



# POLITECNICO

## MILANO 1863

## Requirement Analysis and Specification Document

**Authors:**

Alberti Emanuele Emilio  
Gaudiano Alessia Vittoria  
Pazienza Andrea

**Professor:**

Elisabetta Di Nitto

<b>1 INTRODUCTION</b>	4
1.1 Purpose	4
1.1.1 Goals	4
1.2 Scope	5
1.2.1 World Phenomena	6
1.2.2 Shared Phenomena - World Controlled	6
1.2.3. Shared Phenomena - Machine Controlled	7
1.3 Definitions, acronyms, abbreviations	8
1.3.1 Definitions	8
1.3.2 Acronyms	8
1.3.3 Abbreviations	8
1.4 Revision History	9
1.5 Reference Documents	9
1.6 Document Structure	9
<b>2 OVERALL DESCRIPTION</b>	10
2.1 Product perspective	10
2.1.1. Scenarios	10
2.1.2 Domain class diagram	13
2.1.3 State diagrams	14
2.2 Product functions	16
2.3 User characteristics	19
2.3.1 Non-registered users	19
2.3.2 Student	19
2.3.3 Company	19
2.3.4 University	19
2.4 Assumptions, dependencies and constraints	20
2.4.1 Domain Assumptions	20
<b>3 SPECIFIC REQUIREMENTS</b>	21
3.1 External Interface Requirements	21
3.1.1 User Interfaces	21
3.1.2 Hardware Interfaces	22
3.1.3 Software Interfaces	22
3.1.4 Communication Interfaces	22
3.2 Functional Requirements	23
3.2.1 Use Cases Diagrams	25
3.2.2 Use Cases	27
3.2.3 Sequence diagrams	57
3.2.4 Requirement mapping	82
3.2.5 Use Case mapping	83
3.4 Design Constraints	85
3.4.1 Standards compliance	85
3.4.2 Hardware limitations	85
3.4.3 Any other constraint	85

3.5 Software System Attributes	86
3.5.1 Reliability	86
3.5.2 Availability	86
3.5.3 Security	86
3.5.4 Maintainability	86
3.5.5 Portability	86
<b>4. FORMAL ANALYSIS USING ALLOY</b>	<b>87</b>
4.1 Alloy code	87
4.2 Generated models	91
<b>5. EFFORT SPENT</b>	<b>94</b>
<b>6. REFERENCES</b>	<b>94</b>

# 1 INTRODUCTION

## 1.1 Purpose

Securing internships is a complex process involving multiple stakeholders, including students, companies and universities. Students often struggle to find relevant opportunities, manage applications, and receive timely updates. Companies face challenges in handling large volumes of applicants while ensuring a streamlined selection process. Universities, on the other hand, require tools to monitor internships and ensure that they align with students' academic and career goals.

The S&C platform aims to address these challenges by providing a centralized system that facilitates communication, application management, selection, and monitoring of internships. Its purpose is to create a transparent and efficient process that benefits all parties involved.

### 1.1.1 Goals

- [G1] University students can search or be notified about internship opportunities that match their qualifications and CVs
- [G2] University students can apply for internships and accept internship offers from companies
- [G3] University students can track the status of their internship applications, participate in the selection process, and receive notifications of updates throughout the selection process
- [G4] Companies can publish internship opportunities and receive notifications about suitable students based on their specific requirements
- [G5] Companies can contact selected students for the internship position
- [G6] Companies can evaluate internship applications, schedule interviews, provide feedback to students on their candidacy, and, in the meantime, stay updated on the progress through notifications
- [G7] University students and companies can improve their CV and internship offers consulting tailored suggestions
- [G8] Universities can manage and resolve complaints from both companies and students during the internship period, intervening when necessary to interrupt the internship
- [G9] Users can access statistics related to some specific internship positions

## 1.2 Scope

The S&C platform aims to facilitate the matching process between university students seeking internships and companies offering them. It provides a system to manage applications, select students and monitor internships, ensuring an efficient and transparent process for all parties involved.

University students register using their institutional email, ensuring their affiliation with accredited institutions. They upload their CVs and personal details, making their profiles visible to potential companies. Through the platform, students can browse available internship opportunities, apply, and participate in the selection process. After completing the interview process, students are required to fill out the feedback form, regardless of the outcome.

Companies register and create organizational profiles that allow them to post detailed internship offers, including job descriptions, required qualifications, and role responsibilities. The selection process starts when the company accepts a student's application or when a recommended student accepts the company's invitation previously sent through the platform. The platform manages the entire selection process, but the interview part is conducted externally, allowing the company to manage it as it sees fit. After conducting interviews externally, they provide feedback through the platform and finalize hiring decisions based on the overall performance of the candidates.

Universities can monitor the progress of internships linked to their enrolled students and ensure that internships align with academic and professional development goals. If necessary, universities have the authority to intervene and terminate internships that fail to meet required standards or policies.

This document will further outline the platform's goals, requirements, and constraints, providing a structured framework for its development and implementation.

## 1.2.1 World Phenomena

- [W1] The Student creates their CV
- [W2] The Company interviews the student
- [W3] The Company evaluates the students interview

## 1.2.2 Shared Phenomena - World Controlled

### The Student:

- [SP1] Registers to the platform
- [SP2] Logs into the platform
- [SP3] Uploads their CV
- [SP4] Updates their CV
- [SP5] Browses in the home section searching for an internship
- [SP6] Receives a company request to start the selection process
- [SP7] Applies for an internship opportunity
- [SP8] Accepts the company's request for starting the selection process
- [SP9] Fills the starting questionnaire
- [SP10] Fills the final feedback questionnaire
- [SP11] Accepts the company request for starting the internship
- [SP12] Writes comments about the on-going (or ended) internship
- [SP13] Checks the current selection processes view

### The Company:

- [SP14] Registers to the platform
- [SP15] Log into the platform
- [SP16] Upload the internship offer
- [SP17] Creates their starting questionnaire and upload it
- [SP18] Evaluates the starting questionnaire
- [SP19] Deletes the job offer
- [SP20] Update the job offer
- [SP21] Rejects the student application
- [SP22] Asks only to recommended students to start the selection process
- [SP23] Accepts a student application
- [SP24] Fills the feedback questionnaire
- [SP25] Requests the student to start the internship

### The University:

- [SP26] Register to the platform
- [SP27] Logs into the platform
- [SP28] Reads the student and the company comments
- [SP29] Decides whether to interrupt or not the internship

### 1.2.3. Shared Phenomena - Machine Controlled

#### The Platform:

- [SP30] Sends to companies recommended students
- [SP31] Sends to students recommended internship offers
- [SP32] Sends to students the questionnaire at the beginning of the selection process
- [SP33] Sends to students an automatic rejection message when the company hires another student for an internship, and the student was in the selection process for that internship
- [SP34] Sends the final feedback questionnaire to the company
- [SP35] Sends the final feedback questionnaire to the students
- [SP36] Creates suggestions to improve CVs
- [SP37] Creates suggestions to improve companies attractiveness
- [SP38] Sends notifications to students at each selection process' step
- [SP39] Sends notifications to companies at each selection process' step
- [SP40] Creates statistics on internship positions

## 1.3 Definitions, acronyms, abbreviations

### 1.3.1 Definitions

- **Internships offers:** Internship offers are the opportunities that students can find on their “Home” page, including those filtered and recommended
- **Internships proposal:** Internship proposals are the offers that students find in the corresponding section. These proposals are those for which companies have selected the student from the recommendations
- **Starting questionnaire:** The starting questionnaire is a form that the company creates and the student fills. The system sends it to the student automatically at the beginning of the selection process and the system sends it to the student automatically
- **Feedback questionnaire:** The feedback questionnaire is a form that both the company and the student must complete regarding the selection process and the interview, before finalization
- **Final offer:** The final offer is the last step of the selection process, following the feedback questionnaire. Through this offer, the company proposes to the student to start the internship

### 1.3.2 Acronyms

- **S&C** - Students and Companies
- **CV** - Curriculum Vitae
- **API** - Application Programming Interface
- **UI** - User Interface
- **UML** - Unified Modeling Language
- **CD** - Class Diagram
- **SMD** - StateMachine Diagram
- **SD** - Sequence Diagram
- **GDPR** - General Data Protection Regulation
- **RESTful APIs** - Representational State Transfer APIs

### 1.3.3 Abbreviations

- **[Gi]** - i-th Goal
- **[WPi]** - i-th World Phenomena
- **[SPi]** - i-th Shared Phenomena
- **[Di]** - i-th Domain assumption
- **[Ri]** - i-th Requirement
- **[UCi]** - i-th Use Case

## 1.4 Revision History

- Version 1.0 (22/12/2024)

## 1.5 Reference Documents

The document is based on the following materials:

- Assignment RDD AY 2024-2025.pdf
- Slides of the “Software Engineering 2 AY 2024-2025” course on WeBeep
- Slides of the “Ingegneria del Software AY 2022-2023” course on WeBeep

## 1.6 Document Structure

The document is composed of six chapters, detailed as follows:

- **Chapter 1 - Introduction:** introduces the system and its purpose, providing an overview of the project, the context, goals, scope, and related phenomena
- **Chapter 2 - Overall description:** provides a high-level description of the system with UML diagrams, its features, and the interactions between system and users
- **Chapter 3 - Specific requirements:** details the functional and non-functional requirements for the system providing a description of the use cases
- **Chapter 4 - Formal analysis using Alloy:** describes the formal analysis of the system using the Alloy modeling language to ensure the correctness and consistency of the most relevant aspects of the system
- **Chapter 5 - Effort spent:** provides an overview of the time invested in the project for each component of the group, divided by chapter
- **Chapter 6 - References:** lists all the resources referenced and the tools used to realize the document

## 2 OVERALL DESCRIPTION

### 2.1 Product perspective

#### 2.1.1. Scenarios

##### 1. Student finds an internship

Filippo is a student at the Politecnico di Milano studying Management Engineering in his first year of the master's program. Talking with his new classmates, he realizes that he is the only one who hasn't yet had any work experience in a company, as he did a project at the university for his bachelor's thesis. He decides he wants to find an internship to learn how the job of a Project Manager works. He discovers the S&C platform, which collects internship offers from many companies. Filippo goes to the platform's website and follows the registration process by entering his institutional email, personal data, CV, and specific skills. After registering and logging in, Filippo starts scrolling through the home page in search of an internship suitable for him. He sees many interesting options, but none seem right for him, so he starts actively searching using filters. He sets that his internship should be part-time, from March to June, and in the field of Project Management. After filtering the search, three offers appear that seem to have all the required characteristics. Out of curiosity, Filippo decides to check which of these are recommended by S&C, so he clicks on the "Recommended" button, and based on his CV, the platform narrows the choice to an internship at BCG. Filippo clicks on "Apply" and now waits for the company he chose to accept him. Within a few hours, he receives a notification informing him that he has been chosen by the company and that he can fill out the starting questionnaire from the "Selection Process" section. Filippo answers all the questions and submits the questionnaire. After the company evaluates the questionnaire, Filippo receives a notification with the details of the internal contact at BCG with whom he arranges an interview. The student attends the interview and returns to the platform to find out if he will be chosen. To view the response, he is asked to fill out a feedback questionnaire on the BCG selection process. After submitting the form, Filippo discovers that he has been chosen for the internship he wanted, accepts, and the selection process is finalized. His internship is now visible among the "Ongoing Internships."

## **2. Company uses recommendation system and invite student**

PwC is developing a new project that utilizes artificial intelligence. For the development of this innovative project, they want to collaborate with young students who are completing their studies in this field. The company decides to offer an internship for thesis development to a student and to do so, they want to rely on S&C. Rebecca, a human resources officer, opens the profile management section to add a new offer. She enters a job description, the requirements for the student, and the relevant information about the offer such as duration, part-time/full-time, etc. Rebecca also creates the questions for the starting questionnaire and specifies that only one position is available; now that the offer is complete, she can publish it.

The offer initially does not receive attention from students, and the platform struggles to find recommendations. Not understanding the reason, Rebecca opens the suggestions section on S&C. Here, she discovers that the description she made is too vague and does not clearly explain the job to be done. Additionally, it requires a level of knowledge that a student does not yet have. She decides to modify the description to make the offer more attractive.

Immediately after modifying the offer, Rebecca checks the CVs of the students recommended by the platform again. Among them, she finds Stefano, who is studying Computer Engineering with a specialization in Artificial Intelligence at the Politecnico di Milano. Rebecca proposes her internship to Stefano using the appropriate button on the recommendation. Stefano accepts the internship offer, passes all the steps of the selection process and he can start his internship at PwC.

## **3. Student asks for suggestions on their CV**

Beatrice is an economics student at Università Cattolica di Milano who is about to graduate and wants to start looking for work experiences. Despite being on the platform for a while, she has not been accepted by companies or even invited, so she begins to think that the problem might be her CV. Beatrice accesses S&C and goes to the "Suggestions" section. The student selects "Market Analyst" from the dropdown menu and generates the suggestions. The platform highlights to Beatrice that those usually hired for these positions have previous projects, at least internally at the university. Now aware of her shortcomings, Beatrice joins the university association that deals with startup launches, where she can surely practice conducting research in this field.

After a couple of months of following projects with the association, Beatrice opens S&C and updates her CV. Now that her CV is more interesting, a company selects her for an internship offer.

#### **4. Comments on ongoing internship and university intervention**

Greta is a Cultural Heritage student at Università Statale who managed to secure an internship at the Pinacoteca di Brera of which she is very proud. The offer description stated that she would have the opportunity to work with experts within the museum and acquire skills in painting restoration techniques. However, when Greta arrives on her first day of work, the supervisor informs her that she will be responsible for ticket sales for the entire duration of the internship.

Greta, upset by the discrepancy between the description and the actual job, opens S&C, navigates to the "Ongoing Internships" section, where she is allowed to comment on her internship, and explains what happened.

Università Statale, seeing the student's comment, contacts both parties through the contacts provided by S&C. Finding that it is not possible to reconcile the positions actually available at the Pinacoteca di Brera with what was offered, the university decides to terminate Greta's internship.

#### **5. A student is rejected by the company after the last interview**

Marco is a Biomedical Engineering student at Politecnico di Milano who found an internship offer for medical device design at NGC Medical using S&C. Marco applies and is accepted, so he proceeds to fill out the starting questionnaire. The company quickly reviews the questionnaire and the platform makes the contacts of both parties available. Marco and the NGC Medical representative arrange the interview, which takes place as scheduled. Marco prepares to check if the company intends to hire him for the internship and opens S&C. To see the company's response, he must complete the feedback questionnaire.

When he finishes filling out the questionnaire, Marco sadly realizes that he has not been chosen for the position. To understand the reason, Marco looks at the feedback questionnaire that the company had to fill out to see where he could improve. The feedback states that Marco's problem is with the language. The supervisor noticed that Marco struggled to express himself, especially with technical terms, which would have created problems in an international team like the one he was supposed to work with. Realizing his shortcoming, Marco decides to start taking English courses and studying the technical terms that will be needed for his future profession.

#### **6. Student finds his career by consulting statistics**

Francesco is a Computer Engineering student who wants to gain his first work experiences and is unsure which field suits him best. He decides to consult the statistics page on S&C to understand which of the roles he has in mind fits him better in the real world. Francesco opens the "Statistics" section and selects the roles he is interested in to compare them, first Data Analyst and then Software Engineer. The platform allows him to read about the most requested skills in each role, and Francesco discovers that he has more skills in common with the Software Engineer profile than with the Data Analyst profile. This allows him to make more informed and targeted choices for his professional future.

## 2.1.2 Domain class diagram

The aim of this diagram is to be general and allow the reader to understand the main functionalities and interactions between users and classes, without adding too many constraints or technical aspects.

For example, the User class includes a general attribute [info: string] to stay adaptable, and subclasses (Student, Company, University) include only one unique attribute each to give an example of possible implementations.

Relationships are made up of associations and multiplicity together instead of being two different connections. Attributes do not overlap with associations to avoid redundancy, so if a class is related to another class with an association arrow, the attribute is not present.

