto and Matteo Camilli at the Politecnico di Milano,A.Y 2024/2025.

- Slides of Software Engineering 2 course on WeBeep.

1.6 Document Structure

Mainly the current document is divided in 6 chapters, which are:

1. **Introduction:** it aims to describe the environment and the demands taken into account for this project. In particular it's focused on the reasons and the goals that are going to be achieved with its development.
2. **Overall Description**: it's a high-level description of the system by focusing on the shared phenomena and the domain model (with its assumption).
3. **Specific Requirements:** it describes in very detail the requirements needed to reach the goals. In addition, it contains more details useful for developers (i.e information about HW and SW interfaces).
4. **Formal Analysis**: this section contains a formal description of the main aspect of the World phenomena by using Alloy.
5. **Effort Spent**: it shows the time spent to realize this document, divided for each section.
6. **References:** it contains the references to any documents and to the Software used in this document

2. Overall Description

2.1 Product perspective

2.1.1 Scenarios

1.Company advertise an open internship position

The technology company Banana is currently seeking for talented university students to join their company as software developers. For this reason, Mr. Bianchi, the HR manager decides to use the platform S&C. After successful registration and account verification, he publishes on the platform a job posting where is specified the project, such as application domain, task to be performed and terms offered (for example if it is provided any tangible or intangible benefits) by Banana company.

2. Student upload CV on S&C

Eugenio, a student at Politecnico di Milano, is searching for an internship as software developer to increase his practical knowledge. Thanks to his friends recommendation, he comes into the S&C platform. After successful registration, he obtains his S&C account, then he uploads his CV on his account profile.

3. Student looks for internships proactively

Eugenio after logging in his S&C account, begins to search for internships position by tapping in the search bar “java software developer”. The platform shows many results, for example Banana Inc. and Strawberry Inc., where first one has two open internship positions for software developer, and the second one has only one position opened for software developer but it is unavailable in this moment. For all the results, Eugenio could apply for some interested position, or it is also possible to show interests on momentary unavailable positions and inform him in the future when these positions become open by clicking “inform me when it is open”. During these operations, the system detects all Eugenio’s interests, and keeps those in the background for the future recommendations. (scenario 4)

4. S&C recommendation to Student

S&C platform after considering all companies’ open internships position, and considering Eugenio’s possibly interested positions, decided to send recommendations of Banana Inc. and Strawberry Inc. open positions. Eugenio log in his personal account and find S&C recommendations in the notification, for each of them Eugenio could decide to accept and apply.

5. S&C recommendation to Companies

S&C platform detects that Banana Inc.'s is searching for a software developer from their job posting, so the platform helps the company searching for possibly compatible candidates by looking all students' profile and CV. Then the platform all possibly suitable candidates and send the list to Banana Inc. Mr. Bianchi, HR manager, after logging in the company account, received the list of the possibly suitable candidates. Then, he can decide whether to contact them.

6. Contact estabilished

After scenario 4 and 5. Eugenio decides to apply for Banana Inc. internship position and Banana Inc. is also satisfied with Eugenio' CV and personal experience so that they want to conduct an interview. In this way the connection is established, then S&C helps each part to organize an interview.

7. Comunication of the interview result

After Banana Inc.'s evaluations, Mr. Bianchi uploads the decision on S&C. Eugenio finds the result on notifications section. He can also refuse it if it is successful.

8. Feedback and suggestions

After every period of use, S&C asks students and companies for feedbacks and suggestions to improve their system.

2.1.2 Domain class diagram

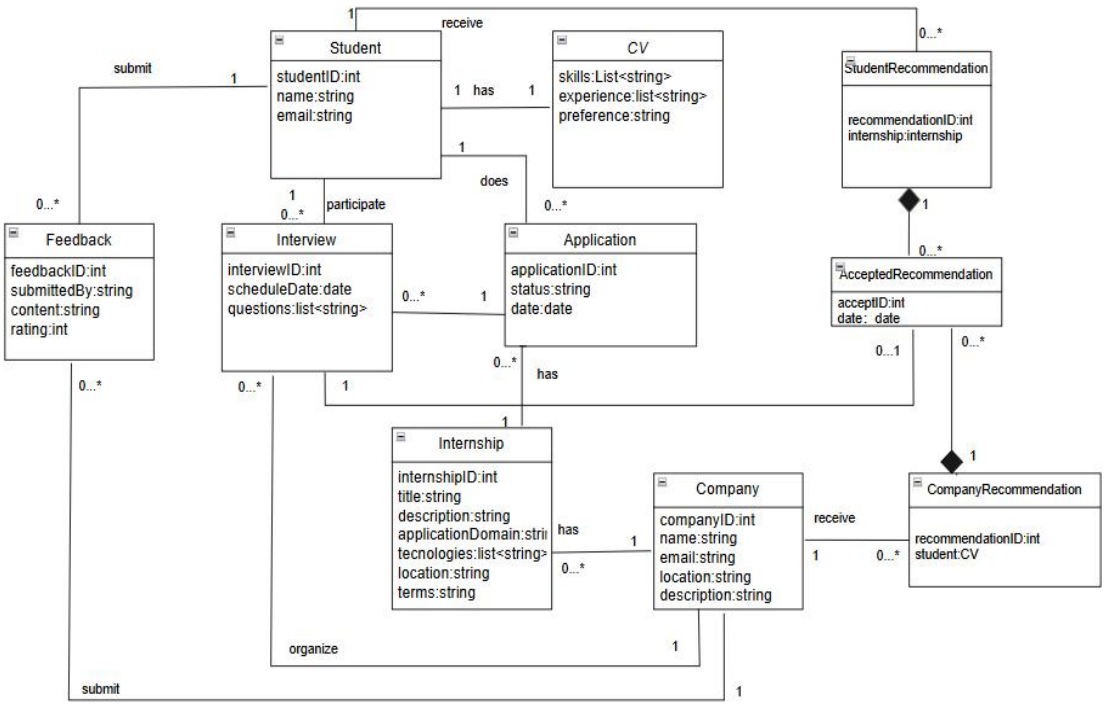


Figure 2.1 - High Level Class Diagram

Since there are many different variables between students and companies, only the email address is the same. For example, the student should fill their name which can be repeated, but the company name is unrepeatable. The details students need to fill in information are academic background, major, skills, desired position, etc., but the information of companies is almost different, such as company address, company introduction, etc.

Each student has a CV class, which is specifically classified into skills, experience, and position preferences. We think that a student does not need multiple CVs because it is not conducive to the recommendation mechanism. However, a company can have zero or more positions available. Students can browse the web and select jobs of interest, and apply directly. The company will receive the application on the homepage and choose whether to conduct further interviews.

At the same time, we have also designed a recommendation mechanism. The website will recommend to both parties based on the information filled in the student's resume and the job search information released by the company. If both parties accept the recommendation, the application process starts.

During the use process, students and companies can provide zero or multiple feedback. The feedback forms by rating and writing suggestions.

2.1.3 State Diagram

In this subsection there is a discussion of the state charts diagram about the proactive application for an internship position from a student and the recommendation mechanism of S&C system.

Proactive application

Students submit applications proactively after the company posts a job posting. Before the deadline, the student sends a message to the company. The company will evaluate the student's resume information and the fit for the position, and decide whether to conduct the next interview or directly reject the student's application. If the company decides to conduct an interview and the student passes the interview, the student will receive a message and decide whether to accept the job, then ending the process. If the company rejects, the process ends directly after the student receives the rejection message.

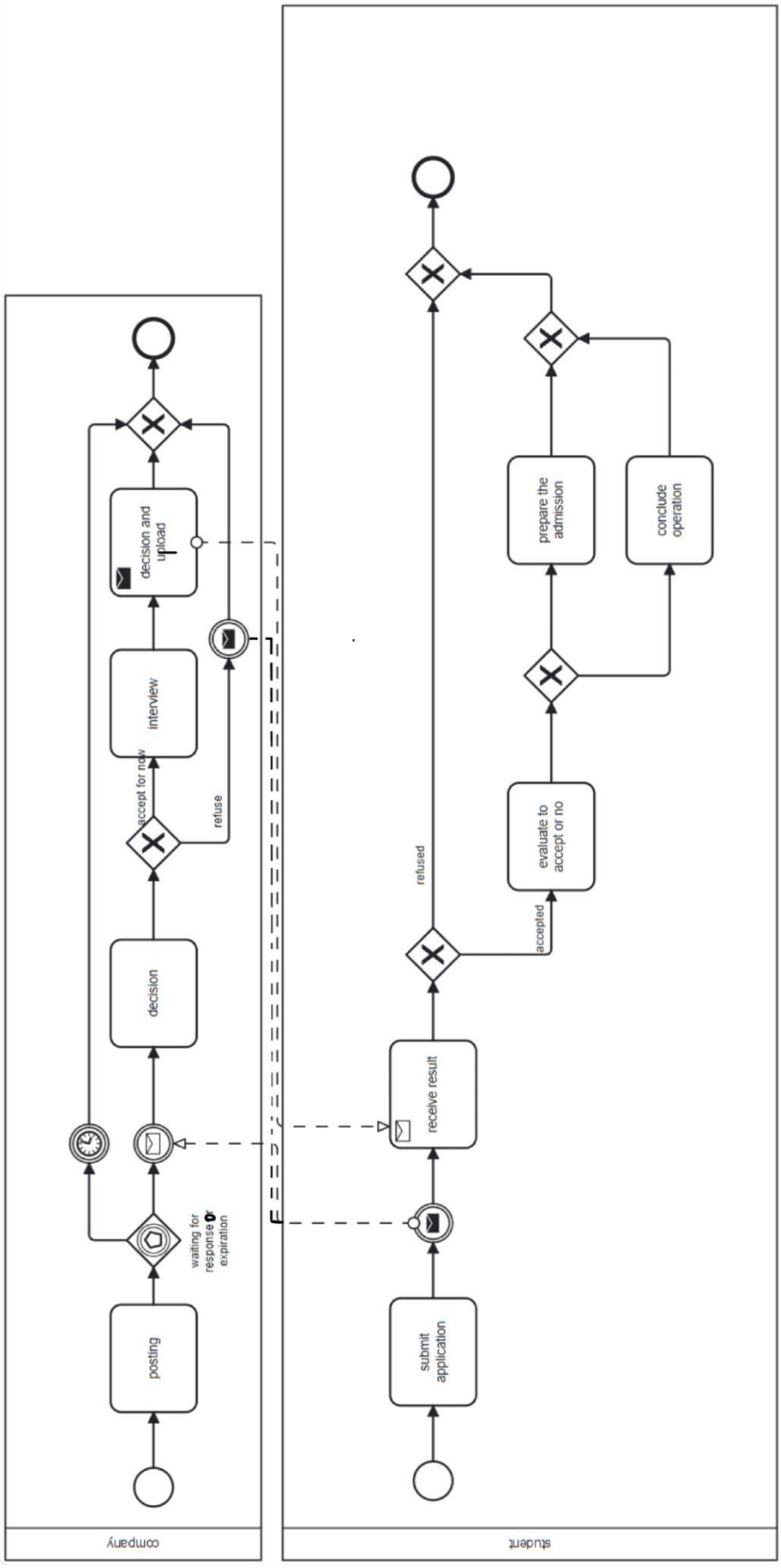


Figure2.2 Proactive application State Diagram

Recommendation mechanism of S&C system

In this state charts diagram is explained how a recommendation mechanism works and the different states that it has. In the recommendation state students and companies receive the recommendation message and decide to accept or no. The selection phase represents the phase in which both two parts accept the recommendation and begin an interview. The second last phase is evaluation in which after the interview company decide if they will recruit this student. The last phase is the terminated in which the company ends the interview.

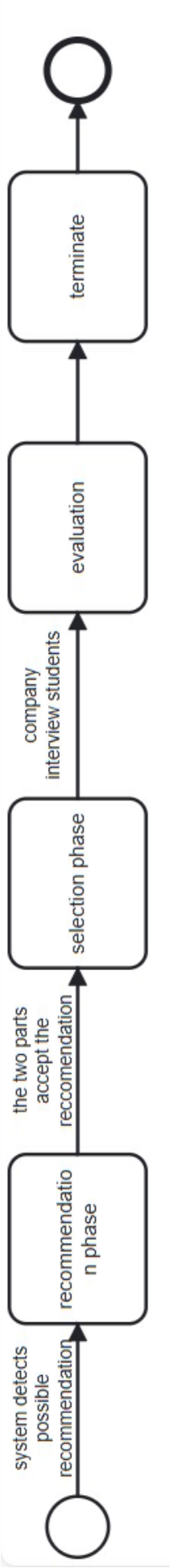


Figure 2.3 - Recommendation mechanism State Diagram

2.2 Product Functions

2.2.1 Product Functions

Sign up and log in

Sign-up is available to all users who want to subscribe to the platform. When a new user opens the platform, he will press the button “Sign-up”. The user will then be redirected to a registration page, where he is asked to insert name, surname, an email address and to create a password. A verification request will be sent to the email address inserted for security reasons. Once the email address is verified, the user will be able to log onto the platform for the first time. If the user is a student, at the first log in, the student will be asked for extra information, such as university, skills, experience, preferences internship position. If the user is a company, at the first log in, the company will be asked for company name, company email address, company location and a brief description. The email address inserted will be used in the future to contact the user. After registration, users can log in to the platform whenever they want with their own credentials.

Posting and managing internship position

This function is available only to companies. The worker of the companies who is occupying of the S&C platform can post an internship position for his company. In the job post he should specify internship position covered, responsibilities, requirements, duration, location, benefits, application process(for example documents required, how to submit applications, deadline for application). After posting that is still possible to manage that post by adding or deleting information, or even deleting the entire post.

Upload CV

This is a function reserved for all students. Every student can open the personal area and upload their CV, helping the system to find suitable recommendations.

Search and apply for an internship position

This is a function reserved for all students. Once log in the platform, everyone can write keywords in the search bar to retrieve open position interested by the user. If the user wants, they can also apply proactively to the position.

Recommendation

This is the system’s automatic function. The system informs students when an internship that might interest them becomes available and can inform companies about the availability of

student CVs corresponding to their needs. This function helps establish contact between students and companies.

Logout

A User session will be closed if the User clicks on "Logout" button. Next time the User opens S&C he will need to log in again.

Feedback and suggestions

This is a function reserved for all user, every can give feedback and suggestions to the S&C platform

Complaint

This is a function reserved for all user taking parting in an ongoing internship experience (both student and company). They can submit their complaint about this experience to the S&C platform.

2.3 User Characteristics

There are mainly two types of users that interact with the platform: student and company.

2.3.1 Students

University students join S&C platform in order to find internship positions in companies, where they can acquire practical knowledge and go into contact with their possible future jobs. They need to have a device with an internet connection and an account in order to have access to S&C.

2.3.2 Company

Companies join S&C platform in order to find possible candidates for some internship positions that they offer. They (workers who are responsible for S&C platform) need to have a device with an internet connection and an account in order to have access to S&C.

Both the student and the company need to register an account in order to access S&C. During the registration process they both asked to provide an email account.

2.4 Assumptions, Dependencies and Constraints

Domain Assumptions

The following assumptions are made for the domain. They are properties or conditions that the system will take for granted.They must be checked to ensure a correct platform behaviour.

Identifier	Description
D1	Students need to have a stable internet connection and a device to access and interact with S&C.
D2	Companies need to have a stable internet connection and a device to access and interact with S&C.
D3	Students information must be correct.
D4	Companies information must be correct.
D5	Students need to have a valid email address.
D6	Companies need to have a valid email address.
D7	S&C need to communicate correctly with the email system.
D8	Students and companies need to undergo a secure authentication phase during the login process to access the platform.
D9	S&C can reliably send notifications to students and companies.
D10	S&C's recommendation mechanisms will perform effectively based on the input data
D11	Students and companies are comfortable sharing personal and sensitive information with the platform, assuming adequate privacy and security measures are in place.

3. Specific Requirements

This section is devoted to a specific description of every kind of requirement the system has to deal with in order to achieve all the functionalities described.

3.1 External Interface Requirements

3.1.1 User Interfaces

The S&C's User interface will be a website, developed in order to be used both by students and companies, available to everyone who has a device with an Internet Browser and a reliable Internet connection.

A student or a company needs to sign in to access the website, if he/she have not registered before, they can click the button "sign up here" below and the website will jump to the registration interface. By filling in the email address and password, they can have a new account.

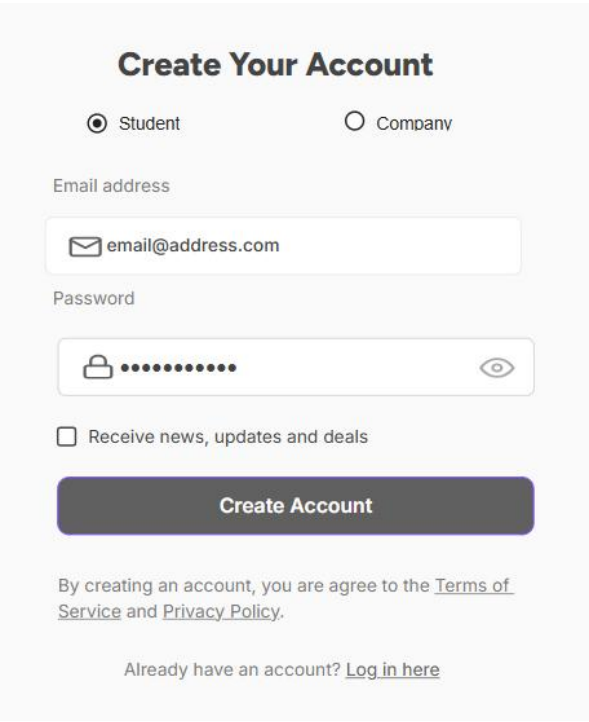


Figure 3.1 - Sign up

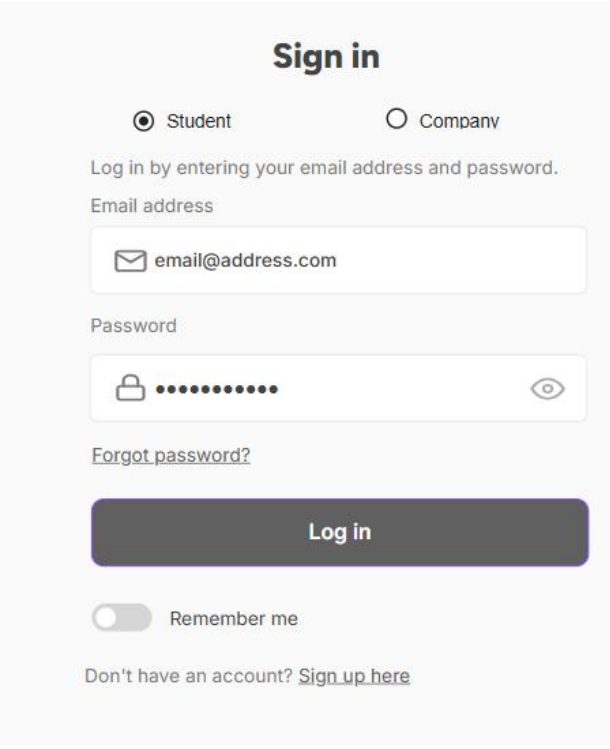


Figure 3.2 - Sign in

Once is logged in, all the students can see the specific homepage: there are many selection bars such as job type, location, does it accept remote working or no to help them find a job they liked.

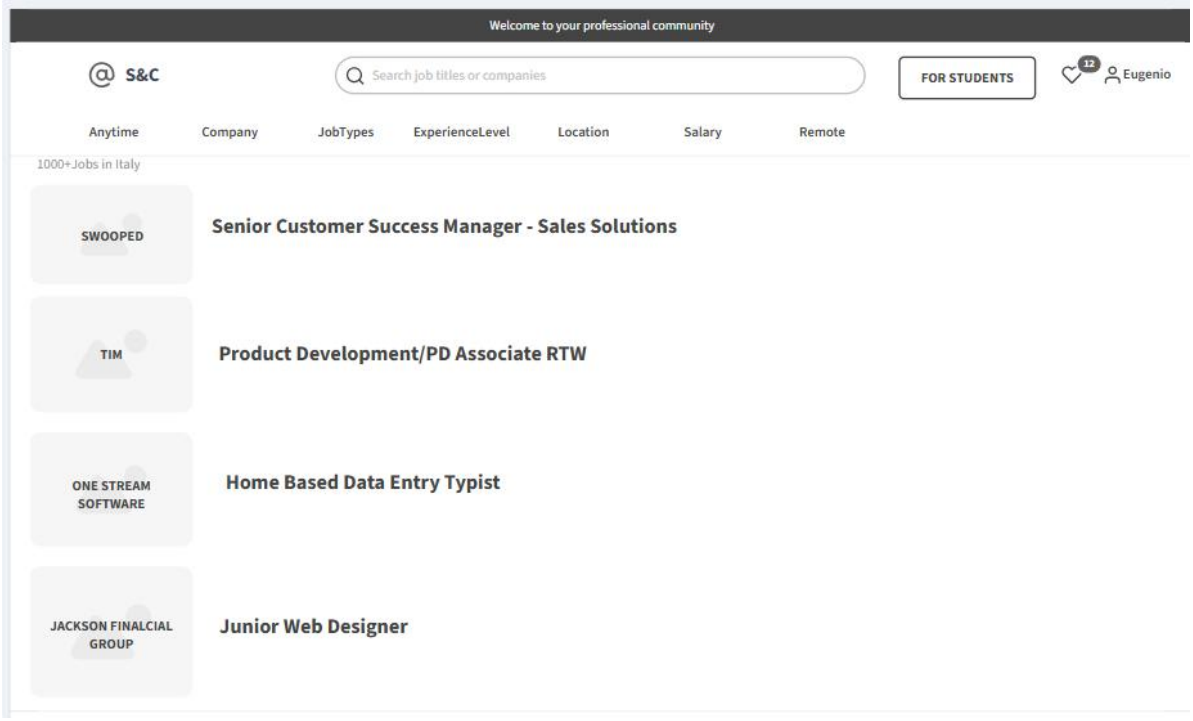


Figure 3.3 - Student's Recommendation

For companies, the interface we provide is similar. They can select the students they like by selecting their educational background and work experience.

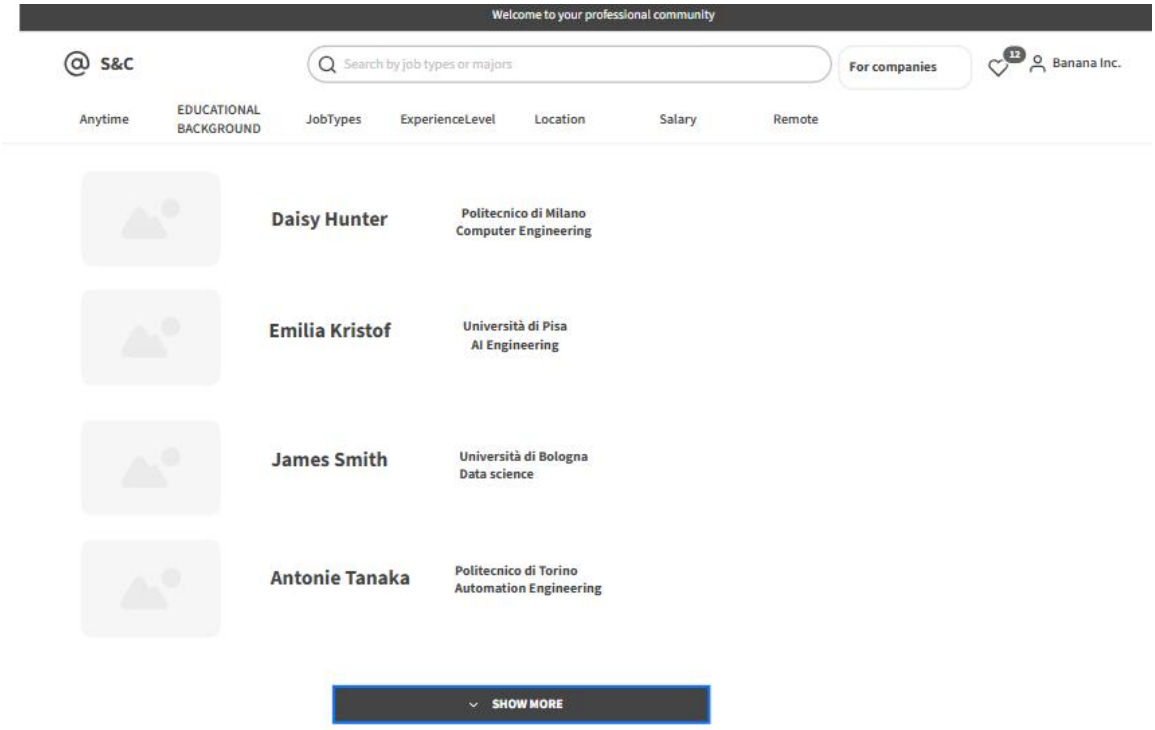


Figure 3.4 - Company's Recommendation

In addition, we have created another company homepage so that they can see all the students who apply for their posts and their detail information on this page, and then choose whether to conduct further interviews.