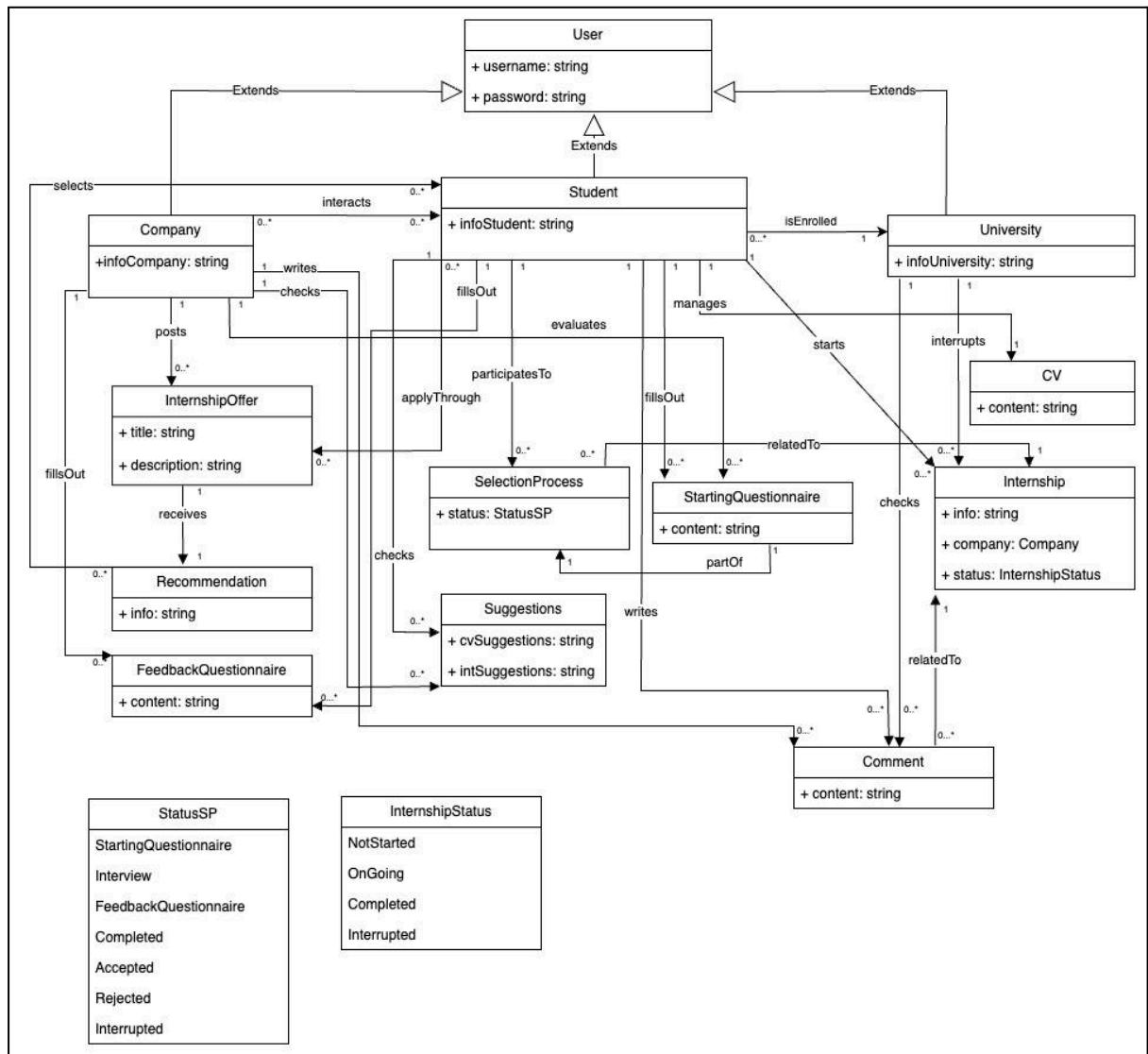


Figure 2.1: CD platform S&C

### 2.1.3 State diagrams

The aim of these diagrams is to explain the evolution of the status of two key aspects managed by the platform, in order to clarify the flow of events before the beginning of the internship period (selection process) and during the internship period (internship). Other aspects are left out due to their simplicity.

#### Selection process status

- **Starting condition:** company accepts student application or student accepts company proposal
- **Ending condition:** student is accepted, student is rejected or student interrupts the selection process before its completion
- **Notes:** the outcome of the interview(s) is communicated to the student after the submission of the feedback questionnaires by both the company and the student; in case of positive outcome the company sends the final offer to the student and the student is assumed to provide the answer

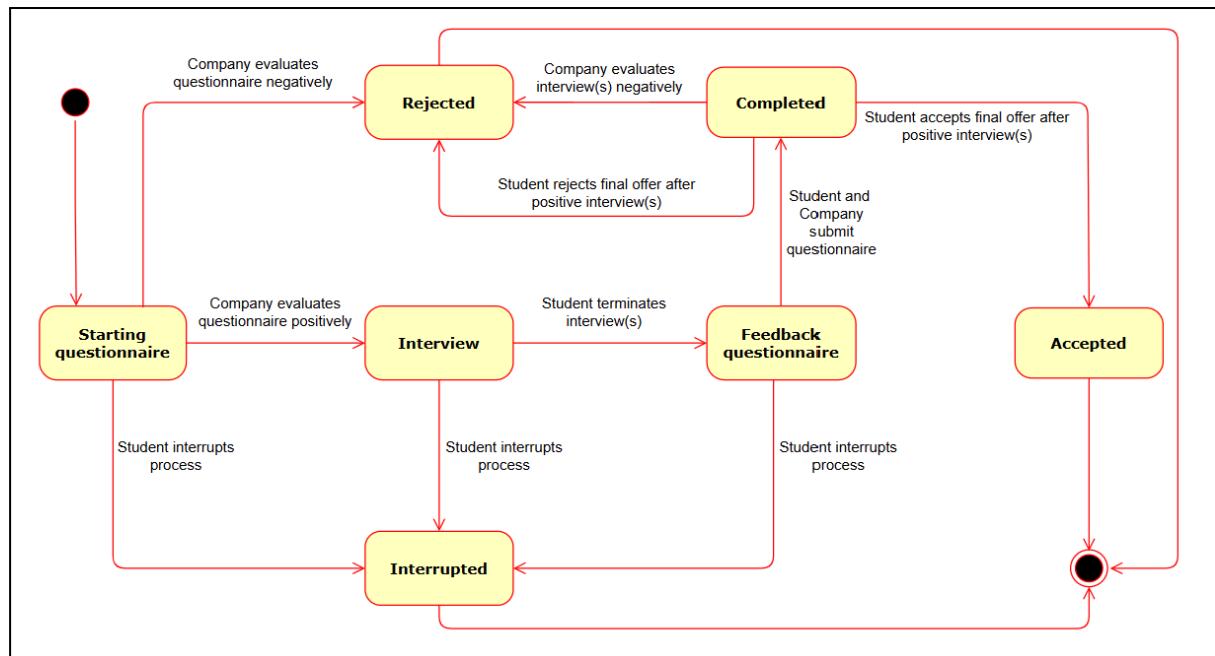


Figure 2.2: SMD Selection process status

## Internship Status

- **Starting Condition:** company publishes the internship offer
- **Ending conditions:** internship is completed by the student or the internship is interrupted by the university or the student
- **Notes:** the internship is assumed to either be taken by a student (eventually) or be removed by the company

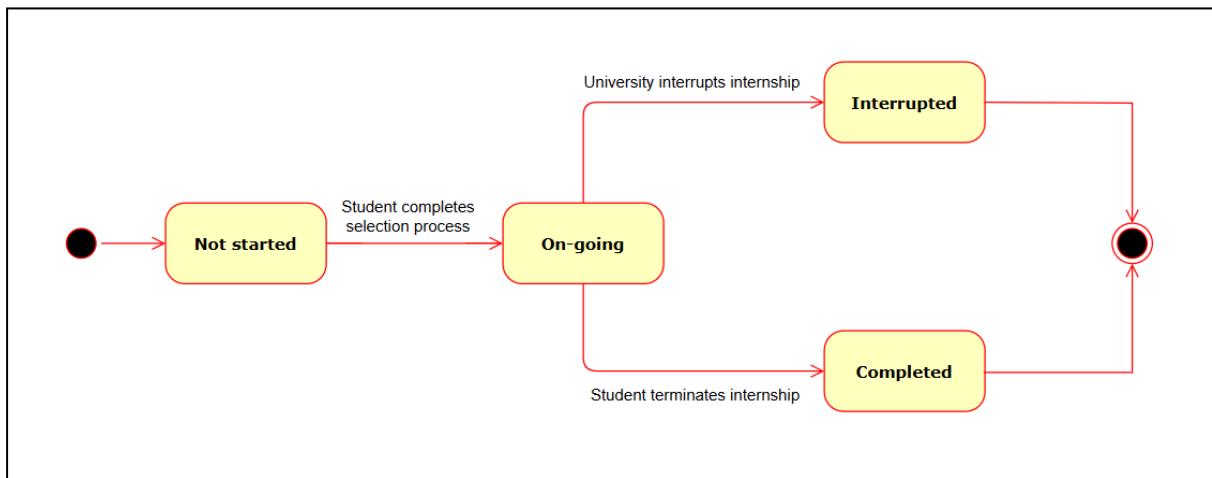


Figure 2.3: SMD internship status

## 2.2 Product functions

### 1. Upload and update CV

The student uploads the CV during the registration phase. The registration process begins with opening the platform and clicking the registration button. During registration, the student enters:

- Personal details
- Institutional email
- PDF of the CV
- Degree
- University
- Other optional information (desired position, areas of interest, known languages, programming languages, certifications)

Once all the data is entered, the student saves their account, and the CV will be available on their profile. The platform will recommend it to companies that might be interested in the student's profile.

In order to update the CV, the student must access the "Profile management" view. From this section they can modify their CV by replacing the PDF file and the optional information. When they are done, they can save the changes by clicking the dedicated button.

### 2. Upload Internship Offer

The company, after creating the account and logging in, accesses the "Profile Management" view where it has the possibility to add or remove internship offers. To add an offer, they click on the appropriate button and are allowed to write directly on the platform. Here, the company must enter:

- A description of the offer
- Requirements for applicants (degree, known languages, programming languages, certifications)
- Contacts of those who will conduct the interview within the company
- If the internship is paid
- Duration of internship along with a starting date
- Starting questionnaire
- Number of available positions

When the company completes all the fields, including the creation of the questionnaire, they can publish the offer. Based on the number of available positions, the platform will create as many offers as the available positions to propose to students. Once the internship offer is published, the platform will recommend it to students who might be interested and who meet the required criteria.

### **3. The student applies for an internship**

The student can apply for an internship in three ways:

- Clicking the "Apply" button on an offer on the homepage where they find all internships, including platform recommendations.
- Clicking the "Apply" button on an offer they found actively using filters.
- Accepting a proposal that arrived in the "Internship Proposals" section from a company that chose them by viewing their CV.

In the first two cases, following the application, the company receives a notification and the student profile appears in the "Applied Students" list from which they can accept to start the selection process. In the third case, the student can find the offer in the "Selection Process" view where the starting questionnaire will appear.

### **4. Management of Selection Process**

For managing the selection process, both the company and the student must access the corresponding view. Within this section, the student can see the internships for which they are participating in a selection process and the related status (starting questionnaire, interview, feedback questionnaire). From here, they also have the possibility to complete the starting questionnaires and find the company's contacts. They acknowledge in this section the decisions of the company regarding their progress in the process as well as in notifications.

In the "Selection Process" view the company visualizes its internship offers. By clicking on a specific offer, they can see all the students involved in the selection process for that offer and the student's progress in the process. Besides viewing the status, this section allows the company to evaluate the questionnaire (accept/reject the student), view contacts of the student and compile the feedback questionnaire. Additionally, from here, the company provides the final response to the student to determine whether they have been selected for the internship or not.

### **5. Monitoring and handling of the executions of the internship**

The university is allowed to monitor and to intervene during the internship. In the "Home" view the university sees the list of its students involved in an internship. For each student, by clicking on them, it is possible to see:

- The company where the internship is being carried out
- The student's profile
- The company's comments on the ongoing internship
- The student's comments on the ongoing internship
- Contacts of the student
- Contacts of the company

In case of complaints from either party, the university can intervene and, if necessary, terminate the internship through the platform.

## **6. Collection of feedback and elaboration of statistics**

To collect feedback regarding the selection process, both the company and the student are automatically required to complete a form about the interview to proceed with the process.

For data collection in the statistics, in the "Statistics" view, the platform collects data from student profiles and internship offers and processes it to provide relevant information to those consulting the section.

Additionally, there is a search bar that, when selected, displays a dropdown list proposing some possible selectable roles. Once a role is chosen, S&C will propose a list of the most requested skills for the position.

## **7. Recommendations mechanism**

The recommendation system informs students of interesting internships. To view the recommendations, the student just needs to click on the button on the "Home" page. Based on the information provided by the student and the criteria specified in the internship offers, the platform will generate recommendations. In the same way, the system informs companies of the availability of student CVs. In the company's homepage S&C propose CVs of students who meet the criteria sought by the company and who might be suitable for the offered role.

If one of the parties selects the other, the counterpart receives a notification and the proposal/application appears in the dedicated section.

## **8. Suggestion to improve projects (Description of an Internship offer and CV)**

To access the suggestions, both students and companies must go to the "Suggestions" view. Here, students can view their CV on the left and a bar that allows them to select the desired position on the left. Once a role is chosen, the platform will propose a list of suggestions to improve the CV based on the CVs of students previously hired for the position.

For companies, from the same view, it is possible to choose the internship offer for which they want suggestions. This will be analyzed by the platform, and a list of suggestions for the specific description will be proposed.

Both the student and the company will need to make the changes manually from the "Profile Management" section.

## 2.3 User characteristics

### 2.3.1 Non-registered users

A non-registered user is someone who is visiting the platform without being logged in or having created an account, their actions are restricted only to create an account. Once registered and logged in, they can proceed to use the platform as a student, company or university.

### 2.3.2 Student

A student is a type of user who uses the platform to search for internship opportunities offered by the companies. To do so the student must be registered on the S&C platform using their university email address. The student is required to upload a CV that details their skills, previous experiences and career interests. Additionally, it is needed to confirm their email to prove their identity and their student status as well.

### 2.3.3 Company

A company is a type of user that uses the platform to advertise internship opportunities and recruit university students according to their needs. In order to publish internship opportunities on the S&C platform, the company must be correctly registered and provide the necessary details about the internship.

### 2.3.4 University

A university is a type of user that is interested in monitoring the ongoing internships of its students. Universities are responsible for handling complaints from both the company and the student sides during the internship period. In order to do so it is necessary to be registered and logged in to the S&C platform.

## 2.4 Assumptions, dependencies and constraints

### 2.4.1 Domain Assumptions

- [D1] Students have a valid CV with correct informations
- [D2] Companies periodically evaluate applications and guarantee to accept or reject all applications arrived
- [D3] Students pursuit all selection processes or interrupt them through the platform
- [D4] Students compile the feedback questionnaire after the interview
- [D5] Students finalize the selection process after the final offer is available (accept or decline)
- [D6] The information provided by the company regarding an internship (e.g., role description, duration, location, and conditions) is accurate and corresponds to the actual internship offered
- [D7] Companies compile the feedback questionnaire and finalize the selection process after the interview
- [D8] The university intervenes only when either the student or the company requests it
- [D9] The university may interrupt an internship only for valid and justified reasons, such as violations of policies, legal issues, or situations that compromise the student's well-being or academic progress

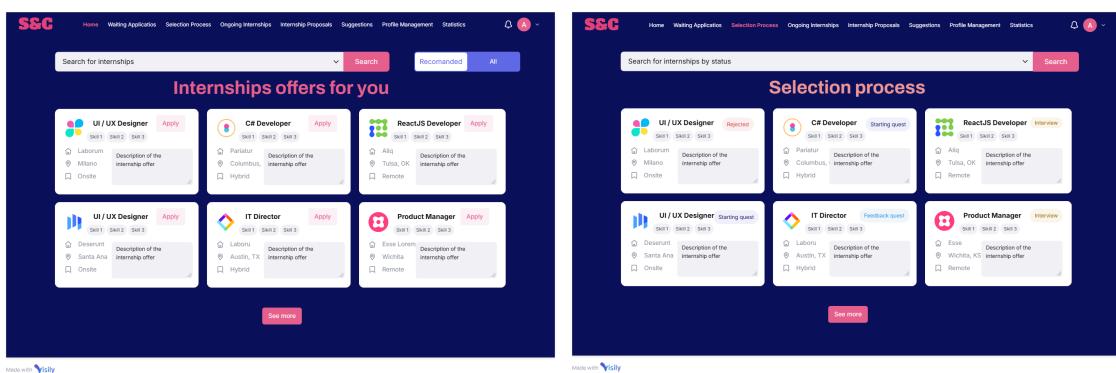
# 3 SPECIFIC REQUIREMENTS

## 3.1 External Interface Requirements

### 3.1.1 User Interfaces

Here are inserted some of the user interfaces for the three types of users of the platform, more will be included in the Design Document.