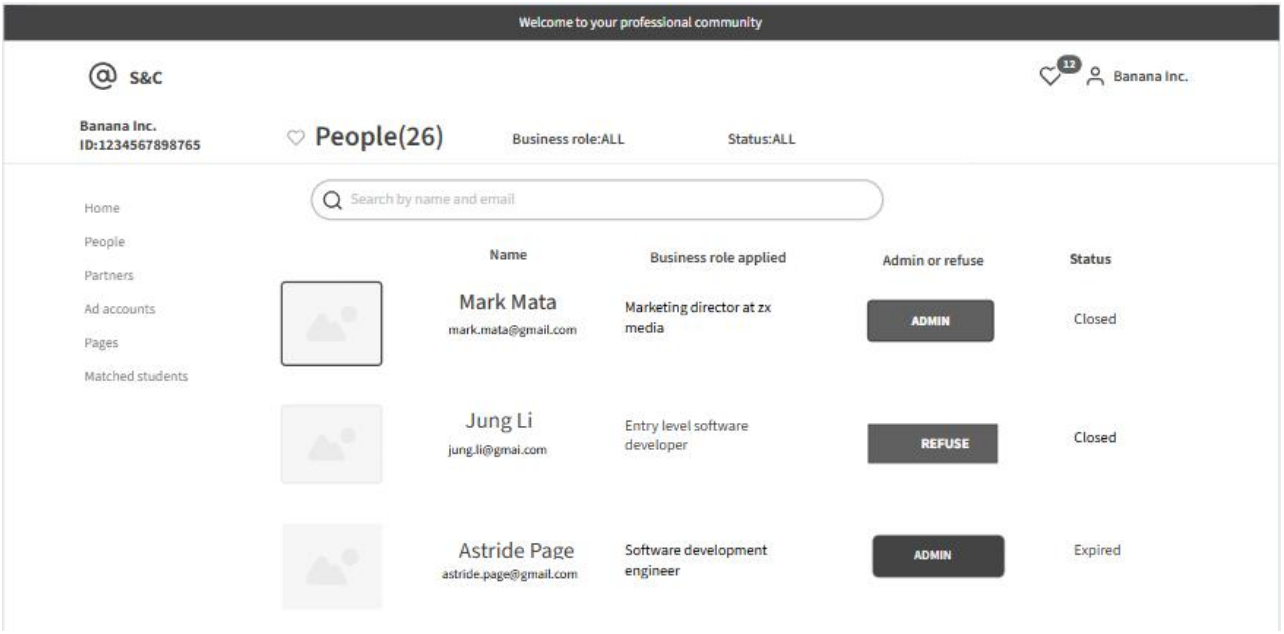


Figure 3.5 - Company's Home Page

In order to facilitate users to provide feedback and suggestions on their experience at any time during use, we have reserved buttons for rating and leaving suggestions at the bottom of all interfaces.

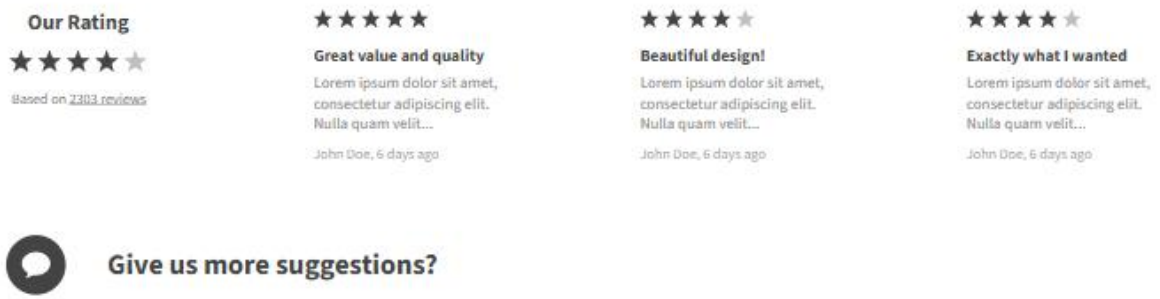


Figure 3.6 - S&C Feedback and Suggestion Page

3.1.2 Hardware Interfaces

The platform will be accessible from every device with an Internet Browser to access the website and a reliable Internet connection.

The User is free to choose his device from a computer to a tablet or smartphone.

3.1.3 Software Interfaces

The system requires External Tools to work properly :

- Interface to enable communication between students and companies during the selection process. Such as Gmail, Outlook APIs.
- Interface for the recommendation engine to interact with the statistical analysis tools for evaluating matches. Such as an analytics module using Python-based libraries (e.g., pandas, scikit-learn) exposed via an internal API.
- Interfaces for sending alerts to users (students or companies) about:
  1. Internship recommendations.
  2. Interview schedules.
  3. Status updates on applications.

  Such as Integration with push notification services.

3.1.4 Communication Interfaces

The communication Interfaces needed by the system are the HTTPS Protocol and the Mail System Transfer Protocol (SMTP).

3.2 Functional Requirements

The following specifies all the requirements that the system must fulfill to function properly:

Requirement	Description
R1	S&C allows Students to sign up.
R2	S&C allows Companies to sign up.
R3	S&C allows Students to log in.
R4	S&C allows Companies to log in. .
R5	S&C allows Student to upload their CV.
R6	S&C allows Student to set university, skills, experience, preferences internship position.

R7	S&C allows Companies to create internship positions on the platform.
R8	S&C allows Companies to set an application deadline for an internship position.
R9	S&C allows Companies to set a document list needed for an internship position.
R10	S&C allows Student to search for internship positions.
R11	S&C allows Student to apply for internship positions.
R12	S&C allows Student to send feedback and suggestions.
R13	S&C allows Companies to send feedback and suggestions.
R14	S&C allows Student to send complaints.
R15	S&C allows Companies to send complaints.
R16	S&C allows Companies to manage their posts.
R17	S&C allows Student and Companies to participate in interviews.
R18	S&C notifies Students once there are new recommendations.
R19	S&C notifies Companies once there are new recommendations.
R20	S&C notifies Student about the result of an application.
R21	S&C notifies Companies about new applications request.

3.2.1 Use Cases Diagrams

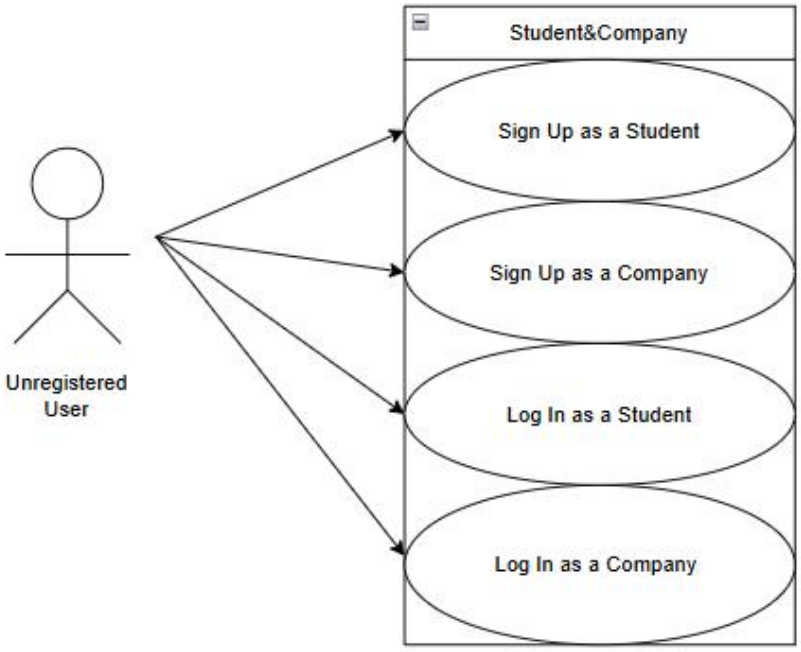


Figure 3.7 -Use Case Diagram for Unregistered User

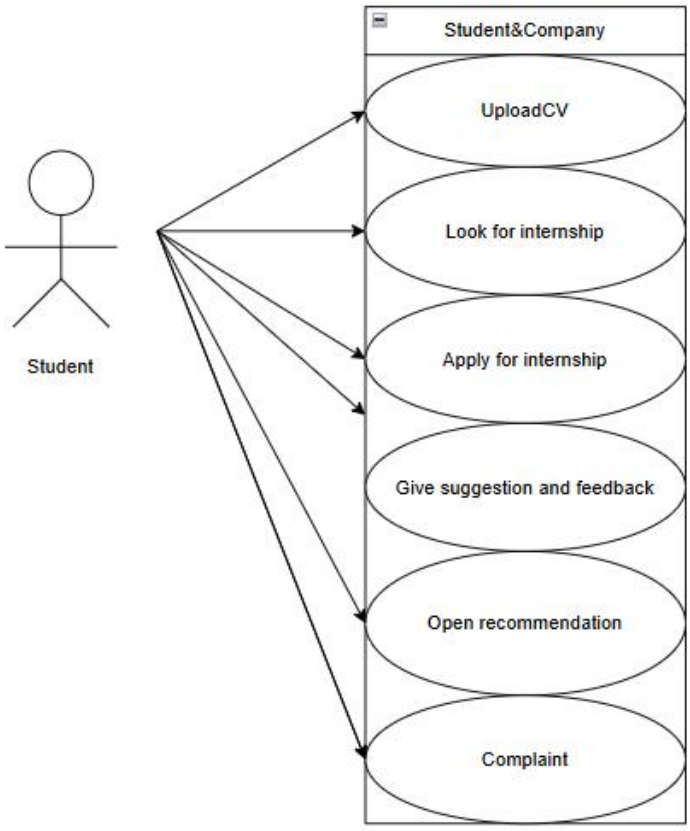


Figure 3.8 -Use Case Diagram for Student

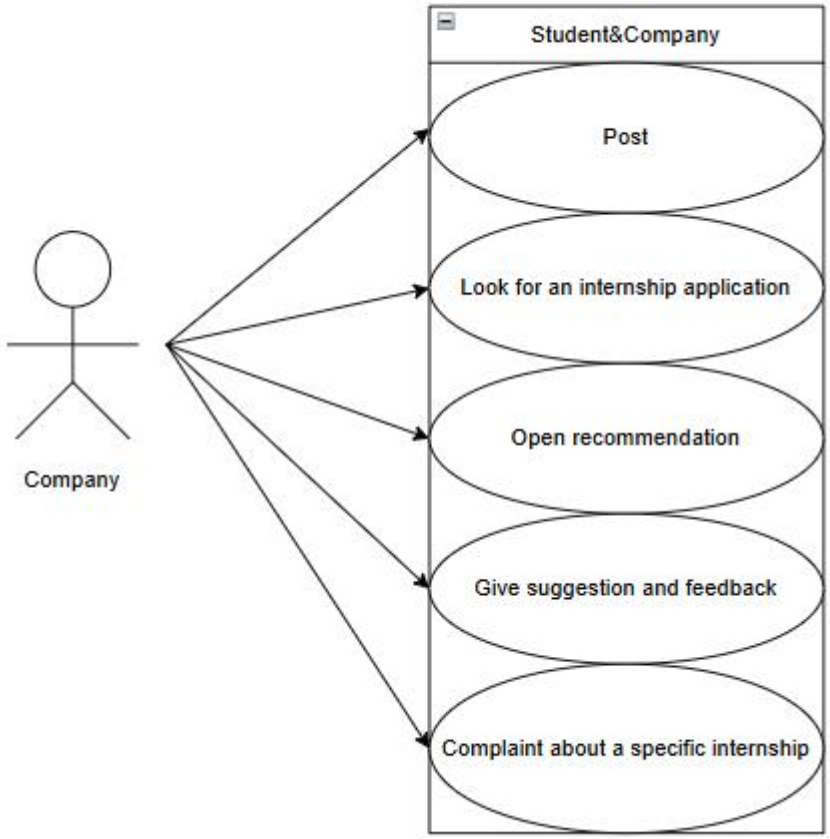


Figure 3.9 -Use Case Diagram for Company

3.2.2 Use Cases

In this section, there are explained and represented the main identified use cases. There is a table with entry conditions, event flow, exit conditions and exception for each of them, and a sequence diagram that shows the messages exchanged between the entities and the called functions.

[UC1]	Sign up as Student
Actor	Student, email provider
Entry Condition	The student is not already registered in S&C and has to search the S&C URL in the browser search bar.
Event Flow	1 – S&C shows the login form. 2 - The Student clicks on “Create an Account” button. 3 – S&C shows the signup form. 4 - The Student inserts name, surname, email, password, university, skills, experience and preferences internship positions in the form and ticks on the “Signup as Student” checkbox. 5 – The student clicks on the “Register” button. 6 – S&C checks all the credentials. 7 - If credentials are correct S&C sends a confirmation email to the student through the email provider. 8 - The student clicks on the confirmation link.
Exit Condition	S&C allows the student to access to the S&C system.
Exception	The email address is already linked to an account. In this case an error message is shown, and the student is redirected to the profile creation settings.

[UC2]	Sign up as company
Actor	Company, email provider
Entry Condition	The Company is not already registered in S&C and has to search the S&C URL in the browser search bar
Event Flow	1 – S&C shows the login form. 2 - The Company clicks on “Create an Account” button. 3 – S&C shows the signup form. 4 - The Company inserts the company name, the company email address, company location and a briefly description in the form and ticks on the “Signup as Company” checkbox. 5 – The Company clicks on the “Register” button. 6 – S&C checks all the credentials. 7 - If credentials are correct S&C sends a confirmation email to the Company through the email provider. 8 - The Company clicks on the confirmation link.