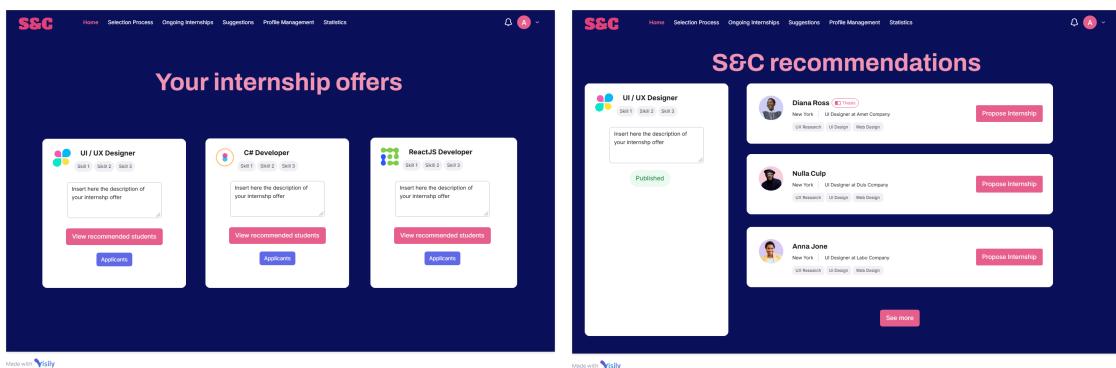
#### Student



The screenshots show the student's home screen and the selection process screen. Both screens feature a search bar at the top and a navigation bar with links to Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. The home screen displays a grid of internship offers with columns for title, skills, location, and status (e.g., Apply, Selected). The selection process screen shows a similar grid but with different status indicators like Starting quest or Interview.

Figures 3.1 and 3.2: Student home and Selection process UIs

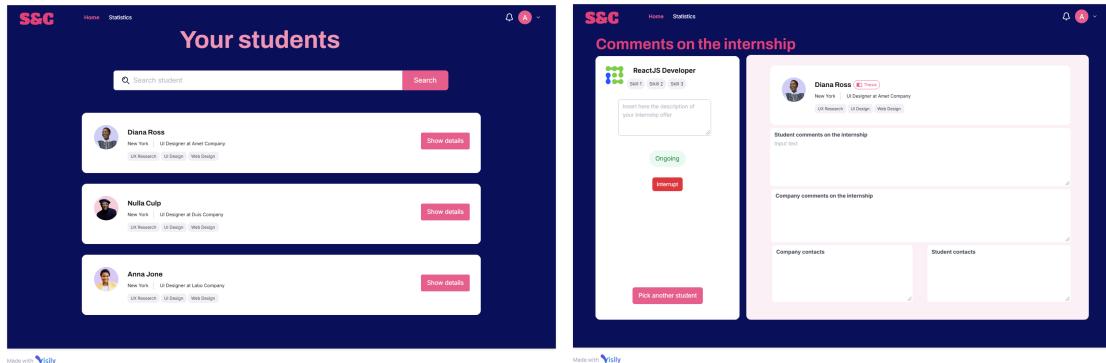
#### Company



The screenshots show the company's home screen and its recommendation feature. The home screen has sections for 'Your internship offers' and 'S&C recommendations'. The 'Your internship offers' section contains three boxes for UI/UX Designer, C# Developer, and ReactJS Developer, each with a 'View recommended students' button. The 'S&C recommendations' section lists profiles of recommended students with their names, locations, and job titles, along with a 'Propose Internship' button.

Figures 3.3 and 3.4: Company home and Recommendations UIs

## University



Figures 3.5 and 3.6: University home and comments UIs

### 3.1.2 Hardware Interfaces

The platform is a web application that requires no specific hardware and even though it suits the best for desktop, it can also operate for mobile solutions such as smartphones and tablets. Users can access it using devices with at least 1GB of RAM and a single-core processor and an active internet connection.

### 3.1.3 Software Interfaces

The platform is compatible with modern web browsers and uses a relational database to manage user data, internship offers, and applications. Authentication is handled via a system, ensuring secure access for students, companies, and universities. Files are stored using cloud storage solutions. Additionally, the platform offers RESTful APIs for integrating external systems.

### 3.1.4 Communication Interfaces

The platform includes an automated email notification system to inform users about significant events, with an optional feature to receive critical updates via SMS.

## 3.2 Functional Requirements

### Sign-up and log-in

- [R1] The system allows users to sign-up
- [R2] The system allows users to log-in

### Students requirements

- [R3] The system allows students to upload the CV
- [R4] The system allows students to ask tailored suggestion on their CV
- [R5] The system allows students to update the CV
- [R6] The system allows students to manage their profile information
- [R7] The system allows students to filter internship offers
- [R8] The system allows students to visualize all internship offers
- [R9] The system allows students to visualize only recommended internship offers
- [R10] The system allows students to apply to internship offers
- [R11] The system allows students to accept proposals from companies
- [R12] The system allows students to receive and fill out the starting questionnaire
- [R13] The system allows students to check their applications status
- [R14] The system allows students to receive notifications
- [R15] The system allows selected students to see the company contacts
- [R16] The system allows students to receive and fill out the feedback questionnaire
- [R17] The system allows students to accept or decline internship proposal, after the interview(s)
- [R18] The system allows students to write comments on ongoing/past internships
- [R19] The system allows students to see statistics regarding a specific internship position
- [R20] The system allows the student to terminate the selection process before the end

### Companies requirements

- [R21] The system allows companies to upload internship offers
- [R22] The system allows companies to create the starting questionnaire
- [R23] The system allows companies to ask tailored suggestion on their internship offers
- [R24] The system allows companies to update internship offers
- [R25] The system allows companies to visualize recommended students
- [R26] The system allows companies to offer an internship to recommended students
- [R27] The system allows companies to accept/decline students applications
- [R28] The system allows companies to select or not the student based on the starting questionnaire
- [R29] The system provides to the company the contacts of selected student
- [R30] The system allows companies to receive and fill out the feedback questionnaire
- [R31] The system allows companies to offer the final offer to the students or reject them
- [R32] The system allows companies to receive notifications
- [R33] The system allows companies to write comments on ongoing/past internships
- [R34] The system allows to check all the students in the selection process

- [R35] The system allows companies to see statistics regarding a specific internship position

#### **University requirements**

- [R36] The system allows universities to visualize enrolled students profile
- [R37] The system allows universities to visualize all enrolled students internships status
- [R38] The system allows universities to visualize comments from both parties on ongoing/past internships
- [R39] The system allows the university to visualize contacts of companies and students
- [R40] The system allows universities to see statistics regarding a specific internship position
- [R41] The system allows universities to receive notifications

### 3.2.1 Use Cases Diagrams

#### Non Registered User

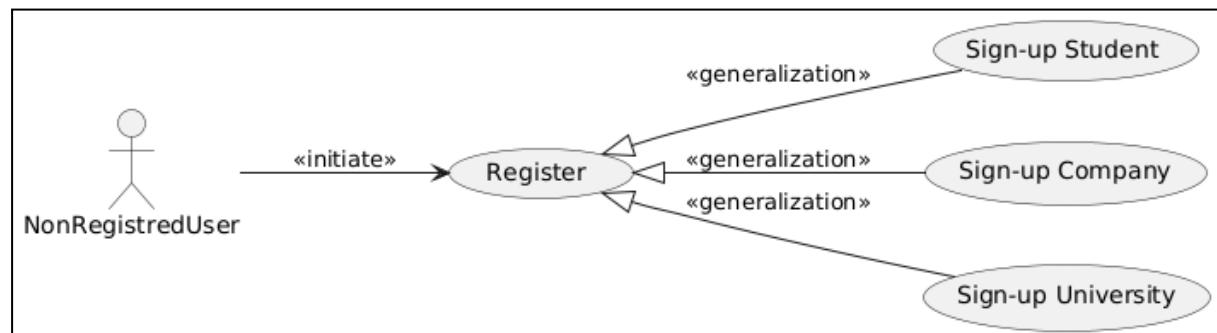


Figure 3.7: UCD Non Registered User

#### Student

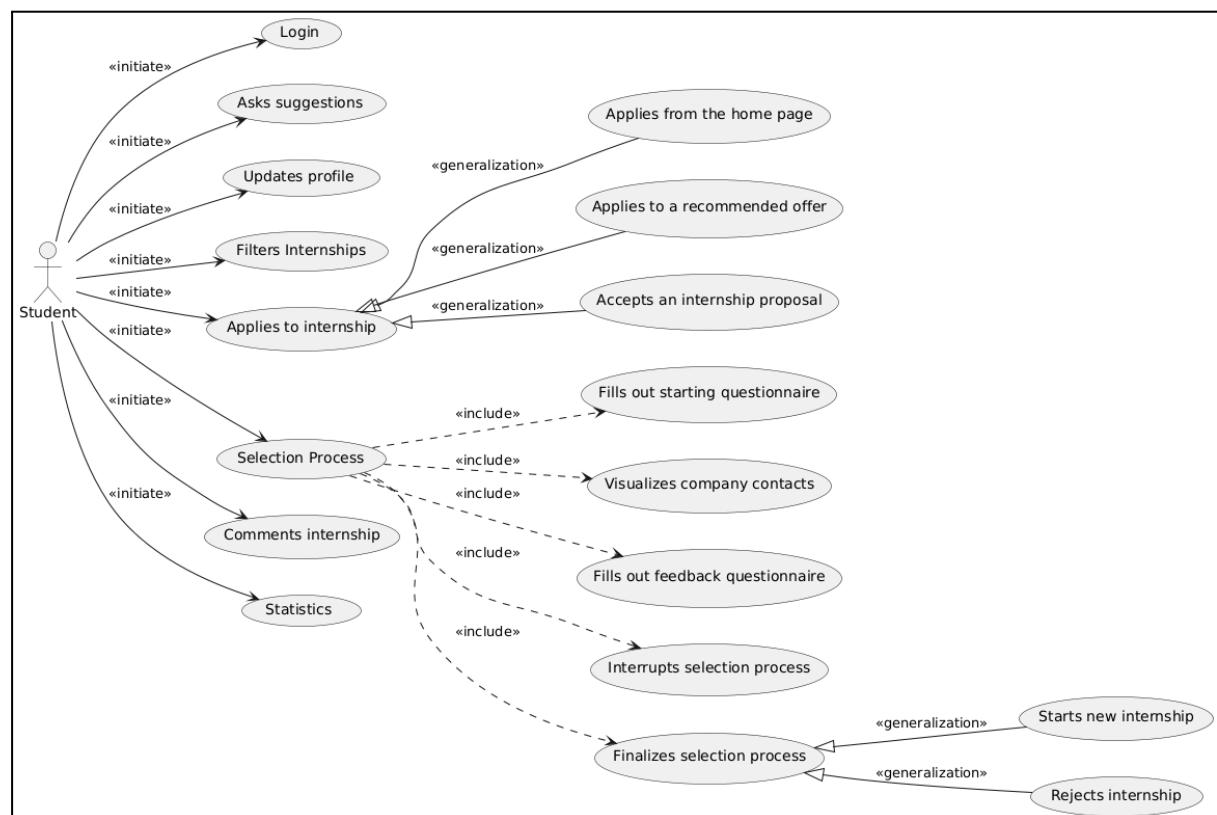


Figure 3.8: UCD Student

## Company

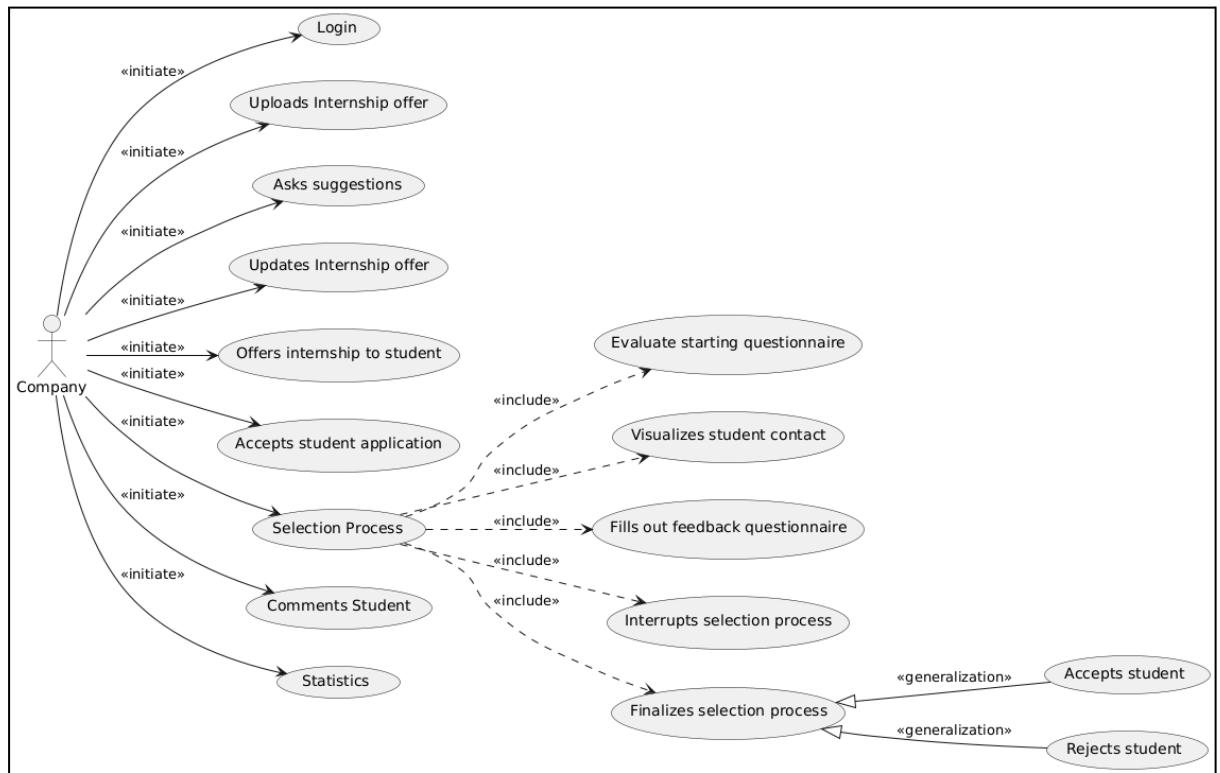


Figure 3.9: UCD Company

## University

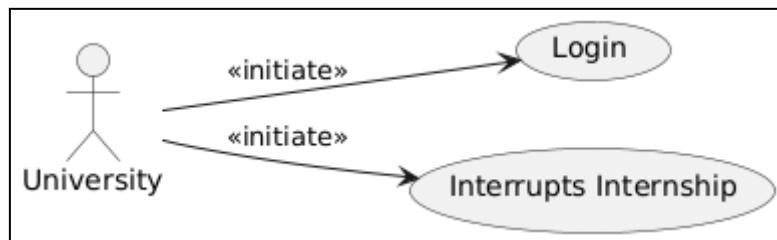


Figure 3.10: UCD University

### 3.2.2 Use Cases

#### [UC1] Student register

Description	The student makes an account on the platform
Actor	Non Registered User
Entry Condition	The student is not registered to the system and is on the “Registration or log-in” page
Event Flow	<ol style="list-style-type: none"> <li>1. The student clicks on the "Sign-up" button</li> <li>2. The system opens the “Sign-up menu” page</li> <li>3. The student selects “Sign-up as a Student”</li> <li>4. The system opens the “Student Registration page”</li> <li>5. The student inputs all the required data: name, surname, institutional email, degree and phone number</li> <li>6. The student inputs not-required information: professional skills, education and working experience</li> <li>7. The student uploads their CV</li> <li>8. The student clicks on the “Register” button</li> <li>9. The system verifies the information and shows a success message</li> </ol>
Exit condition	The account is created and the student is added to the university's student list
Exceptions	<ol style="list-style-type: none"> <li>1. The student doesn't input all the required data</li> <li>2. The data inserted by the student are not correct (e.g. password is not valid).</li> <li>3. The email inserted is already associated with another account</li> </ol> <p>In all cases the system will show a specific error message and ask the user to repeat the process</p>

Table 3.1

## [UC2] Company register

Description	The company makes an account on the platform
Actor	Non Registered User
Entry Condition	The Company is not registered to the system and it is on the “Registration or log-in” page
Event Flow	<ol style="list-style-type: none"> <li>1. The company clicks on the "Sign-up" button</li> <li>2. The system opens the “Sign-up menu” page</li> <li>3. The company selects “Sign-up as a Company”</li> <li>4. The system opens the “Company Registration” page</li> <li>5. The company inputs all the required data: name, company email, and a contact phone number and ATECO code</li> <li>6. The company clicks on the “Register” button</li> <li>7. The system verifies the information and shows a success message</li> </ol>
Exit condition	The company account is created
Exceptions	<ol style="list-style-type: none"> <li>1. The company doesn't input all the required data</li> <li>2. The data inserted by the company are not correct (e.g. password is not valid)</li> <li>3. The email inserted is already associated with another account</li> </ol> <p>In all cases the system will show a specific error message and ask the company to repeat the process</p>

Table 3.2

### [UC3] University register

Description	The university makes an account on the platform
Actor	Non Registered User
Entry Condition	The university is not registered to the system and it is on the "Registration or log-in" page
Event Flow	<ol style="list-style-type: none"> <li>1. The university clicks on the "Sign-up" button.</li> <li>2. The system opens the "Sign-up menu" page</li> <li>3. The university selects "Sign-up as a University "</li> <li>4. The system opens the "University Registration" page</li> <li>5. The university inputs all the required data such as official email, role of the reference person, password etc...</li> <li>6. The university uploads its official accreditation document.</li> <li>7. The university clicks on the "Register" button</li> <li>8. The system verifies the information and shows a success message</li> </ol>
Exit condition	The university account is created
Exceptions	<ol style="list-style-type: none"> <li>1. The university doesn't input all the needed data</li> <li>2. The data inserted by the university are not correct (e.g. password is not valid)</li> <li>3. The email inserted is already associated with another account</li> </ol> <p>In all cases S&amp;C will show a specific error message and ask the university to repeat the process</p>

Table 3.3

#### [UC4] User login

Description	The user login on the platform
Actor	User ( Student/Company/University)
Entry Condition	The user is already registered and it is the “Registration or Log-in” page
Event Flow	<ol style="list-style-type: none"> <li>1. The user clicks on the "Log-in" button</li> <li>2. The system opens the “Log-in” page</li> <li>3. The user enters an email and password</li> <li>4. The user clicks on the “Log-in” button</li> <li>5. The system checks if the email and password match the ones entered during registration</li> </ol>
Exit condition	The user logs-in
Exceptions	<ol style="list-style-type: none"> <li>1. The user doesn't insert email or password or both before pressing on the “Log-in” button</li> <li>2. The email or password don't match with the ones entered during the registration</li> </ol> <p>In both cases the system will return an error message</p>

Table 3.4

**[UC5] Student asks suggestions**

Description	The student checks the suggestions for a certain position
Actor	Student
Entry Condition	The student is registered, on the student “Home” page page and wants to improve their CV for a specific position
Event Flow	<ol style="list-style-type: none"> <li>1. The student, from the student “Home” page, clicks on “Suggestions”</li> <li>2. The system opens the student “Suggestions” page</li> <li>3. The student clicks on the main bar</li> <li>4. The system shows a list of positions</li> <li>5. The student clicks on the position they want to apply for</li> <li>6. The system shows on the left the current student’s CV and on the right a list of suggestions to improve it</li> </ol>
Exit condition	The student exits the page
Exceptions	<ol style="list-style-type: none"> <li>1. The data for the position is insufficient. The platform returns a specific error message</li> </ol>

Table 3.5

**[UC6] Student updates CV**

Description	The student updates the CV
Actor	Student
Entry Condition	The student is already registered and logged in
Event Flow	<ol style="list-style-type: none"> <li>1. The student, from the student “Home” page clicks on “Profile Management”</li> <li>2. The system opens the “Student profile management” page</li> <li>3. The student selects the “Add” to modify the “Professional Skills”</li> <li>4. The system opens a list of skills to select</li> <li>5. The student selects the new skills to add</li> <li>6. The student selects the “Replace” to upload a new CV</li> <li>7. The system opens a dedicated screen to upload the new CV</li> <li>8. The student replaces the CV</li> <li>9. The student clicks the “Save changes” button at the bottom of the page to save the changes</li> </ol>
Exit condition	The changes are saved
Exceptions	<ol style="list-style-type: none"> <li>1. The new CV is not a PDF file</li> <li>2. The student closes the S&amp;C website without saving the changes</li> </ol> <p>In the first case the system returns a specific error, in the second case the changes are not saved</p>

Table 3.6

**[UC7] Company uploads internship offer**

Description	The company uploads an internship offer
Actor	Company
Entry Condition	The company is already registered and logged in
Event Flow	<ol style="list-style-type: none"> <li>1. The company clicks on “Profile Management”</li> <li>2. The system opens the company “Profile management” page</li> <li>3. The company clicks on the “Add Internship Offer” button</li> <li>4. The system opens a screen that allows writing directly on the platform</li> <li>5. The company enters all the required information:             <ol style="list-style-type: none"> <li>a. Title</li> <li>b. Location</li> <li>c. Type</li> <li>d. Duration</li> <li>e. Starting Date</li> <li>f. Remuneration</li> <li>g. Description</li> <li>h. Requirements</li> <li>i. Contacts</li> </ol> </li> <li>6. The company makes and uploads the starting questionnaire</li> <li>7. The company inputs the number of available positions for the internship</li> <li>8. The company clicks the “Publish” button to publish the offer</li> </ol>
Exit condition	The internship offer is published and the system creates as many available offers as the open positions
Exceptions	<ol style="list-style-type: none"> <li>1. The company does not enter all the required information. The system returns a specific error message</li> </ol>

Table 3.7

**[UC8] Company visualizes suggestions**

Description	The company checks the suggestions to improve an offer
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one published offer
Event Flow	<ol style="list-style-type: none"> <li>1. The company clicks on “Suggestions”</li> <li>2. The company interacts with the search bar to view to positions</li> <li>3. The system displays a list of internship positions published by the company</li> <li>4. The company selects a position from the list</li> <li>5. The system presents suggestions to improve the selected internship offer</li> </ol>
Exit condition	The company has successfully visualized the suggestions
Exceptions	<ol style="list-style-type: none"> <li>1. No enough data available for that position If data for the position is insufficient, the platform will display a specific error message</li> </ol>

Table 3.8

**[UC9] Company updates internship offer**

Description	The company updates an internship offer
Actor	Company
Entry Condition	The company is already registered and logged in. The company has at least one published offer
Event Flow	<ol style="list-style-type: none"> <li>1. The company from the company “Home” page clicks on “Profile management”</li> <li>2. The system opens the company “Profile management” page</li> <li>3. The company selects the internship offer they want to modify</li> <li>4. The company modifies one or more of the required information</li> <li>5. The company clicks the “Save” button</li> </ol>
Exit condition	The system saves the changes and notifies all the students involved in the internship selection process about the modifications
Exceptions	<ol style="list-style-type: none"> <li>1. The company closes without saving the changes The changes are not saved</li> </ol>

Table 3.9

#### [UC10] Student filters internship

Description	The student filters the internship offers
Actor	Student
Entry condition	The student is already registered and logged in
Event Flow	<ol style="list-style-type: none"><li>1. The student, from the student “Home” page clicks on the dropdown menu</li><li>2. The system shows the list of possible filters to the student</li><li>3. The student clicks the desired filters in the list</li><li>4. The student clicks on the “Search” button</li><li>5. The system shows the offers satisfying the selected filters</li></ol>
Exit condition	The system applies the filters
Exceptions	<ol style="list-style-type: none"><li>1. There are not positions with those filters The system returns a specific error message</li></ol>

Table 3.10

**[UC11] Student applies to internship from “Home” page**

Description	The student apply to an internship from the “Home” page
Actor	Student
Entry condition	The student is already registered and logged in
Event Flow	<ol style="list-style-type: none"> <li>1. The student, from the student “Home” page clicks on the “Apply” button on the interested internship offer</li> <li>2. The system notifies the company about the application</li> <li>3. The system inserts the offer in the “Waiting applications” section</li> <li>4. The system inserts the student in the “Applicants” list of the offer in the company’s page</li> </ol>
Exit condition	The student has received the acknowledgement message
Exceptions	<ol style="list-style-type: none"> <li>1. The selected offer closes while the student is applying The application request doesn’t proceed, the student gets acknowledged and the offer is removed from the student “Home” page</li> </ol>

Table 3.11

**[UC12] Student applies to recommended internship**

Description	The student applies to an internship recommended by the platform
Actor	Student
Entry condition	The student is already registered and logged in.
Event Flow	<ol style="list-style-type: none"> <li>1. The student, from the student “Home” page clicks on the “Recommended” button</li> <li>2. The system shows to the student only the recommended internship offers</li> <li>3. The student selects an internship offer</li> <li>4. The system shows the internship details to the student</li> <li>5. The student clicks on the “Apply” button</li> <li>6. The system notifies the company about the application</li> <li>7. The system inserts the offer in the “Waiting applications” section of the student’s page</li> <li>8. The system inserts the student in the “Applicants” page of the company</li> </ol>
Exit condition	The student has successfully applied to the internship
Exceptions	<ol style="list-style-type: none"> <li>1. There are no recommended internship offers for the student The system shows a message acknowledging the student</li> <li>2. The selected offer is no more available The application request doesn’t proceed, the student gets acknowledged and the offer is removed from the page.</li> </ol>

Table 3.12

**[UC13] Company offers internship to student**

Description	The company offers an internship to a recommended student
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one published offer
Event Flow	<ol style="list-style-type: none"> <li>1. The company, from the company "Home" page, clicks on the "View Recommended students" button on the Internship offer</li> <li>2. The system shows a list of the recommended students</li> <li>3. The company clicks on the student</li> <li>4. The system shows the student profile and the CV to the company</li> <li>5. The company clicks on the "Propose internship" button</li> <li>6. The system notifies the student about the offer</li> </ol>
Exit condition	The company has successfully invited the student
Exceptions	<ol style="list-style-type: none"> <li>1. There are no recommended students for the offer The system shows a message acknowledging the company</li> <li>2. The student is no more available The internship offer doesn't proceed, the company gets acknowledged and the student is removed from the "Recommended students" list</li> </ol>

Table 3.13

**[UC14] Student accepts internship proposal**

Description	The student accepts an internship proposal from a company
Actor	Student
Entry condition	The student is already registered and logged in. The student has received at least one internship proposal by a company
Event Flow	<ol style="list-style-type: none"> <li>1. The student, from the student “Home” page, clicks on the “Internship Proposals” section</li> <li>2. The system shows the internship offers to the student</li> <li>3. The student clicks on the “Accept” button on the internship offer</li> <li>4. The system inserts the internship in the “Selection process” section of the student’s page with “Starting questionnaire” status</li> <li>5. The system notifies the company</li> </ol>
Exit condition	The student has successfully accepted the proposal and the company has successfully received the notification
Exceptions	<ol style="list-style-type: none"> <li>1. The proposal is no more available The acceptance doesn’t proceed, the student gets acknowledged and the invitation is removed from the “Proposals” list</li> </ol>

Table 3.14

**[UC15] Company accepts student application**

Description	The company accepts a student application
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one published offer
Event Flow	<ol style="list-style-type: none"> <li>1. The company from the company “Home” page, clicks on the “Applicants” button on the internship offer</li> <li>2. The system shows the list of students that have applied with the flag “recommended” if they are recommended</li> <li>3. The company selects a student from the list</li> <li>4. The system shows the student profile and the CV to the company</li> <li>5. The company clicks on the “Accept” button on the student label</li> <li>6. The system creates a new process in the “Selection process” section of the student page with “Starting questionnaire” status</li> <li>7. The system notifies the student</li> </ol>
Exit condition	The company has successfully accepted the student and the student has been successfully notified
Exceptions	<ol style="list-style-type: none"> <li>1. There are no applicant students for the offer The system shows a message acknowledging the company</li> <li>2. The student is no more available The internship offer doesn't proceed, the company gets acknowledged and the student is removed from the “Applied students” list</li> </ol>

Table 3.15

**[UC16] Student fills out starting questionnaire**

Description	The student fills out a starting questionnaire
Actor	Student
Entry condition	The student is already registered and logged in. The student has at least an active selection process in "Starting questionnaire" status
Event Flow	<ol style="list-style-type: none"> <li>1. The student clicks on the "Selection process" section</li> <li>2. The system opens the student "Selection Process" page showing the internship offers</li> <li>3. The student clicks on the internship offer that he is interested in</li> <li>4. The system shows the starting questionnaire page</li> <li>5. The student fills out the starting questionnaire</li> <li>6. The student clicks on the "Submit" button</li> <li>7. The system inserts the filled out questionnaire in the list of questionnaires associated with the student and the offer in the company's page</li> </ol>
Exit condition	The student has successfully submitted the questionnaire
Exceptions	<ol style="list-style-type: none"> <li>1. The student doesn't answer every question before clicking "Submit"</li> </ol> <p>The system shows a message to the user and doesn't send the questionnaire</p>

Table 3.16

[UC17] Company evaluate starting questionnaire

Description	The company evaluates a starting questionnaire
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one offer with a student with a submitted starting questionnaire
Event Flow	<ol style="list-style-type: none"> <li>1. The company clicks on “Selection process”</li> <li>2. The system shows company “Selection Process” page that shows the published internship offers</li> <li>3. The company clicks on the internship offer</li> <li>4. The system shows the list of students in the selection process</li> <li>5. The company selects a student with the label “Starting quest”</li> <li>6. The system shows the filled out Starting Questionnaire submitted by the student</li> <li>7. The company evaluates the answers through the buttons “Accept” or “Reject”</li> <li>8. The system updates the status of the selection process in the student “Selection Process”</li> <li>9. The system notifies the student</li> </ol>
Exit condition	The company has successfully evaluated the questionnaire and the student has received the notification
Exceptions	<ol style="list-style-type: none"> <li>1. The student is no more available: they have retired or have started another internship</li> </ol> <p>The company gets acknowledged and the student is removed from the selection processes list</p>

Table 3.17

**[UC18] Student visualizes company contact**

Description	The student visualizes the contact of a company
Actor	Student
Entry condition	The student is already registered and logged in. The student has at least an active selection process in "Interview" status
Event Flow	<ol style="list-style-type: none"> <li>1. The student from the student "Home" page clicks on "Selection process"</li> <li>2. The system shows the student "Selection Process" page</li> <li>3. The student clicks on the internship offer</li> <li>4. The system shows the internal company contacts to book the interview</li> </ol>
Exit condition	The system correctly shows shows the contact of the company referent
Exceptions	<ol style="list-style-type: none"> <li>1. The offer is no more available: it has already filled the position or deleted the offer The student gets acknowledged and the internship offer is removed from the selection processes list</li> </ol>

Table 3.18

**[UC19] Company visualizes student contact**

Description	The company visualizes the contact of a student
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one offer with a student in the “Interview” status selection process
Event Flow	<ol style="list-style-type: none"> <li>1. The company from the company “Home” page clicks on “Selection process”</li> <li>2. The system shows the company “Selection Process” page</li> <li>3. The company clicks on the internship offer</li> <li>4. The system shows the student contacts to book the interview</li> </ol>
Exit condition	The system correctly shows the contact of the student
Exceptions	<ol style="list-style-type: none"> <li>1. The student is no more available: they have retired or have started another internship</li> </ol> <p>The company gets acknowledged and the student is removed from the selection processes list</p>

Table 3.19

**[UC20] Student fills out feedback questionnaire**

Description	The student fills out a feedback questionnaire
Actor	Student
Entry condition	The student is already registered and logged in. The student has at least an active selection process in "Feedback" status
Event Flow	<ol style="list-style-type: none"> <li>1. The student from the student "Home" page selects the "Selection process" section</li> <li>2. The system shows the student's selection processes</li> <li>3. The student clicks on the internship offer</li> <li>4. The system shows the "Feedback" questionnaire to fill out</li> <li>5. The student fills out the form</li> <li>6. The student clicks on the "Submit" button</li> </ol>
Exit condition	The student has successfully filled the "Feedback" questionnaire
Exceptions	<ol style="list-style-type: none"> <li>1. The student doesn't fill every field before clicking "Submit" The system shows a message to the student and doesn't send the form</li> </ol>