Exit Condition	S&C allows the Company to access to the S&C system.
Exception	- The email address is already linked to an account. In this case an error message is shown, and the Company is redirected to the profile creation settings. -The company name is already registered on the platform. In this case an error message is shown, and the Company is redirected to the profile creation settings.

[UC3]	Login as a Student
Actor	Student
Entry Condition	The Student should be registered in S&C and has to search the S&C URL in the browser search bar.
Event Flow	1.S&C shows the login form. 2.The student inserts his email and password in the form. 3.The student clicks on the “Login” button. 4.S&C checks the credentials.
Exit Condition	S&C allows the student to access to the S&C platform
Exception	Incorrect email or password. An error message is shown, and the student is redirected back to the Login page.

[UC4]	Login as a Company
Actor	Company
Entry Condition	The Company should be registered in S&C and has to search the S&C URL in the browser search bar.
Event Flow	1. S&C shows the login form. 2. The Company inserts his email and password in the form. 3. The Company clicks on the “Login” button. 4. S&C checks the credentials.
Exit Condition	S&C allows the Company to access to the S&C platform

Exception	Incorrect email or password. An error message is shown and the Company is redirected back to the Login page

[UC5]	Student upload CV
Actor	Student
Entry Condition	The student is correctly logged in. The Student is on his profile page. The Student has decided to upload a new CV.
Event Flow	1. The student clicks on “upload a new CV”. 2.S&C returns the request uploading form. 3.The student uploads the new CV, and then clicks the confirm button. 4.S&C checks if the CV file format is supported and of suitable size (for example < 5MB). 5.If that’s right, S&C returns the Student Profile Page with the new CV attached.
Exit Condition	The CV is correctly uploaded.
Exception	The CV file format is not supported. An error message is shown and the Student is redirect back to his profile page.

[UC6]	Student look for internship
Actor	Student
Entry Condition	The student is correctly logged in. The student is on his home page. The student wants to search for some internships.
Event Flow	1.The student clicks on “search” button. 2.S&C shows the search bar. 3.The student inserts the keyword of what he wants to search. 4.The student clicks on “search” button 5.S&C returns a page where is a list of all possibly suitable results. (6. If the student wants to see details on an internship position, he clicks on that. 7. S&C returns a page on that internship position with all detail information)
Exit Condition	S&C correctly returns possibly suitable results.
Exception	(it could happen that there are no result matches with the keyword typed, but it is non necessary an error/ exception)

[UC7]	Student and company send feedback and suggestions
Actor	Student or Company
Entry Condition	-The user is correctly logged in. He is on his home page. He wants to send feedback and suggestions. - S&C asks to a user for a feedback and suggestions after a selection process or an application process.
Event Flow	1. The user clicks on “give feedback” button. 2. S&C returns a page where are forms to compile. 3. The user fills up the forms and clicks on “submit” button. 4. S&C controls if all mandatory parts are compiled. 5. If it is right, S&C shows a success submit message.
Exit Condition	S&C receives correctly the feedback.
Exception	Some mandatory parts of the form are missing. An error message is shown.

[UC8]	Student apply for an internship
Actor	Student
Entry Condition	The student is correctly logged in. He is on an internship position post. He wants to apply for it.
Event Flow	1.The student clicks on “apply” button. 2.S&C returns a page where can upload the resume. 3.The student uploads the resume and clicks on “submit”button. 4.If the resume is uploaded successfully, the company will receive a message of a new application.
Exit Condition	S&C receives correctly the documents and sends application notify to the company.
Exception	Some mandatory parts of the application documents are missing. An error message is shown.

[UC9]	Student/Company complaint
Actor	Student or Company
Entry Condition	The user is correctly logged in and he has complaints during the execution of the internships. They want to report to S&C.
Event Flow	1.The user clicks on “feedback” button. 2.S&C returns a page where can fill the personal information,the things they complain about and the process of the incident. 3.S&C controls if the personal information corresponds for example if the students actually interns in this company etc. 4.If the data is corresponding, S&C sends a confirmation message to the user.
Exit Condition	S&C correctly received the user’s complaint.
Exception	-The information provided by the user is incorrect.

[UC10]	Company post internship position
Actor	Company
Entry Condition	The company manager is correctly logged in and he is on his homepage.The company wants to recruit some students for internship.He registers the S&C platform and wants to post some job postings.
Event Flow	1.The company clicks on “post internship request” button. 2.S&C returns a page where can upload the detail requirements like position,duration,benefit etc. 3.The company fills the form and clicks on “submit” button. 4.S&C controls if all fields are compiled. 5.If all fields are compiled, S&C shows a success submit message.
Exit Condition	S&C correctly returns possibly suitable results.
Exception	Some mandatory parts of the form are missing. An error message is shown.

[UC11]	Company check for a position applications
Actor	Company
Entry Condition	The company manager is correctly logged in and he is on his homepage. He wants to check if there are any applications for the job post he posted before.
Event Flow	1.He clicks the “internship Post” button. 2.S&C returns a page where lists all the application information. 3.If he is interested in someone’s application,he opens the student’s profile. 4.S&C returns a page with the student’s detail profile
Exit Condition	S&C correctly returns possibly suitable pages.
Exception	(it could happen that there are no one apply for this position, but it is non necessary an error/ exception)

[UC12]	Recommendation for students
Actor	S&C and Student
Entry Condition	S&C system has enough information to give recommendations to the Student
Event Flow	1.The system study using some algorithms all possibly suitable recommendation for the student. 2.The system sends a list of internship position to the student. (3.If the student is interested about one of the position on the list, the student clicks on the internship) (4.S&C returns a page with detailed information about that position) (5.Now the student can accept this recommendation and if so the application phase will start)
Exit Condition	S&C sends correctly its recommendation
Exception	(it could happen that there are no recommendation for the student, but this is not an error/exception)

[UC13]	Recommendation for companies
Actor	S&C and company
Entry Condition	S&C system has enough information to give recommendations to the Company
Event Flow	1.The system study using some algorithms all possibly suitable recommendation for the company. 2.The system sends a list of students to the Company. (3.If the company is interested about someones, the company clicks on that students profile) (4.S&C returns a page with detailed information about that student) (5.Now the company can accept this student and if so S&C will send a notification to the Student)
Exit Condition	S&C sends correctly its recommendation
Exception	(it could happen that there are no recommendation for the company, but this is not an error/exception)