Table 3.20

**[UC21] Company fills out feedback questionnaire**

Description	The company fills out a feedback questionnaire
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one offer with a student in the “Feedback” status selection process
Event Flow	<ol style="list-style-type: none"> <li>1. The company clicks on “Selection process”</li> <li>2. The system shows the list of published internship offers</li> <li>3. The company clicks on the internship offer</li> <li>4. The system shows the list of students</li> <li>5. The company clicks on the student</li> <li>6. The system shows the “Feedback” questionnaire</li> <li>7. The company fills out the form</li> <li>8. The company clicks on the “Submit” button</li> </ol>
Exit condition	The company has successfully filled the “Feedback” questionnaire
Exceptions	<ol style="list-style-type: none"> <li>1. The company doesn't fill every field before clicking “Confirm” The system shows a message to the company and doesn't send the form</li> </ol>

Table 3.21

**[UC22] Company finalizes selection process: Accepts student**

Description	The company accepts a student at the end of the selection process
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one offer. At least one student has already ended the interview part. The company has already filled the feedback questionnaire
Event Flow	<ol style="list-style-type: none"> <li>1. The system shows the “Accept” and “Reject” buttons</li> <li>2. The company clicks on the “Accept” button</li> <li>3. The system closes all the other students’ ongoing selection processes for that internship</li> </ol>
Exit condition	The company has received an acknowledgement to confirm the success of the operation
Exceptions	<ol style="list-style-type: none"> <li>1. The student is no more available: they have retired or have started another internship</li> </ol> <p>The company gets acknowledged and the student is removed from the selection processes list</p>

Table 3.22

**[UC23] Company finalizes selection process: Rejects student**

Description	The company rejects a student at the end of the selection process
Actor	Company
Entry condition	The company is already registered and logged in. The company has at least one offer. At least one student has already ended the interview part. The company has already filled the feedback questionnaire
Event Flow	<ol style="list-style-type: none"> <li>1. The system shows the “Accept” and “Reject” buttons</li> <li>2. The company clicks on the “Reject” button</li> <li>3. The system notifies the student about the final offer</li> </ol>
Exit condition	The company has received an acknowledgement to confirm the success of the operation
Exceptions	<ol style="list-style-type: none"> <li>2. The student is no more available: they have retired or have started another internship</li> </ol> <p>The company gets acknowledged and the student is removed from the selection processes list</p>

Table 3.23

**[UC24] Student finalizes selection process: Starts new internship**

Description	The student accepts the final offer at the end of a selection process
Actor	Student
Entry condition	The student is already registered and logged in. The student has at least ended the interview part and the company has accepted the student
Event Flow	<ol style="list-style-type: none"> <li>1. The student clicks on “Selection process”</li> <li>2. The system shows the student’s selection processes</li> <li>3. The student clicks on the internship offer</li> <li>4. The system shows the final offer along with the “Accept” and “Decline” buttons</li> <li>5. The student clicks the “Accept” button</li> <li>6. The system notifies the company about the finalization of the offer</li> <li>7. The system removes the student from: <ul style="list-style-type: none"> <li>a. “Applied students” list of other internship offers (of every company)</li> <li>b. “Recommended students” list of other internship offers (of every company)</li> <li>c. “Selection process” list of other internship offers (of every company)</li> </ul> </li> <li>8. The system notifies the university about the finalization of the offer</li> </ol>
Exit condition	The student successfully starts the internship
Exceptions	<ol style="list-style-type: none"> <li>1. The offer is no more available The student gets acknowledged and the internship offer is removed from the selection processes list</li> </ol>

Table 3.24

**[UC25] Student finalizes selection process: Rejects internship**

Description	The student declines the final offer at the end of a selection process
Actor	Student
Entry condition	The student is already registered and logged in. The student has completed the interview part and the company has accepted the student
Event Flow	<ol style="list-style-type: none"> <li>1. The student clicks on “Selection process”</li> <li>2. The system shows the student’s selection processes</li> <li>3. The student clicks on the internship offer</li> <li>4. The system shows the “Accept” and “Decline” buttons</li> <li>5. The student clicks the “Decline” button</li> <li>6. The system notifies the company about the finalization of the offer</li> <li>7. The system removes the student from: <ul style="list-style-type: none"> <li>a. “Applied students” list of the internship offer</li> <li>b. “Recommended students” list of the internship offer</li> <li>c. “Selection process” list of internship offer</li> </ul> </li> </ol>
Exit condition	The student successfully declined the internship
Exceptions	<ol style="list-style-type: none"> <li>1. The offer is no more available</li> </ol> <p>The student gets acknowledged and the internship offer is removed from the selection processes list</p>

Table 3.25

**[UC26] Student interrupts selection process**

Description	The student interrupts a selection process before completing it
Actor	Student
Entry condition	The student is already registered and logged in.
Event Flow	<ol style="list-style-type: none"> <li>1. The student clicks on “Selection process”</li> <li>2. The system shows the student’s selection processes</li> <li>3. The student clicks on the internship offer</li> <li>4. The student clicks on the “Terminate” button</li> <li>5. The system removes the student from: <ul style="list-style-type: none"> <li>a. “Applied students” list of the internship offer</li> <li>b. “Recommended students” list of the internship offer</li> <li>c. “Selection process” list of the internship offer</li> </ul> </li> <li>6. The system notifies the university about the finalization of the offer</li> </ol>
Exit condition	The student successfully interrupts the selection process
Exceptions	<ol style="list-style-type: none"> <li>1. The offer is no more available The student gets acknowledged and the internship offer is removed from the selection processes list</li> </ol>

Table 3.26

### [UC27] Student comments internship

Description	The student posts a comment about the internship
Actor	Student
Entry condition	The internship has already started
Event Flow	<ol style="list-style-type: none"><li>1. The student clicks on the “Ongoing Internship”</li><li>2. The system shows the internship</li><li>3. The student writes in the comments section</li><li>4. The student clicks on the “Publish” button</li></ol>
Exit condition	The comment is successfully published
Exceptions	None

Table 3.27

**[UC28] Company comments student**

Description	The student posts a comment about the student
Actor	Company
Entry condition	The company has at least one internship with a student already enrolled
Event Flow	<ol style="list-style-type: none"><li>1. The Company clicks on the “Ongoing Internship”</li><li>2. The system shows the started internships</li><li>3. The company clicks on the “Comment” button on the internship icon</li><li>4. The company writes in the comments section</li><li>5. The company clicks on the “Publish” button</li></ol>
Exit condition	The comment has successfully published
Exceptions	None

Table 3.28

**[UC29] Student checks statistics**

Description	The student checks the statistics for a certain position
Actor	Student
Entry condition	The student is registered and wants to gain more information about specific positions
Event Flow	<ol style="list-style-type: none"><li>1. The student clicks on "Statistics"</li><li>2. The system opens the "Statistics" page</li><li>3. The student selects on the "Statistics" page the desired position from the dropdown list</li><li>4. The system displays statistics, such as most required skills, for the selected position</li></ol>
Exit condition	The student exits the page after reviewing the statistics
Exceptions	<ol style="list-style-type: none"><li>1. Not enough data for that position If data for the position is insufficient, the platform will display a specific error message</li></ol>

Table 3.29

### [UC30] University interrupts internship

Description	The university interrupts a student on going internship
Actor	University
Entry condition	The university is already registered, logged in and associated with the student
Event Flow	<ol style="list-style-type: none"> <li>1. The university from the university "Home" page clicks on the student</li> <li>2. The system displays the student's details along with both parts comments and company contacts</li> <li>3. The university clicks on the "Interrupt internship" button.</li> <li>4. The system updates the status of the internship to "Terminated"</li> <li>5. The system notifies both the student and the company about the interruption</li> </ol>
Exit condition	The university successfully interrupts the internship
Exceptions	<ol style="list-style-type: none"> <li>1. The student is not enrolled in any internships If the student is not currently enrolled in any internship, the system shows a specific error message</li> </ol>

Table 3.30

### 3.2.3 Sequence diagrams

The goal of these diagrams is to show clearly how the actors interact with the system, without the usage of specific methods to prioritize the readability. More detailed sequence diagrams will be included in the Design Document.

Each sequence diagram corresponds to a specific UC, but for cases that refer to a general one there is a single diagram that refers to the generalization.