3.2.3 Sequence Diagrams

UC1 – Sign up as Student

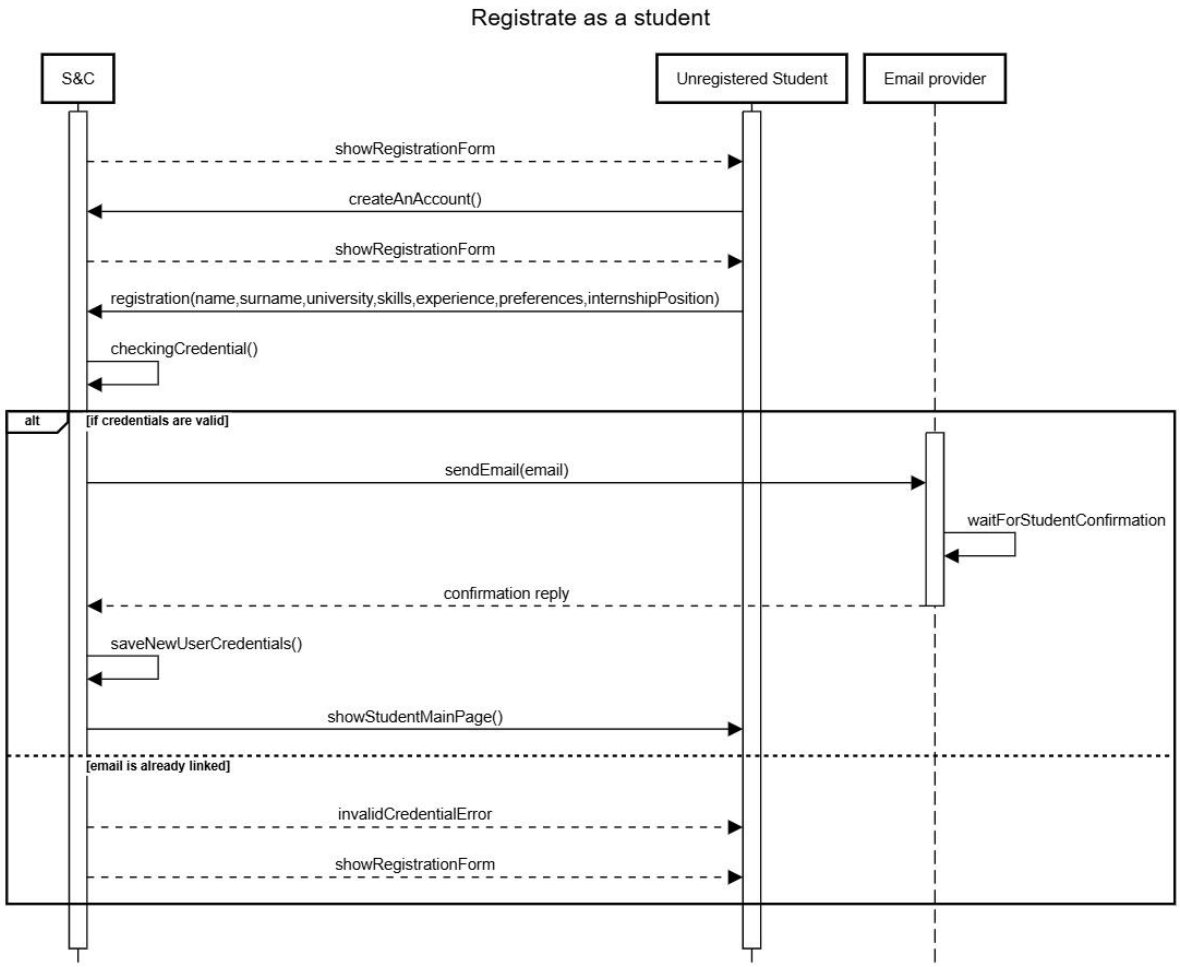


Figure 3.10 -Sign up as Student Sequence Diagram

UC-2 Sign up as company

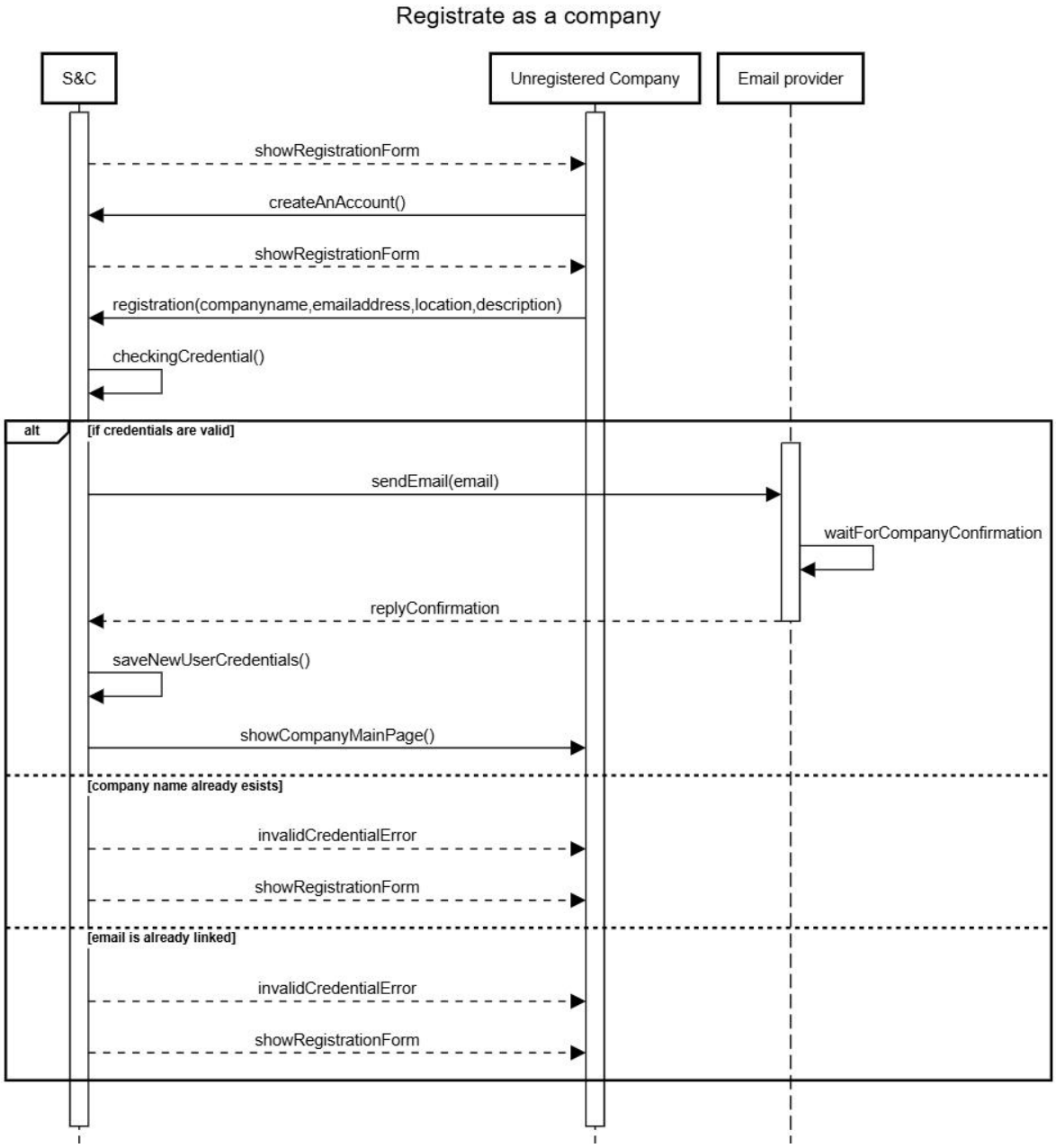


Figure 3.11 -Registrate as a Company Sequence Diagram

UC-3 Login as a Student

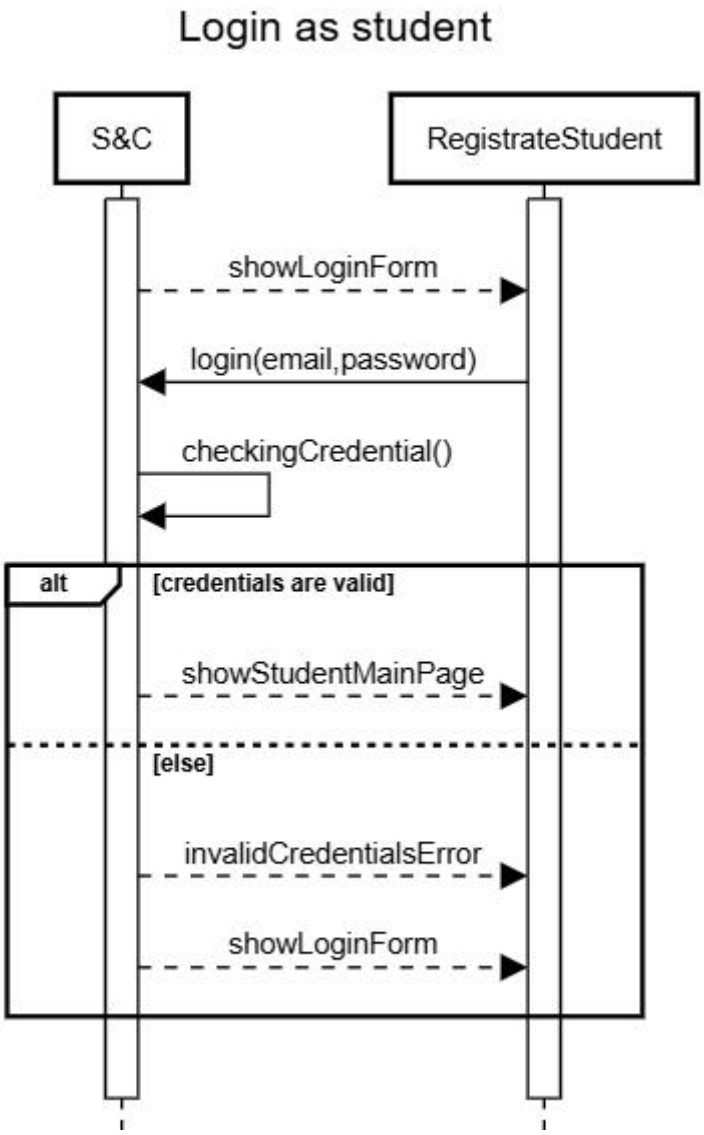


Figure 3.12 -Login as a Student Sequence Diagram

UC-4 Login as a Company

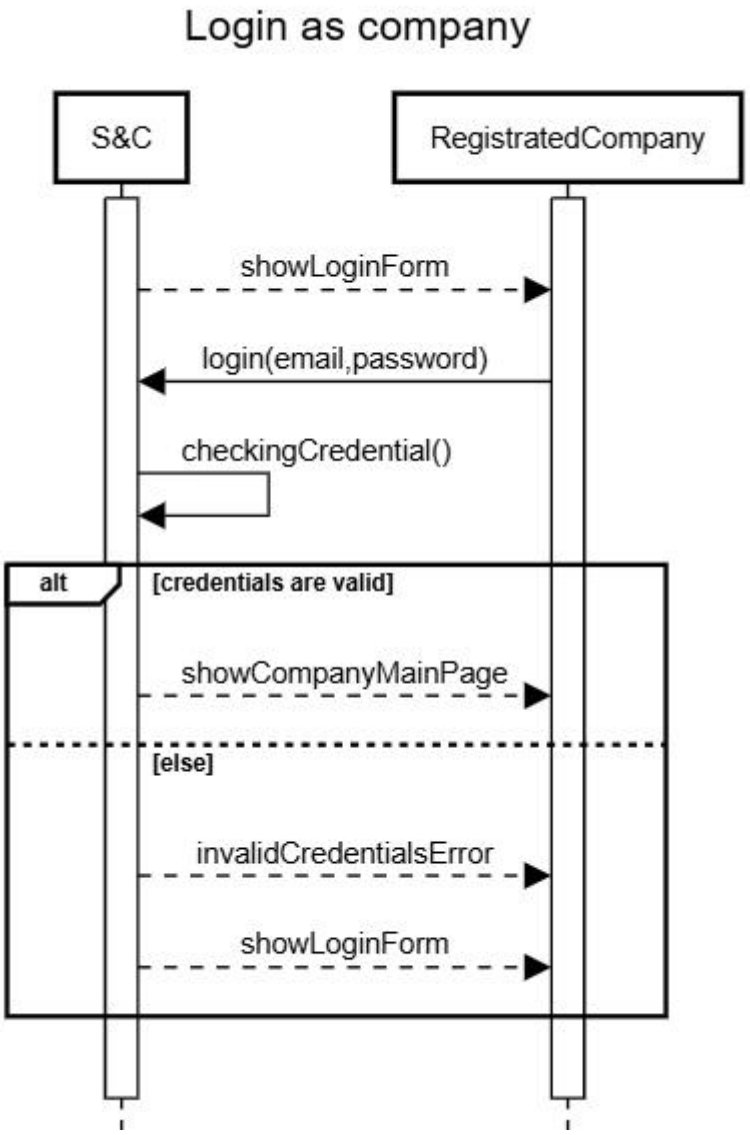


Figure 3.13 -Login as a Company Sequence Diagram

UC- 5 Student upload CV

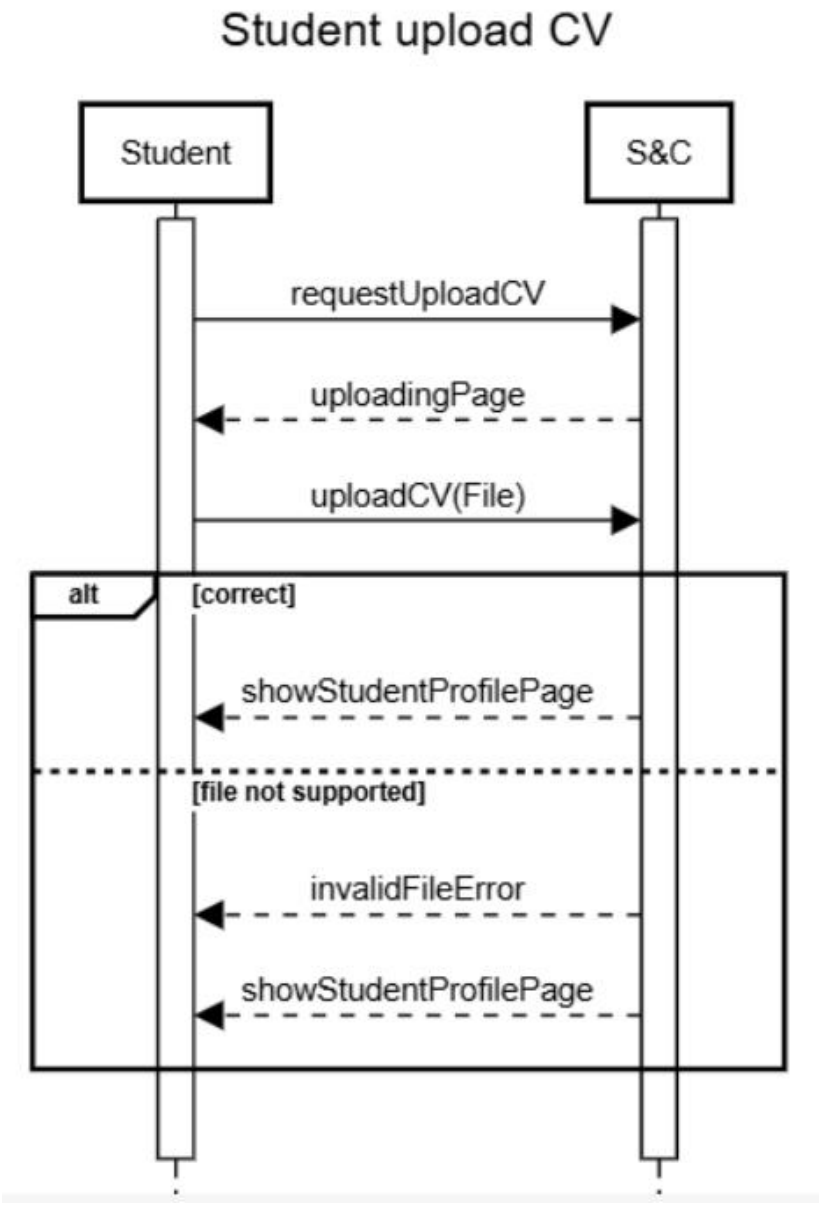


Figure 3.14 -Student uploads CV Sequence Diagram

UC-6 Student look for internship

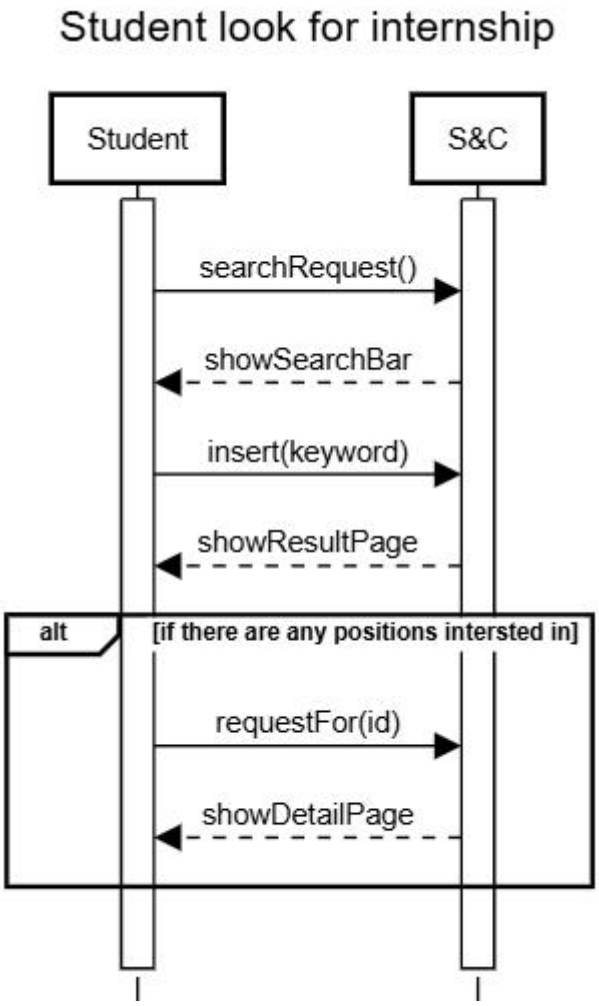


Figure 3.15 -Student looks for internship Sequence Diagram

UC-7 Student and company send feedback and suggestions

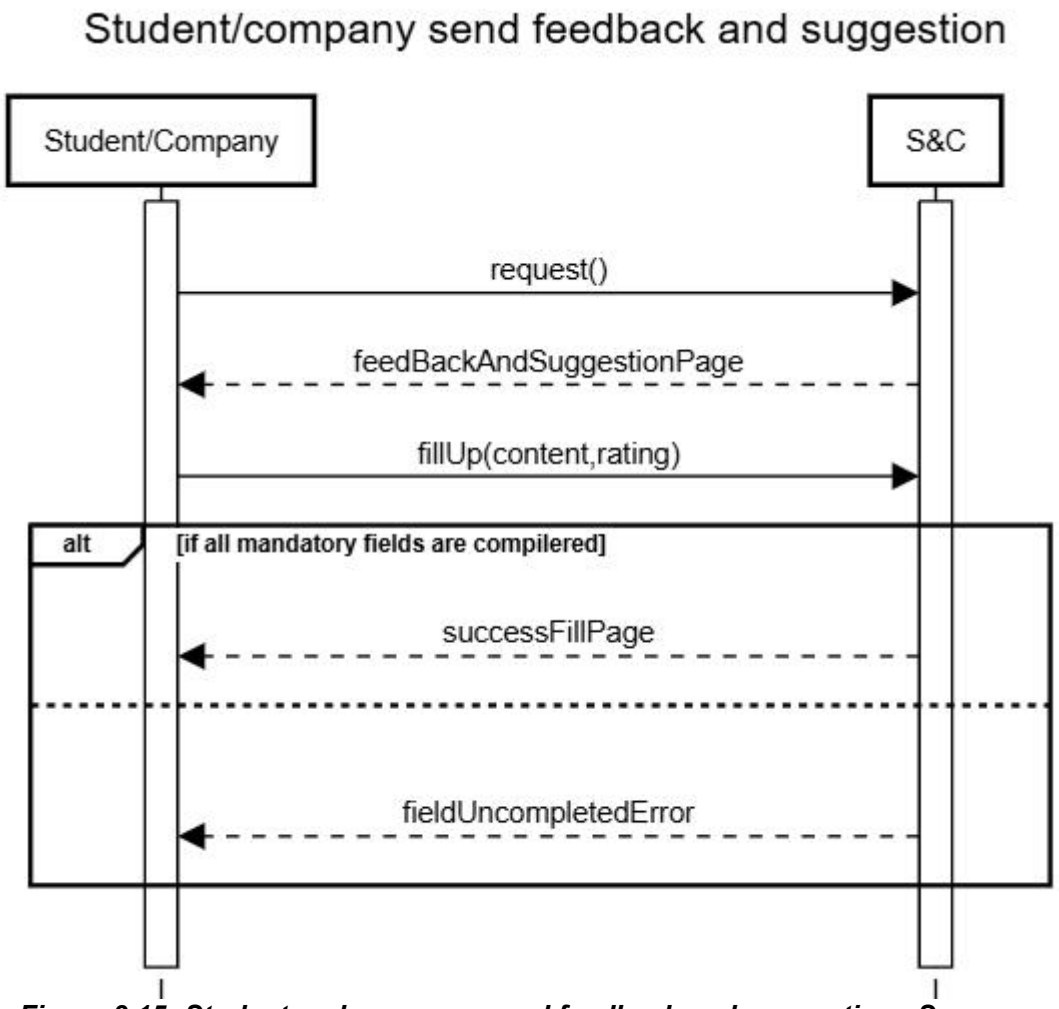


Figure 3.15 -Student and company send feedback and suggestions Sequence Diagram

UC-8 Student apply for an internship

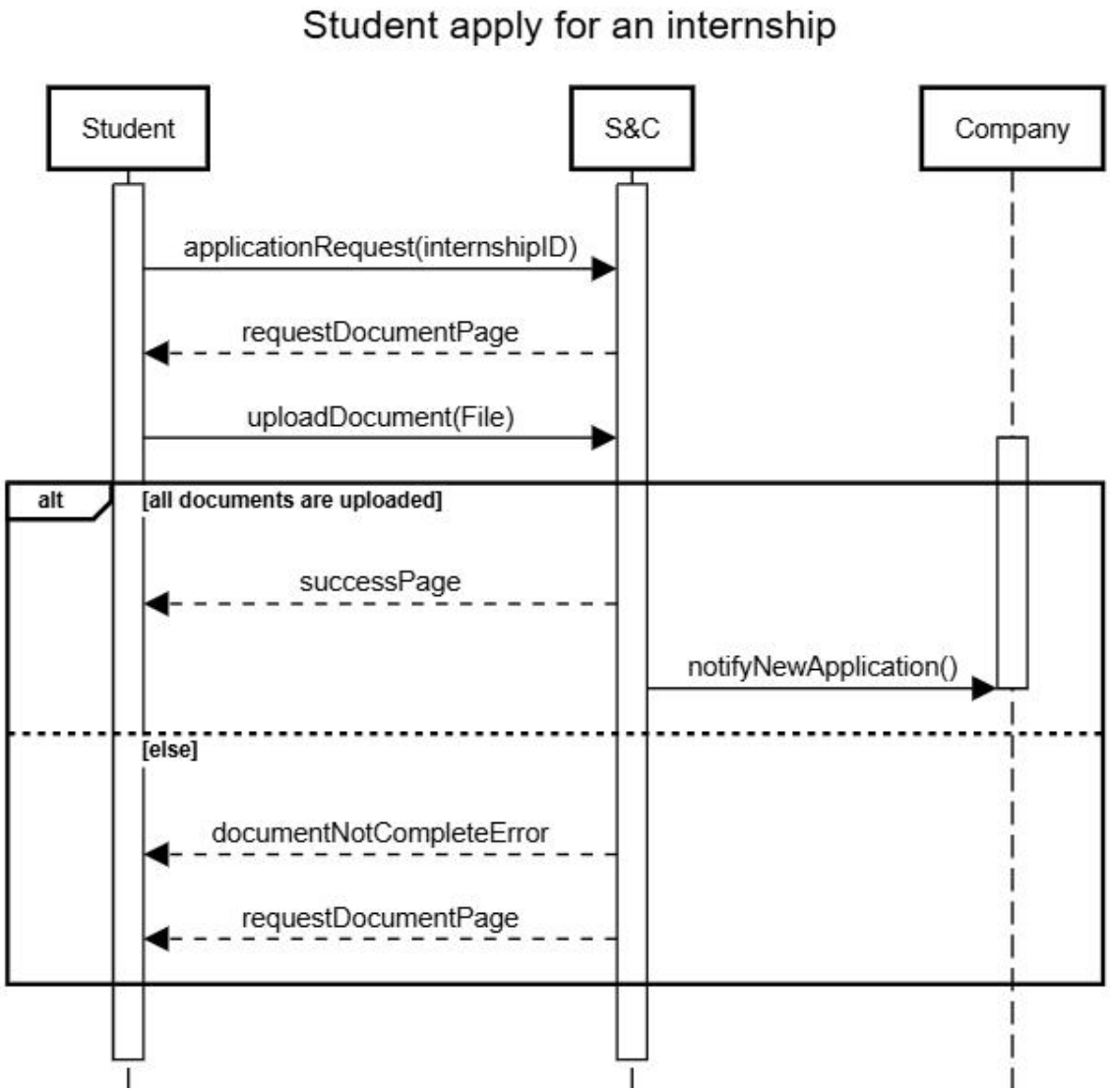


Figure 3.16 -Student applies for an internship Sequence Diagram

UC-9 Student/Company complaint

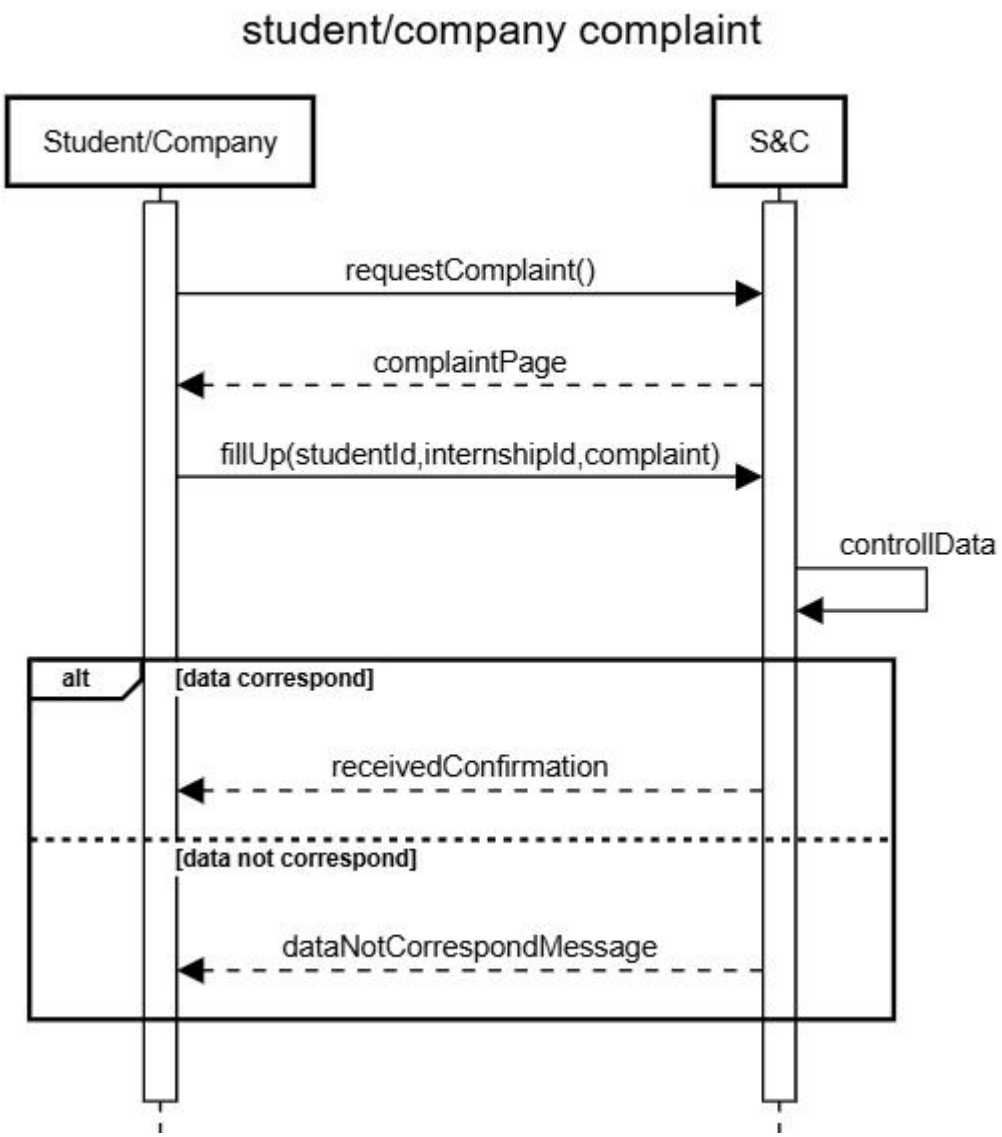


Figure 3.16 -Student/Company's Complaint Sequence Diagram

UC-10 Company post internship position

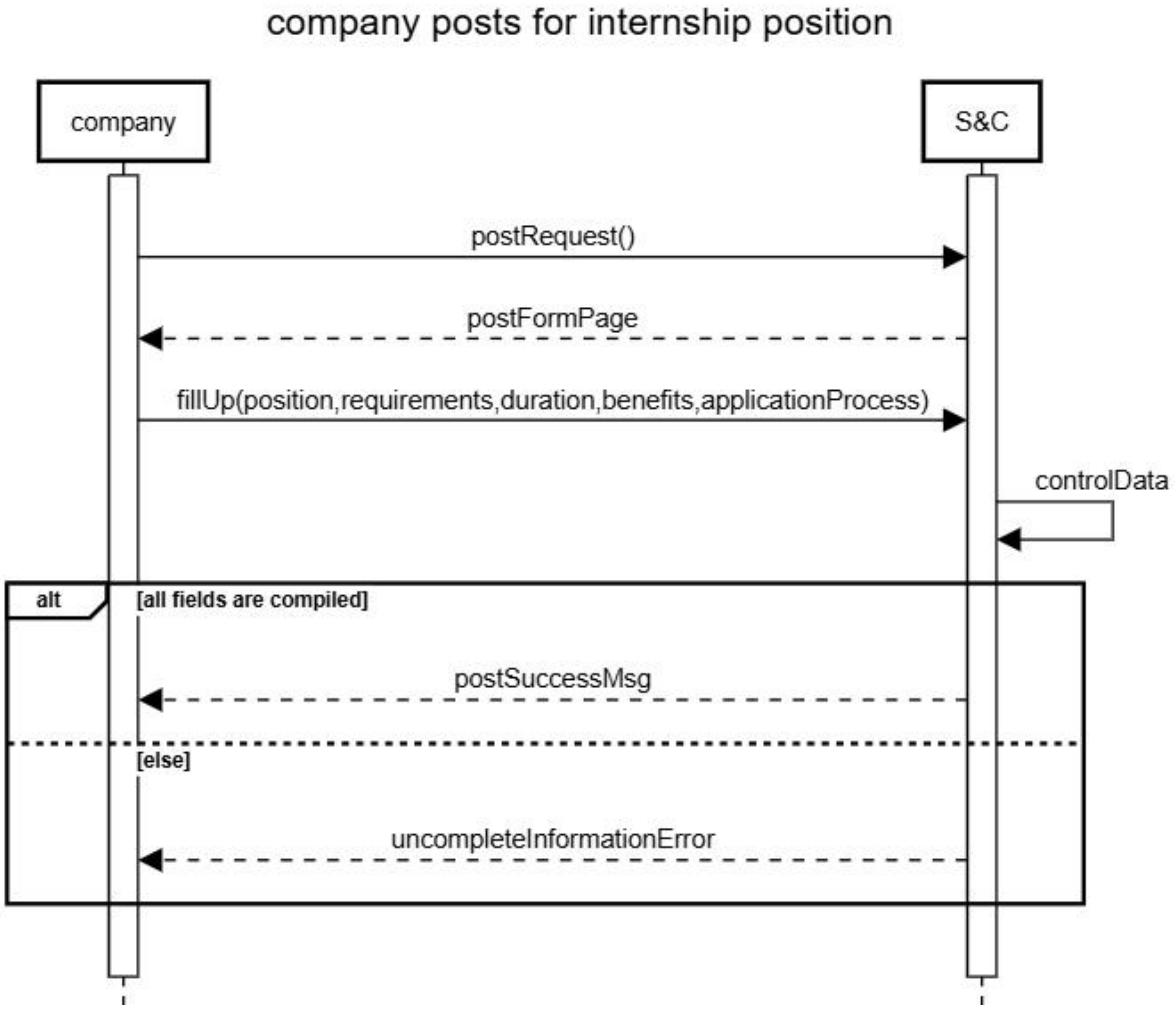


Figure 3.17 -Company posts internship position Sequence Diagram

UC-11 Company check for a position applications

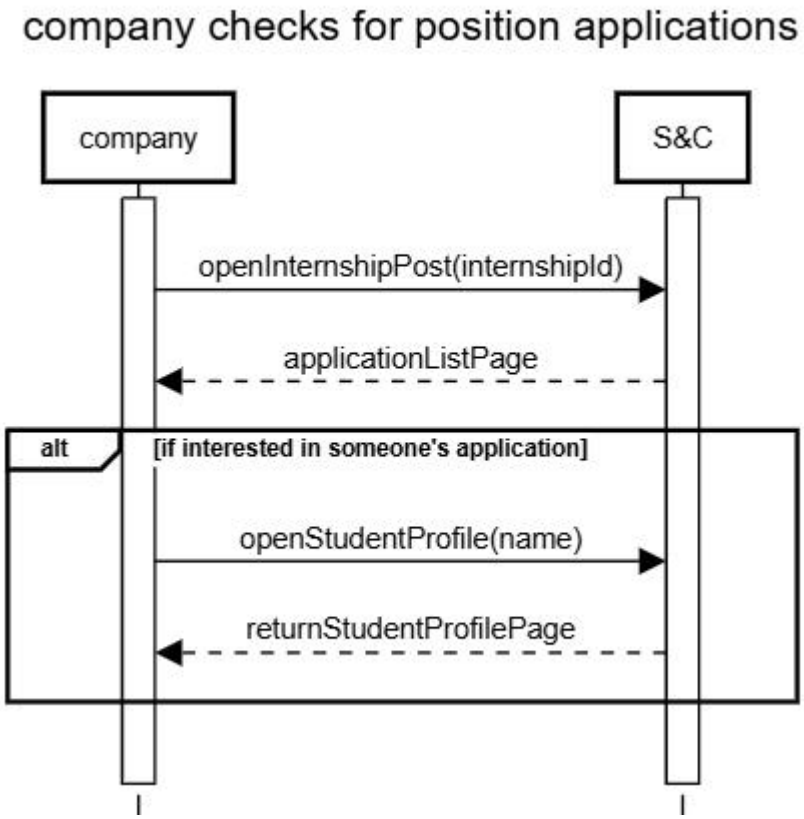


Figure 3.18 -Company checks for position applications Sequence Diagram

UC-12 Recommendation for students

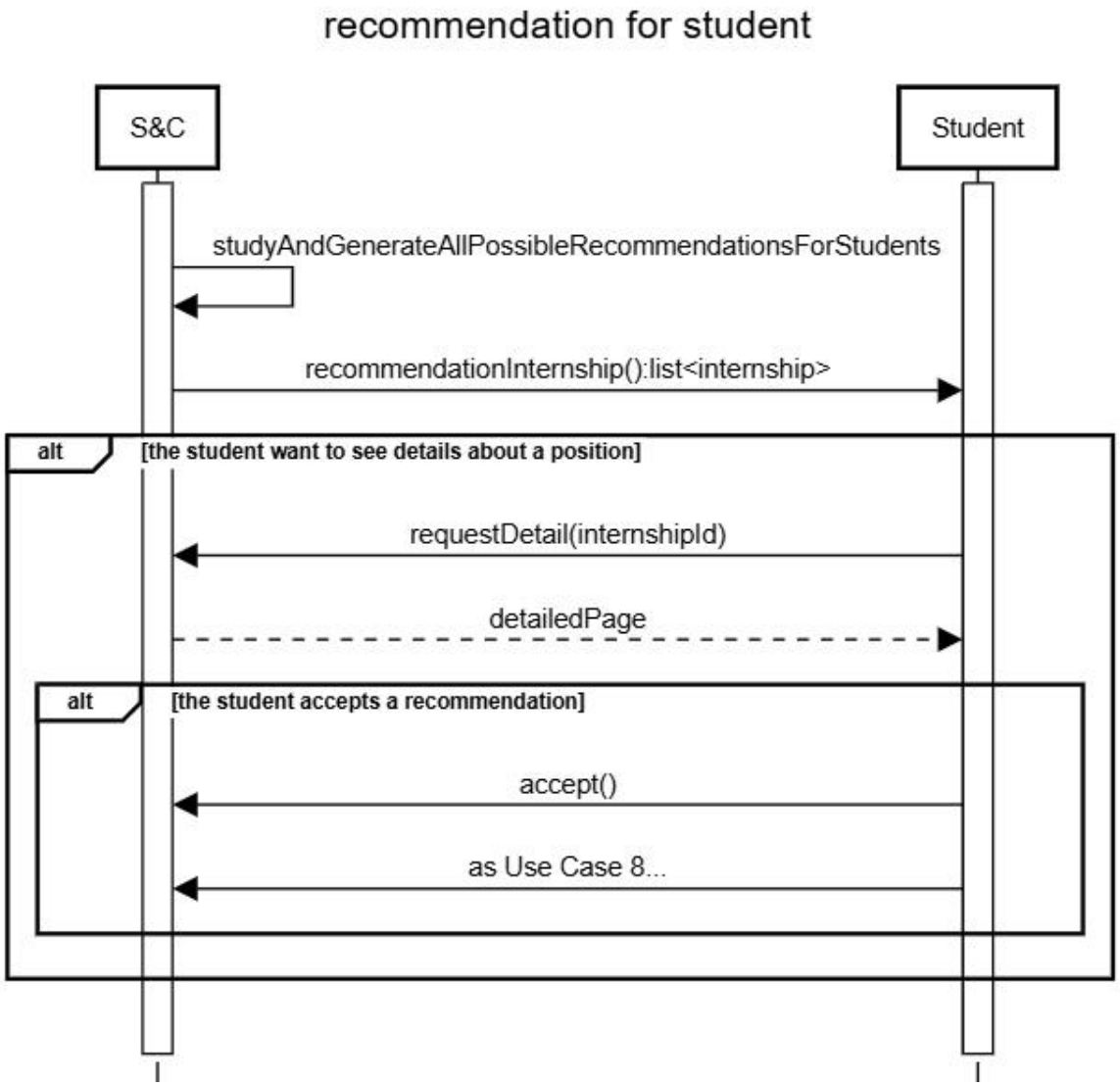


Figure 3.19 -Recommendation for Students Sequence Diagram