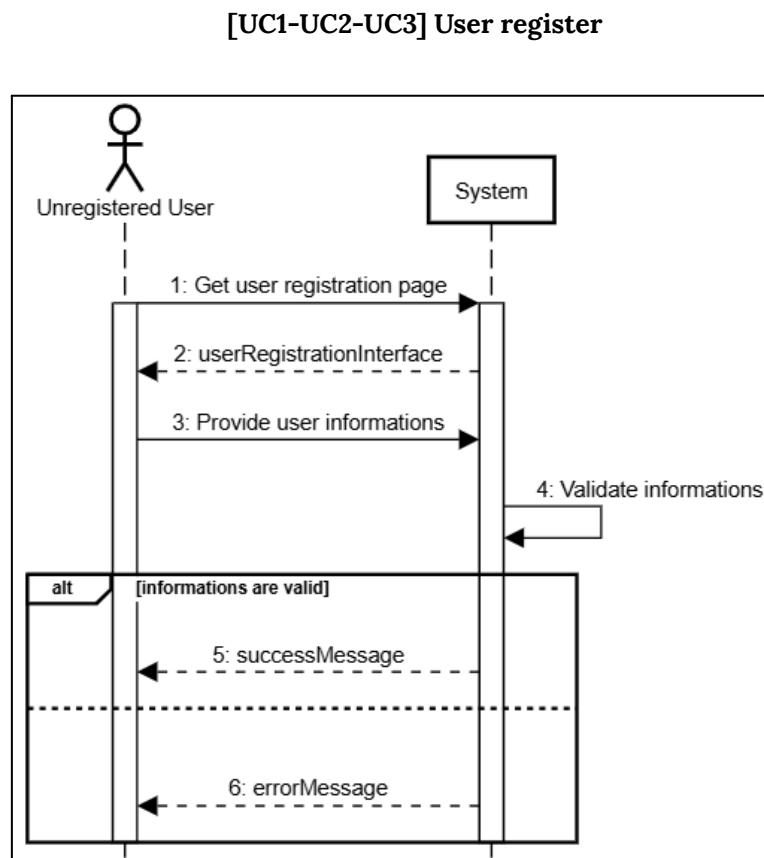


Figure 3.11: SD of the UC1-UC2-UC3 generalization

### [UC4] User login

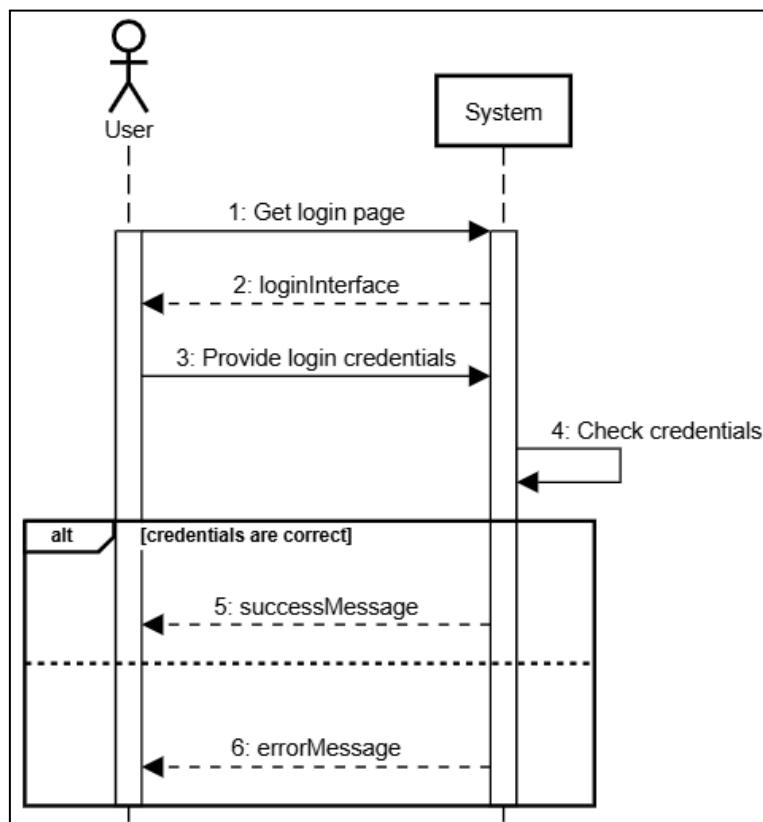


Figure 3.12: SD of the UC4

### [UC5] Student asks suggestions

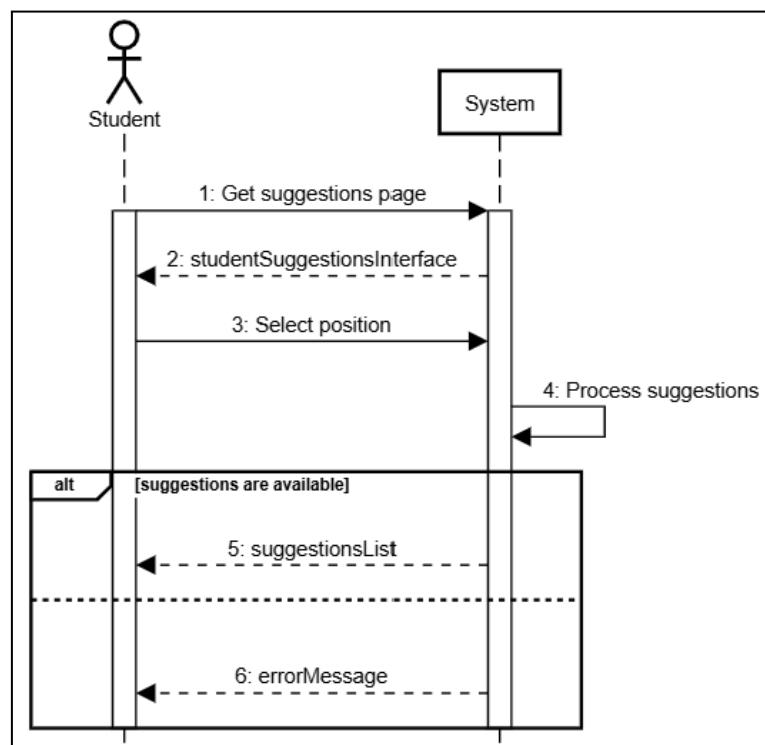


Figure 3.13: SD of the UC5

### [UC6] Student updates profile

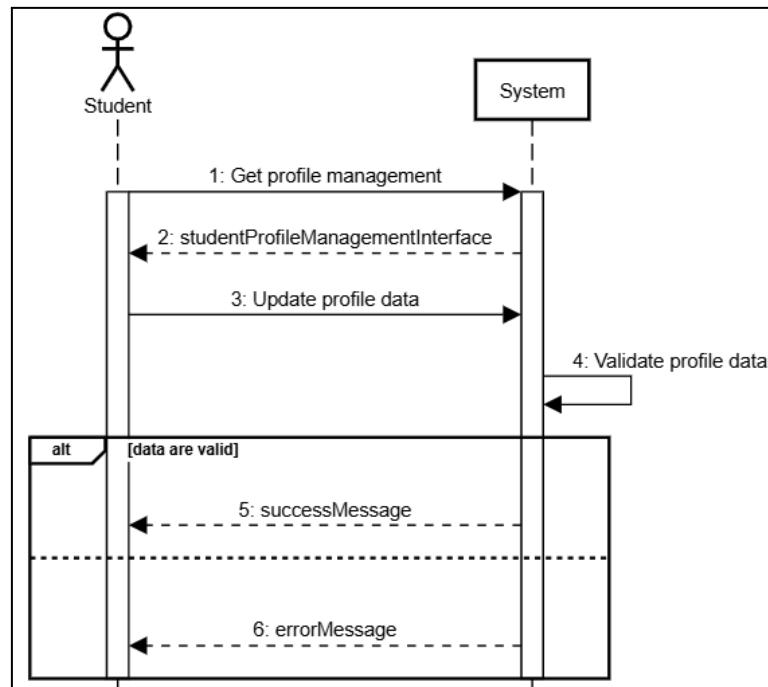


Figure 3.14: SD of the UC6

### [UC7] Company uploads internship offer

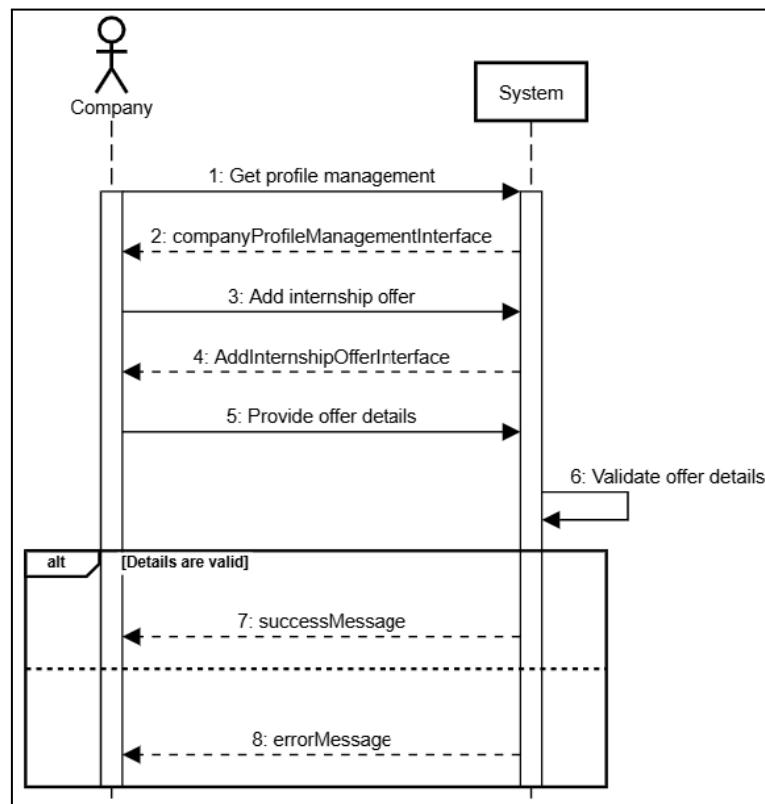


Figure 3.15: SD of the UC7

### [UC8] Company visualizes suggestions

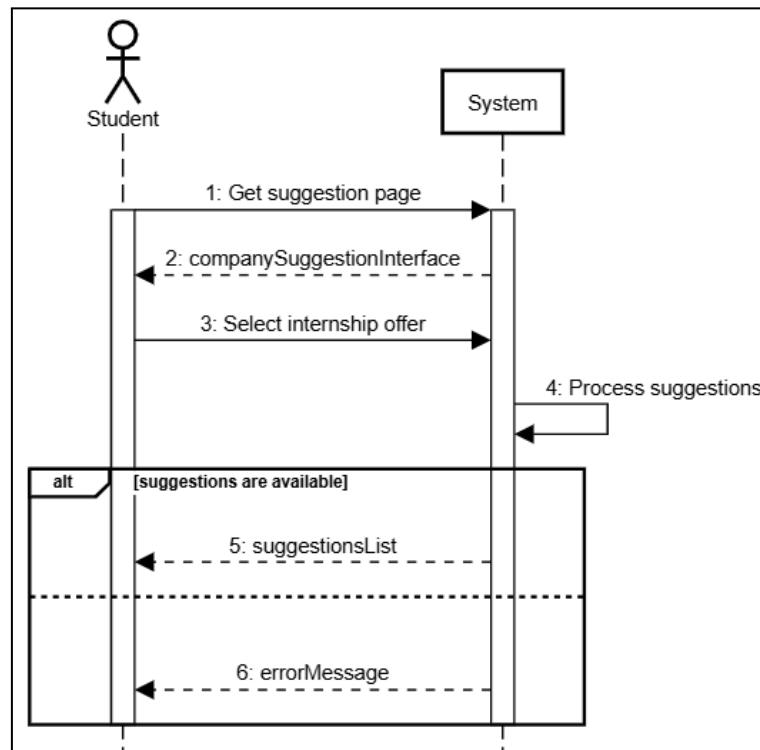


Figure 3.16: SD of the UC8

### [UC9] Company updates internship offer

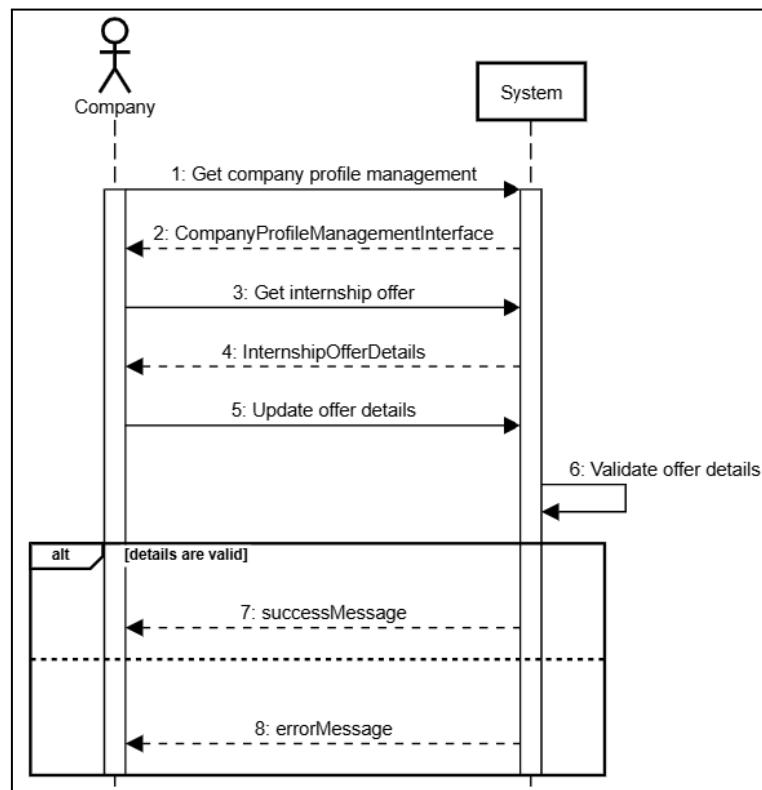


Figure 3.17: SD of the UC9

[UC10] Student filters internship

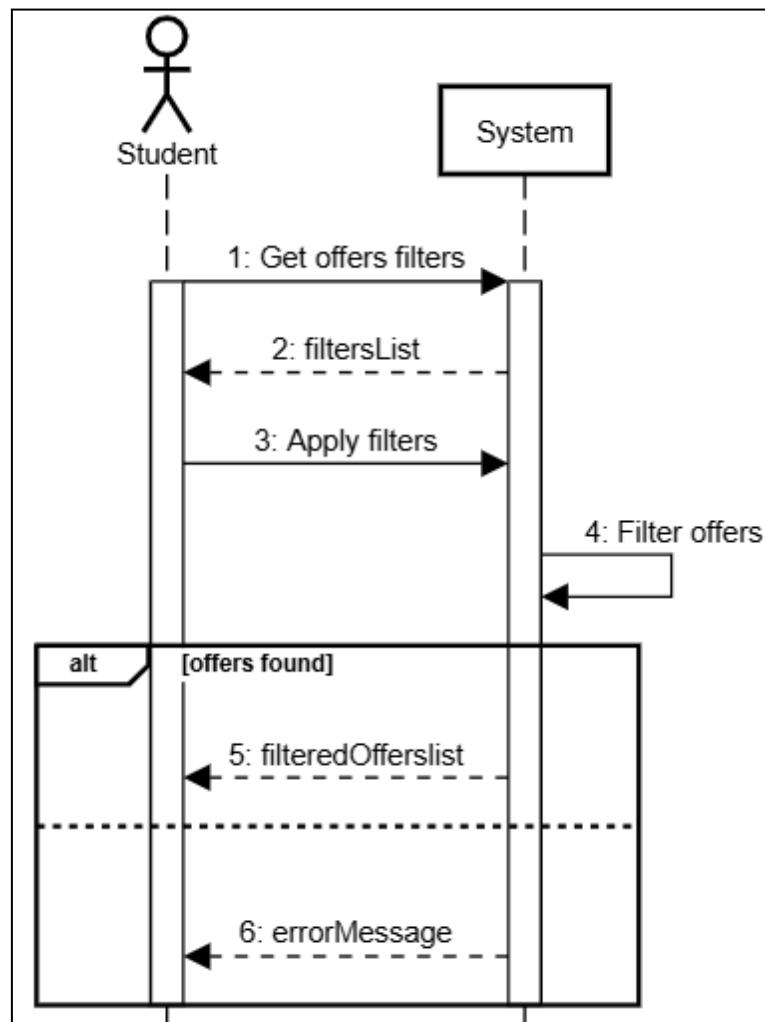


Figure 3.18: SD of the UC10

**[UC11] Student applies to internship from “Home” page**

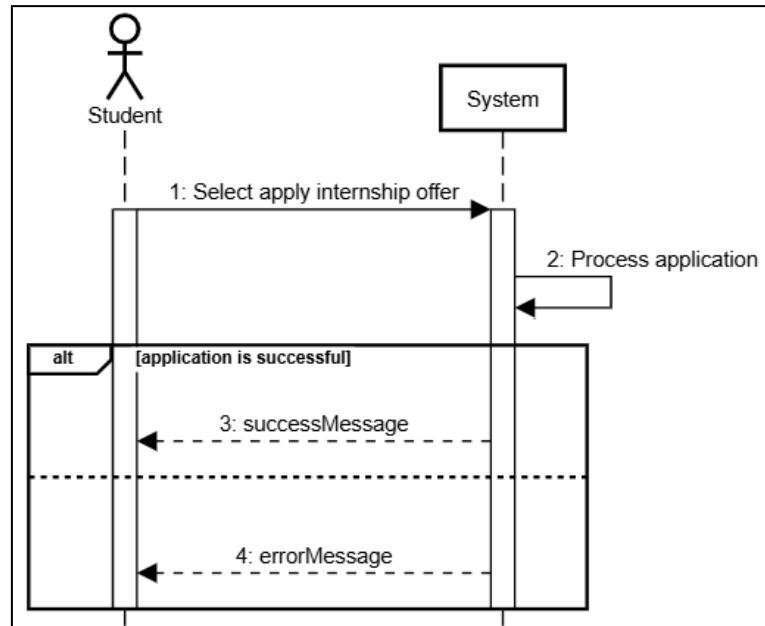


Figure 3.19: SD of the UC11

[UC12] Student applies to recommended internship