UC-13 Recommendation for companies

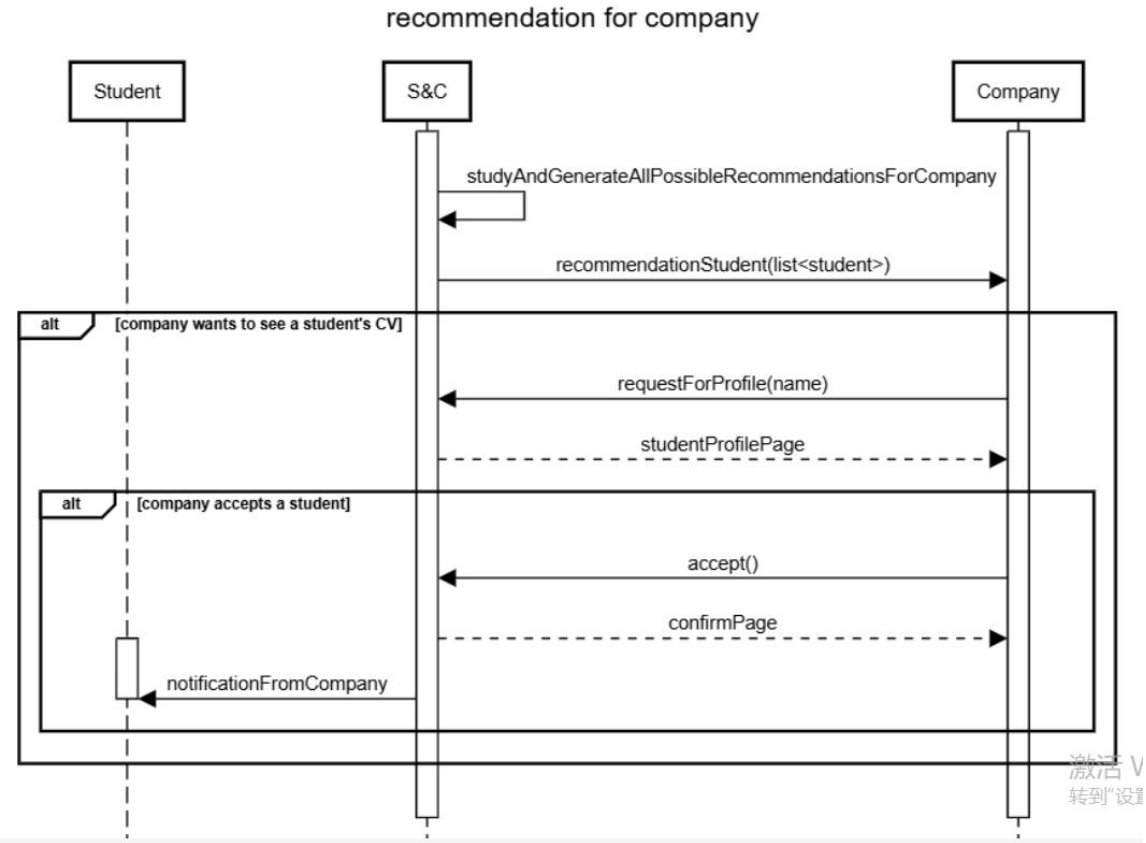


Figure 3.20 -Recommendation for Companies Sequence Diagram

3.2.4 Requirements Mapping

[G1] Allows companies to advertise the internship that they offer	
[R2] S&C allows Companies to sign up. **[R4]**S&C allows Companies to log in. **[R7]**S&C allows Companies to create internship positions on the platform. **[R8]** S&C allows Companies to set an application deadline for an internship position **[R9]** S&C allows Companies to set a document list needed for an internship position. **[R16]** S&C allows Companies to manage their posts. **[R19]** S&C notifies Companies once there are new recommendations. **[R21]** S&C notifies Companies about new applications request.	**[D2]** Companies need to have a stable internet connection and a device to access and interact with S&C. **[D4]** Companies information must be correct.

[G2] Allows Students to look for internships	
[R1] S&C allows Students to sign up. **[R3]** S&C allows Students to log in. **[R5]** S&C allows Student to upload their CV. **[R6]** S&C allows Student to set university, skills, experience, preferences internship position. **[R10]** S&C allows Student to search for internship positions. **[R11]** S&C allows Student to apply for internship positions. **[R18]** S&C notifies Students once there are new recommendations. **[R20]** S&C notifies Student about the result of an application.	**[D1]** Students need to have a stable internet connection and a device to access and interact with S&C. **[D3]** Students information must be correct. **[D5]** Students need to have a valid email address. **[D9]** S&C can reliably send notifications to students and companies. **[D11]** Students and companies are comfortable sharing personal and sensitive information with the platform, assuming adequate privacy and security measures are in place.

[G3] Matching between suitable students and companies	
[R17] S&C allows Student and Companies to participate in interviews. **[R18]** S&C notifies Students once there are new recommendations. **[R19]**S&C notifies Companies once there are new recommendations. **[R20]** S&C notifies Student about the result of an application. **[R21]** S&C notifies Companies about new applications request.	**[D7]** S&C need to communicate correctly with the email system. **[D9]** S&C can reliably send notifications to students and companies. **[D10]** S&C's recommendation mechanisms will perform effectively based on the input data

[G4] Allows students and companies to complaint about an ongoing internship.	
[R1] S&C allows Students to sign up. **[R2]** S&C allows Companies to sign up **[R3]**S&C allows Students to log in. **[R4]** S&C allows Companies to log in. **[R14]** S&C allows Student to send complaints. **[R15]** S&C allows Companies to send complaints.	**[D1]** Students need to have a stable internet connection and a device to access and interact with S&C. **[D2]** Companies need to have a stable internet connection and a device to access and interact with S&C. **[D8]** Students and companies need to undergo a secure authentication phase during the login process to access the platform. **[D11]** Students and companies are comfortable sharing personal and sensitive information with the platform, assuming adequate privacy and security measures are in place.