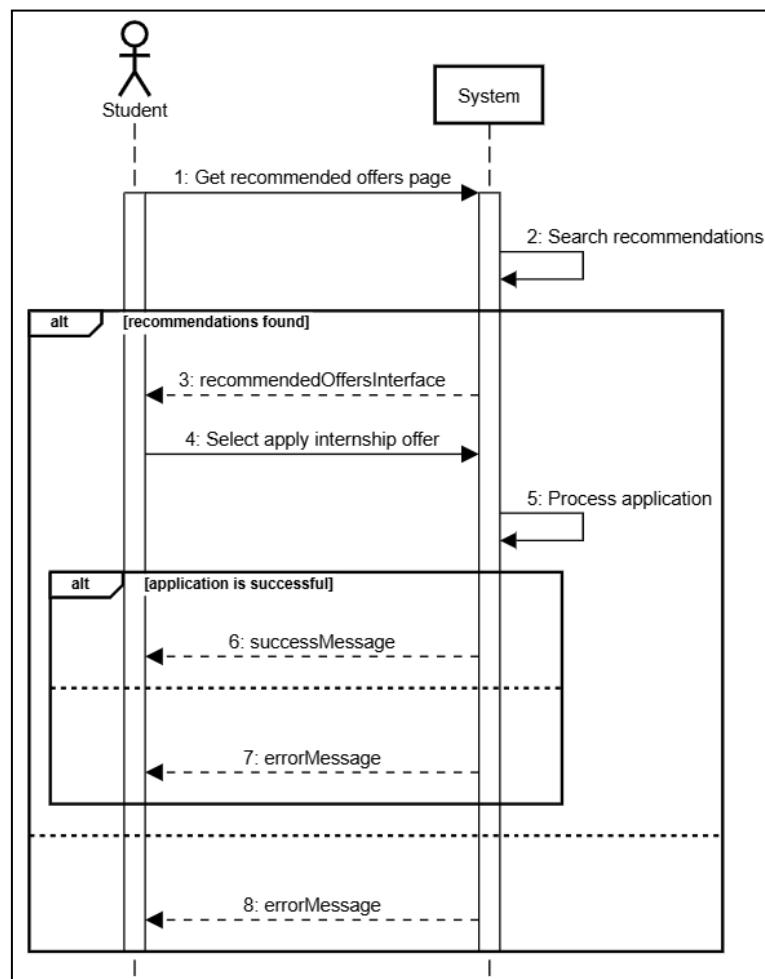


Figure 3.20: SD of the UC12

### [UC13] Company offers internship to a student

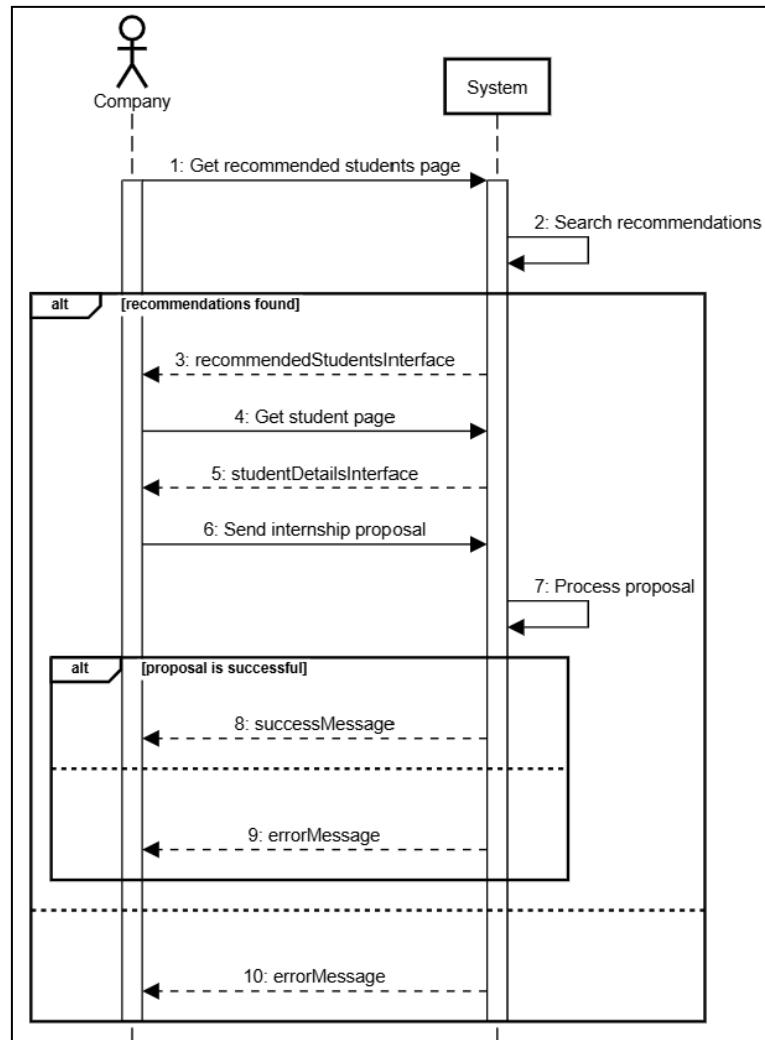


Figure 3.21: SD of the UC13

[UC14] Student accepts internship proposal

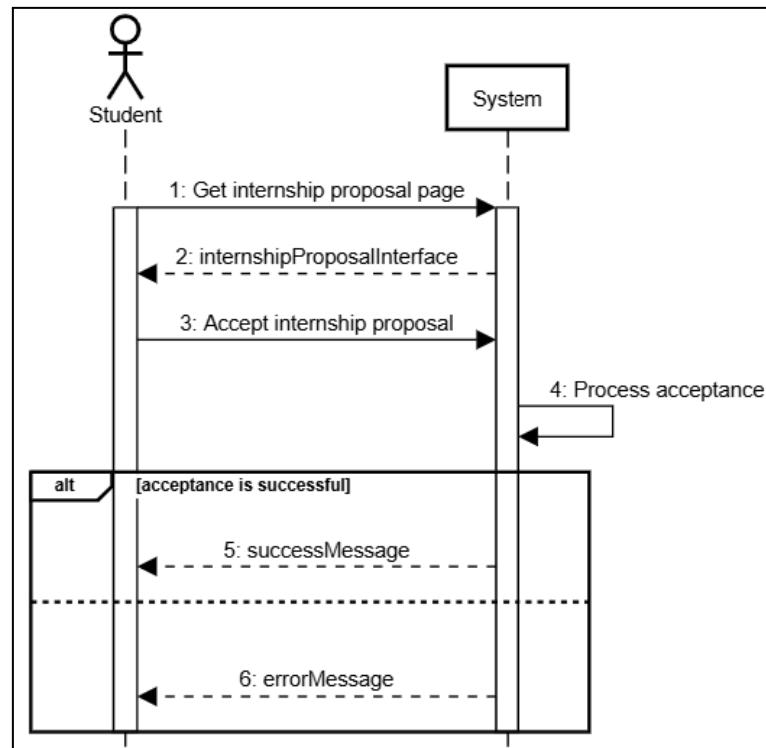


Figure 3.22: SD of the UC14

### [UC15] Company accepts student application

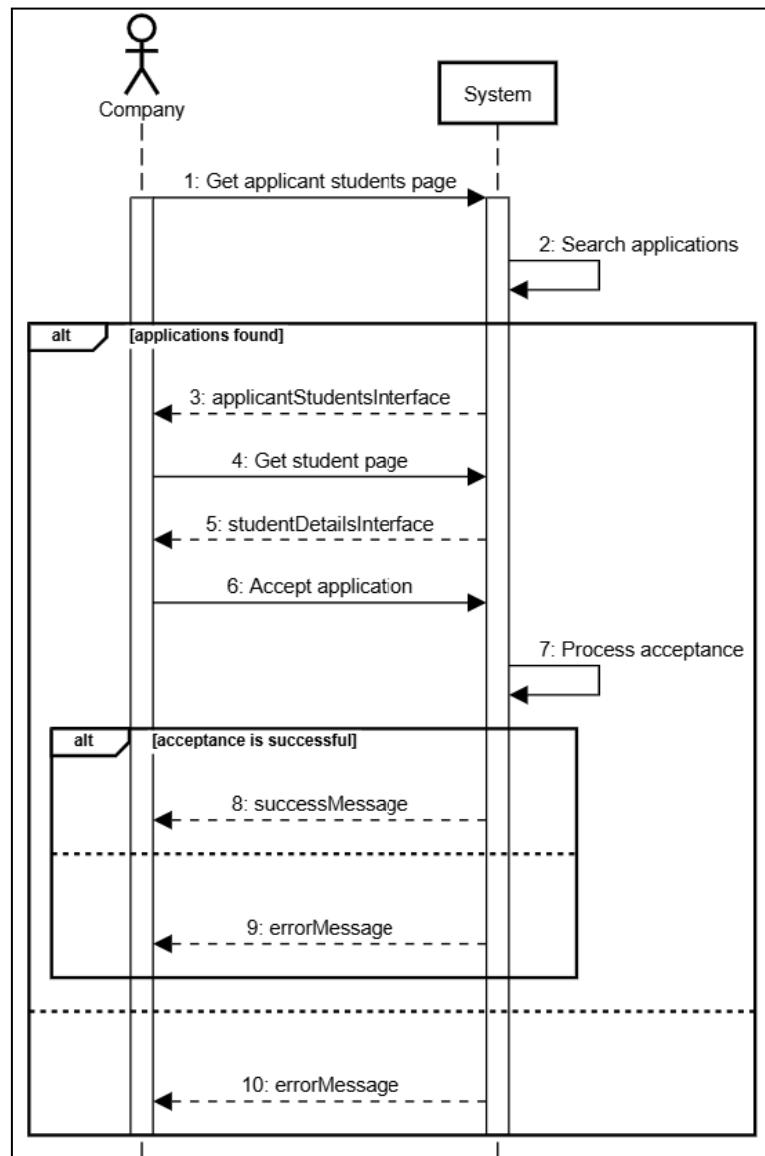


Figure 3.23: SD of the UC15

[UC16] Student fills out starting questionnaire

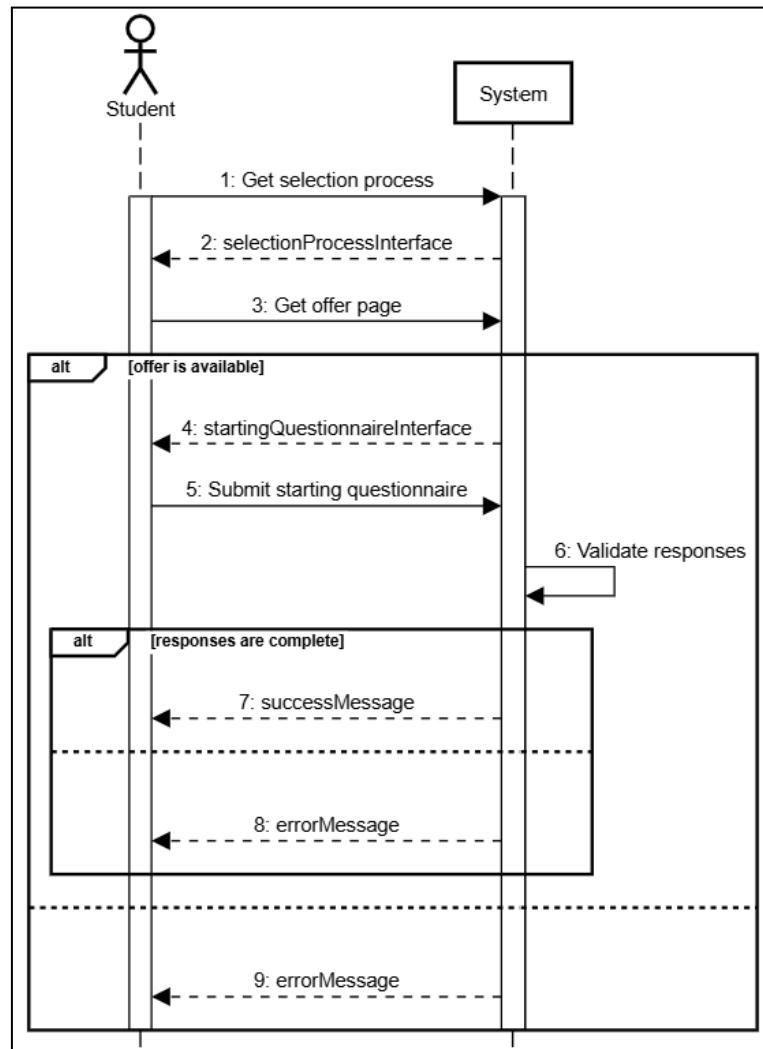


Figure 3.24: SD of the UC16

### [UC17] Company evaluates starting questionnaire

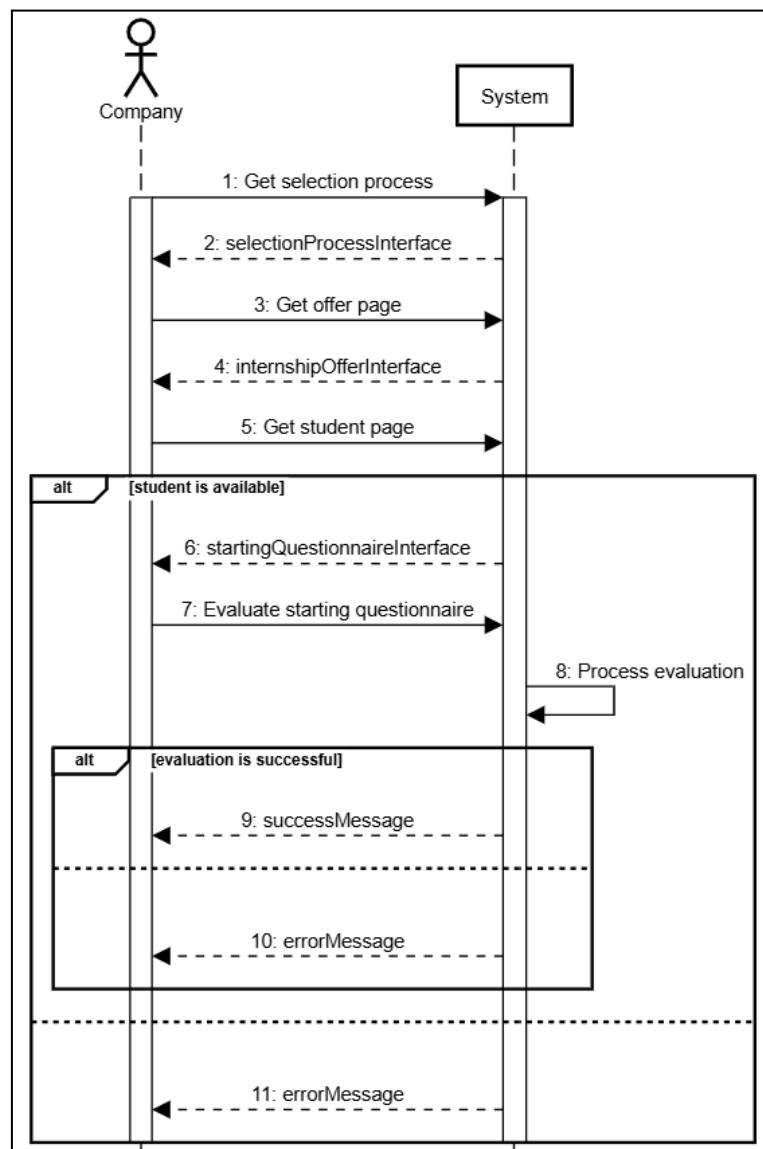


Figure 3.25: SD of the UC17

[UC18] Student visualizes company contact

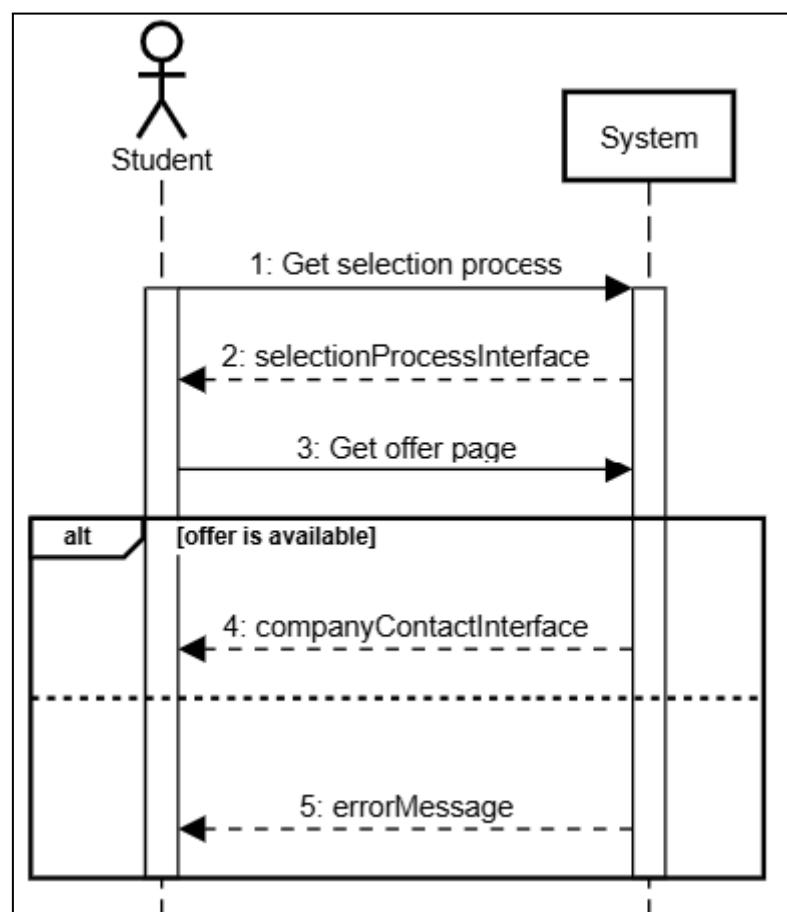


Figure 3.26: SD of the UC18

[UC19] Company visualizes student contact

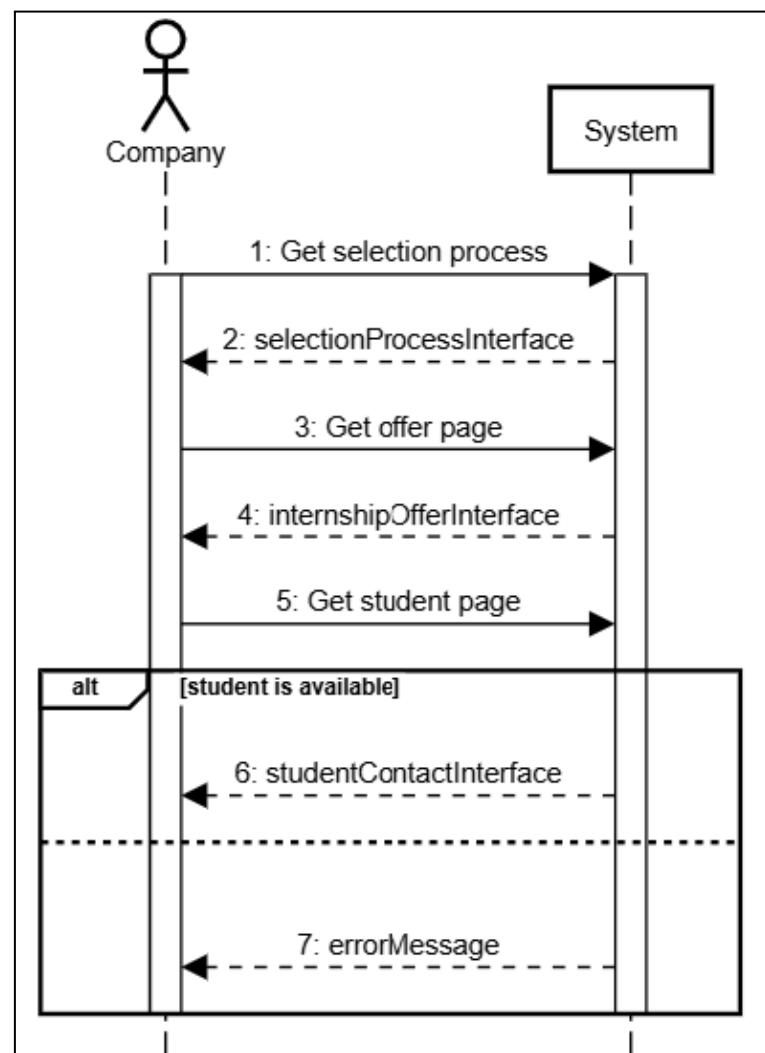


Figure 3.27: SD of the UC19

[UC20] Student fills out feedback questionnaire

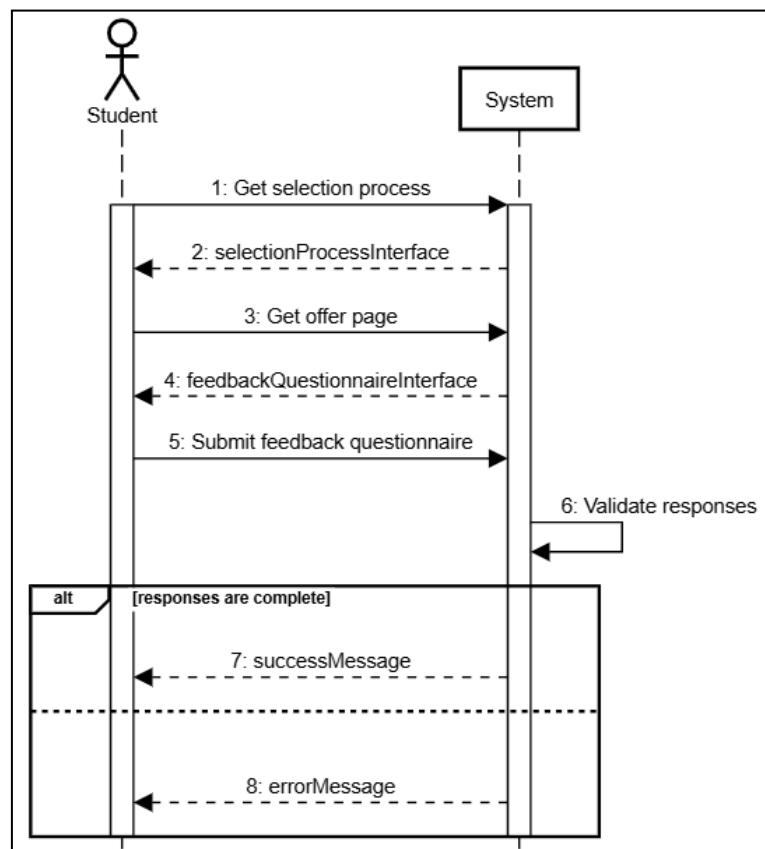