3.3 Performance Requirements

To ensure S&C platform delivers a responsive, reliable and scalable user experience, the following performance requirements are defined:

3.3.1 Response Time

- that is directly executed by S&C should be in the domain of milliseconds.

3.3.2 Data Storage

- S&C needs to be save and manage all the details about both students and companies.

3.3.3 Number of Concurrent Users

- We want our website to attract at least ten thousand users. The platform should support all these users without significant degradation in performance.

3.3.4 Scalability

- The system should be designed to handle a growth in userbase by at least 20% per year. Scalability considerations should be in place to accommodate additional users without compromising performance.

3.3.5 Reliability and Availability

- System Uptime:
  - The platform must maintain a minimum of 99.5% uptime over a rolling 12-Month period, excluding scheduled maintenance windows. This ensures users have reliable access to the system.
- Fault Tolerance:
  - The system should be designed with fault-tolerant mechanisms to handle unexpected failures or disruptions, minimizing downtime and ensuring continuity of service.

These performance requirements are crucial for providing a seamless and efficient experience for users on the S&C platform. Regular performance monitoring and optimizations will be conducted to meet or exceed these specifications.

3.4 Design Constraints

3.4.1 Standards Compliance

- GDPR:
  - The system must be compliant to the EU's GDPR (General Data Protection Regulation), a set of regulations that is designed in order to protect the personal data, the privacy and security of the EU's citizens.
- Web standards:
  - The user interfaces and interactions follow web standards to ensure crossbrowser compatibility, accessibility, and responsiveness. This includes adherence to HTML, CSS, and JavaScript standards.
- Security Standards:
  - The platform complies with industry-standard security practices to protect user data, including secure transmission of information and secure storage of credentials. It follows encryption protocols and secure authentication mechanisms.

3.4.2 Hardware Limitations

The S&C platform operates within specific hardware limitations to ensure optimal performance and resource utilization.

- Minimum System Requirements:
  - Users accessing the platform are required to have devices that meet minimum system requirements, including a compatible web browser and sufficient processing power to handle coding tasks.For example, processor intel i5 or i7, with display with high resolution at least HD and at least 8GB of RAM.
- Network Connectivity:
  - The platform relies on network connectivity for user access and data exchange. Users must have a stable internet connection to use S&C effectively.The device should be compatible with at least one of this standards 3G, 4G, 5G, IEEE 802.11 and IEEE 802.3.

3.5 Software System Attributes

3.5.1 Reliability

The system must operate continuously without interruptions for extended durations. To ensure fault tolerance, the backend deployment should incorporate mechanisms for replication and redundancy. Additionally, offline data backups must be maintained to facilitate disaster recovery in the event of data loss.

3.5.2 Availability

The system must be available the most time possible, with a minimum value of 99.9% (three-nines) of time. In this way the system will be unavailable for only 8.76 hours a year.

3.5.3 Security

The system handles sensitive personal user information, making security a top priority. The central database must be safeguarded using comprehensive protective measures to prevent both external and internal breaches. Passwords stored in the database must be encrypted, and in cases of password recovery, they must never be transmitted in plain text. Communication over the internet should be secured using encryption protocols to protect against traffic interception, spoofing, and fraudulent attacks, thereby ensuring privacy, data integrity, and consistency.

3.5.4 Maintainability

The system should be designed with scalable and reusable models to allow for the seamless addition of new features with minimal effort. Regular maintenance activities should be scheduled during nighttime hours to ensure service availability during periods of peak user traffic.

3.5.5 Portability

The system must be accessible by the Users from every kind of Web Browser and especially it must run on every Operation System(Windows, Mac OS, Linux, etc). There are no particular portability requirements server side.

4. Formal Analysis Using Alloy

4.1 Signatures

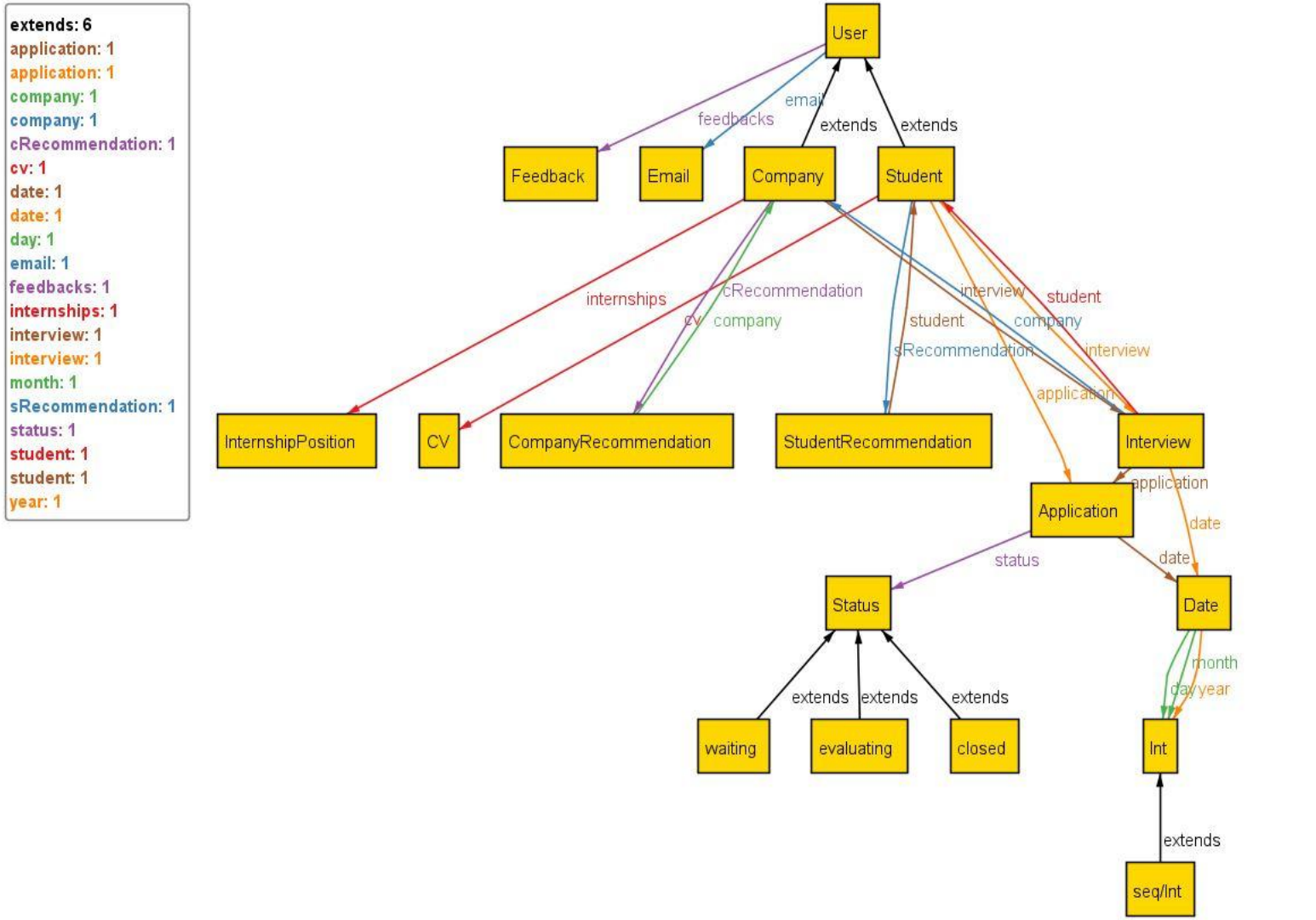
```
// **Basic Definitions**

sig Email {}
// Defines Email as a type for representing unique email addresses.

sig Date {
    year: one Int,
    month: one Int,
    day: one Int
} {
    // Constraints for valid months and days in a Date.
    month >= 1 and month <= 12
    day >= 1 and day <= 31
}

sig CV {}
// Defines CV as a type for storing Curriculum Vitae information.

sig Feedback {}
// Represents feedback objects.

sig InternshipPosition {}
// Represents an internship position offered by a company.

sig Application {
    date: one Date,
    status: one Status
}
// Represents an application, with a specific date and status.

abstract sig Status {}
// Abstract type to represent the status of an application.

one sig evaluating extends Status {}
// Status indicating the application is being evaluated.

one sig closed extends Status {}
// Status indicating the application process is closed.

one sig waiting extends Status {}
// Status indicating the application is waiting for a decision.

sig StudentRecommendation {
    student: one Student
}
// Represents a recommendation for a student.

sig CompanyRecommendation {
    company: one Company
}
// Represents a recommendation for a company.
```

```
abstract sig User {
    email: one Email,
    feedbacks: set Feedback
}
// Abstract user type, with an email and associated feedbacks.

sig Student extends User {
    cv: one CV,
    application: set Application,
    sRecommendation: set StudentRecommendation,
    interview: one Interview
}
// Represents a student, with a CV, applications, recommendations, and an interview.

sig Company extends User {
    cRecommendation: set CompanyRecommendation,
    internships: set InternshipPosition,
    interview: one Interview
}
// Represents a company, with recommendations, internship positions, and an interview.

sig Interview {
    student: one Student,
    company: one Company,
    application: one Application,
    date: one Date
}
// Represents an interview, linking a student, company, application, and date.
```

4.2 Facts

```
fact UniqueInterviewPerDay {
    all i1, i2: Interview |
        (i1 != i2) implies
        (i1.student != i2.student or i1.company != i2.company or i1.application.date !=
i2.application.date)
}
// Ensures no two interviews involve the same student, company, and date.

fact ApplicationsInEvaluatingState {
    all i: Interview | i.application.status = evaluating
}
// Ensures that all applications linked to interviews are in the evaluating status.

fact ApplicationDateBeforeInterviewDate {
    all i: Interview | isEarlier[i.application.date, i.date]
}
// Ensures that an application's date occurs before the interview date.

fact InterviewCoherence {
    all i: Interview |
        i.application in i.student.application and
        some c: Company | c = i.company
}
// Ensures interviews are consistent with student applications and involve valid companies.

fact UniqueInterviews {
    all i1, i2: Interview |
        i1 != i2 implies (
            (i1.company != i2.company) or
            (i1.student != i2.student)
        )
}
// Ensures no duplicate company-student pairs for interviews.

fact UniqueEmail {
    all disj u1, u2: User | u1.email != u2.email
}
// Ensures each user has a unique email address.

fact UniqueCVperStudent {
    all disj s1, s2: Student | s1.cv != s2.cv
}
// Ensures each student has a unique CV.

fact UniqueInternshipPositionsPerCompany {
    all c: Company | all disj i1, i2: c.internships | i1 != i2
}
// Ensures each internship position in a company is unique.

// **Utility Predicates**

pred isEarlier[d1, d2: Date] {
    d1.year < d2.year or
    (d1.year = d2.year and d1.month < d2.month) or
    (d1.year = d2.year and d1.month = d2.month and d1.day < d2.day)
}
```

```
// Predicate to determine if one date is earlier than another.

// **Execution Predicate**
pred show {
    // Add conditions to visualize or verify specific parts of the model.
}

run show
// Executes the model to find instances satisfying all constraints and facts.
```


extends: 6
application: 1
application: 1
company: 1
company: 1
cRecommendation: 1
cv: 1
date: 1
date: 1
day: 1
email: 1
feedbacks: 1
internships: 1
interview: 1
interview: 1
month: 1
sRecommendation: 1
status: 1
student: 1
student: 1
year: 1
User
Feedback
Email
Company
Student
InternshipPosition
CV
CompanyRecommendation
StudentRecommendation
Interview
Application
Status
Date
waiting
evaluating
closed
Int
seq/Int
feedbacks
email
extends
extends
internships
cRecommendation
cv
company
student
sRecommendation
interview
student
company
interview
application
application
date
date
status
month
day/year
extends
extends
extends
extends

5. Time Spent

The timetables below provide an approximate estimation of the time spent writing and discussing each chapter of this document. These durations were not measured during the document's creation; rather, they reflect the team members' personal perceptions of the time spent.

Giovanni Ni

Chapter	Effort (in hours)
1	6
2	22
3	23
4	20

Xinyue Gu

Chapter	Effort (in hours)
1	7
2	20
3	25
4	20

6. References

6.1 References

- ISO/IEC/IEEE 29148:2018 - Systems and software engineering

- The Requirement Engineering and Design Project specification document A.Y. 2024-2025.

6.2 Used Tools

- Github for project sharing
- Sequencediagram.org for sequence diagrams' design
- draw.io for other diagram's design
- moqups.com for user interfaces degign
- Alloy language and Alloy Analyzer for formal analysis