Figure 3.28: SD of the UC20

[UC21] Company fills out feedback questionnaire

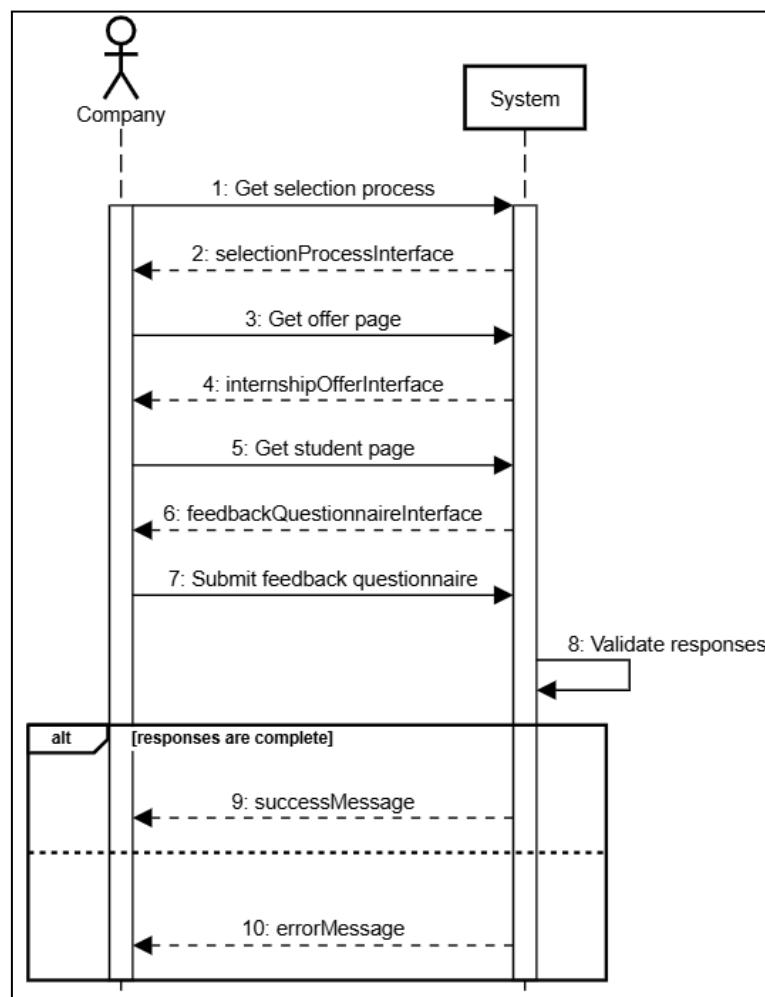


Figure 3.29: SD of the UC21

[UC22-UC23] Company finalizes the selection process

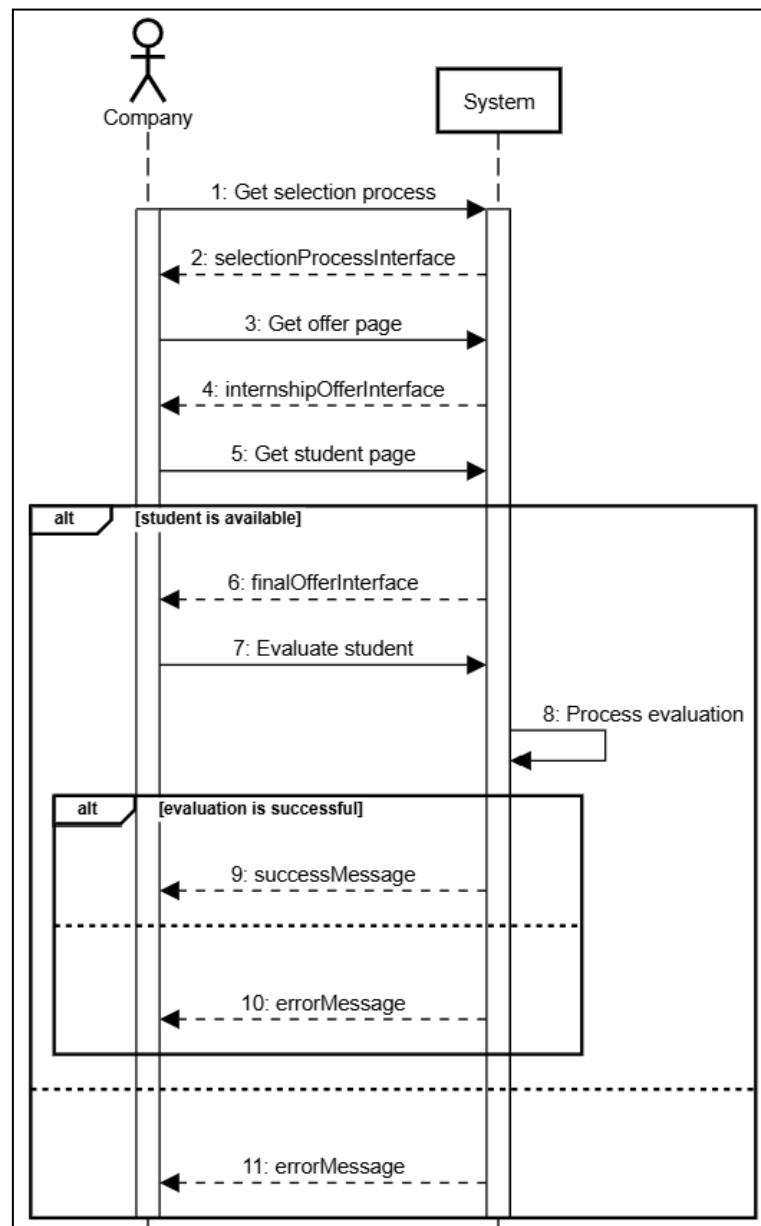


Figure 3.30: SD of the UC22-UC23 generalization

[UC24-UC25] Student finalizes selection process

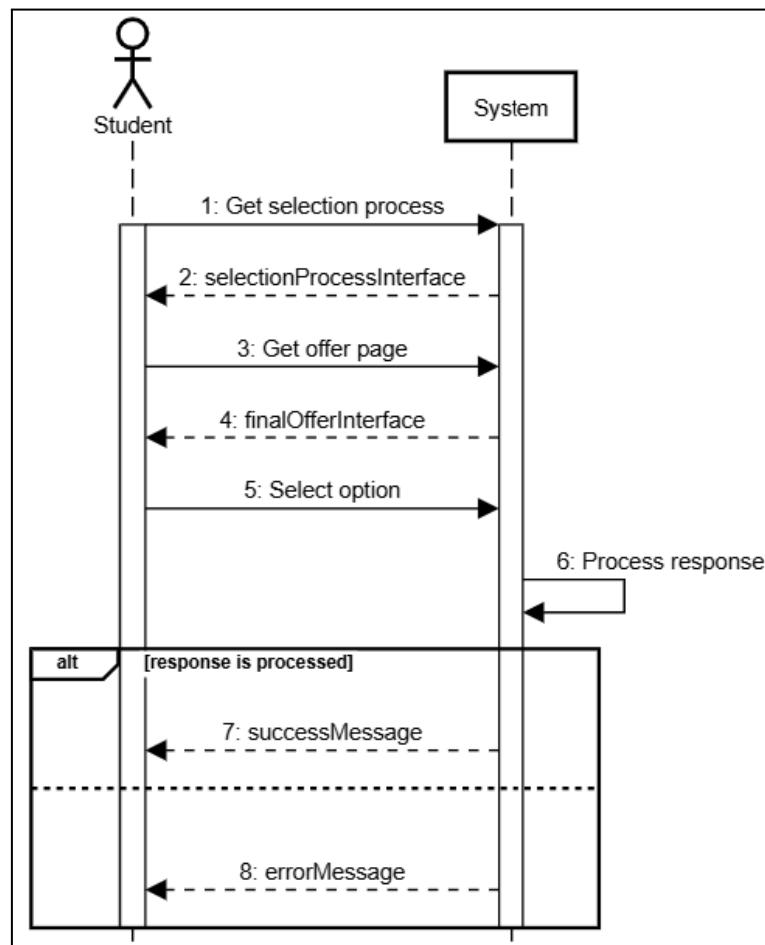


Figure 3.31: SD of the UC24-UC25 generalization

[UC26] Student interrupts selection process

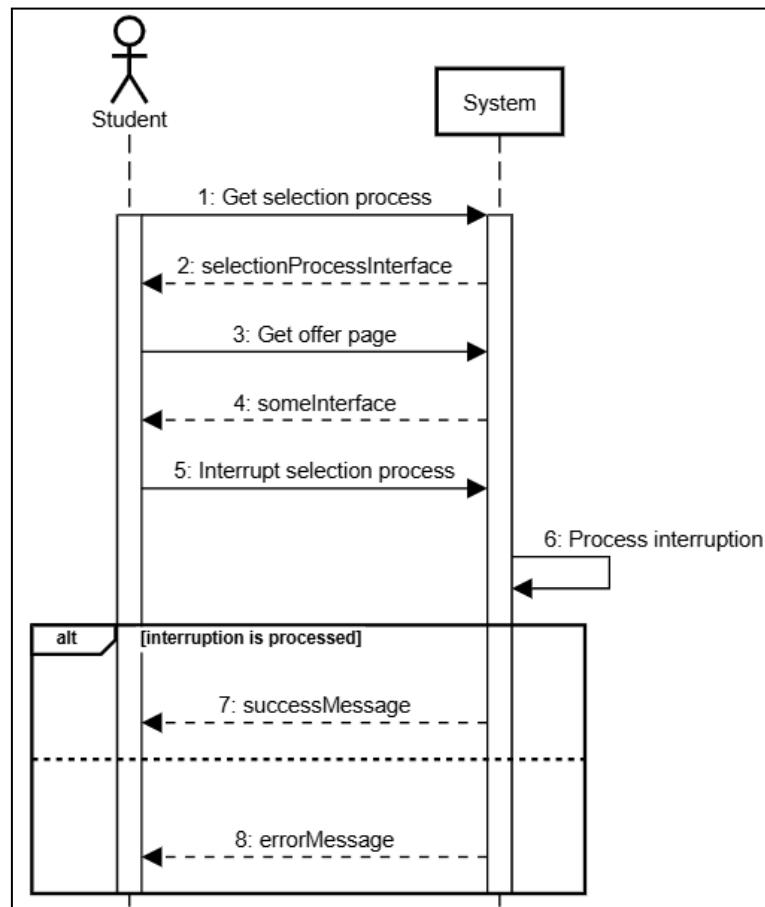


Figure 3.32: SD of the UC26

**Note:** the interface shown to the user depends on the status of the selection process

## [UC27] Student comments the internship

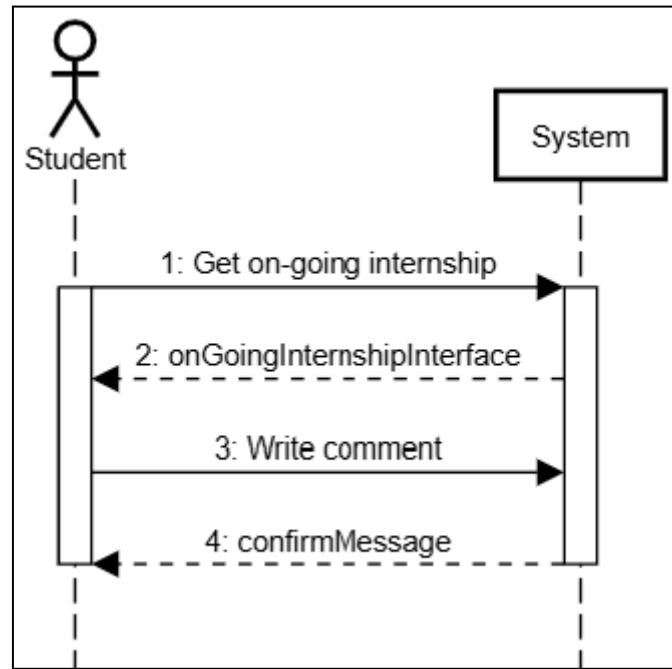


Figure 3.33: SD of the UC27

## [UC28] Company comments the student

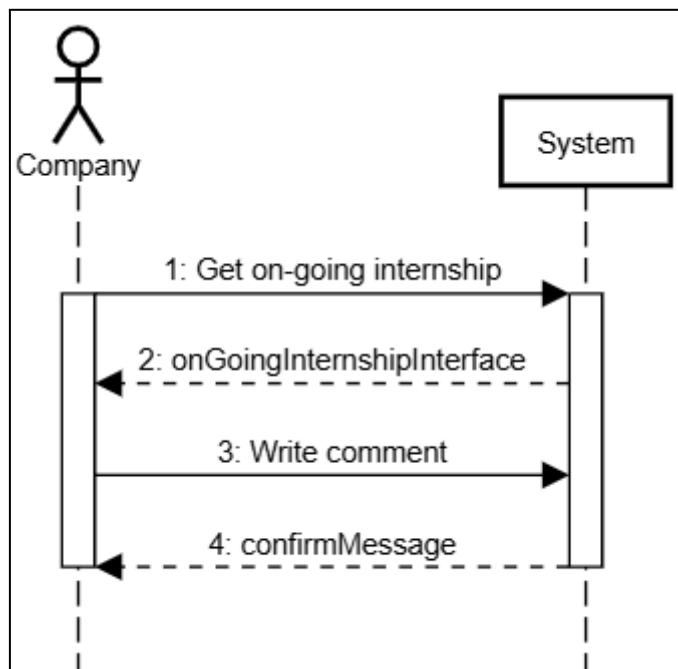


Figure 3.34: SD of the UC28

[UC29] Student checks statistics

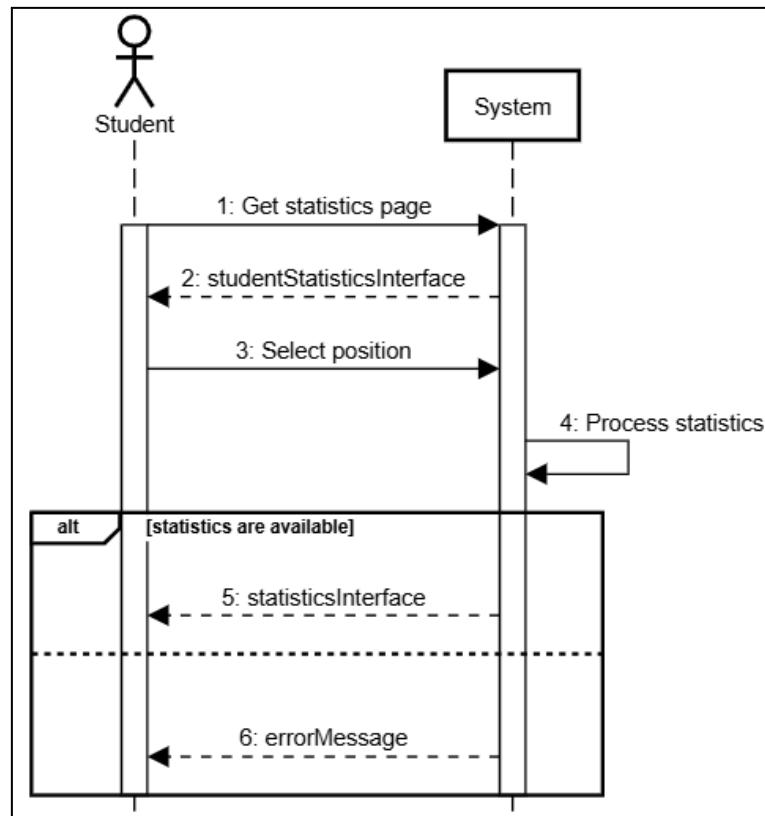


Figure 3.35: SD of the UC29

### [UC30] University interrupts internship

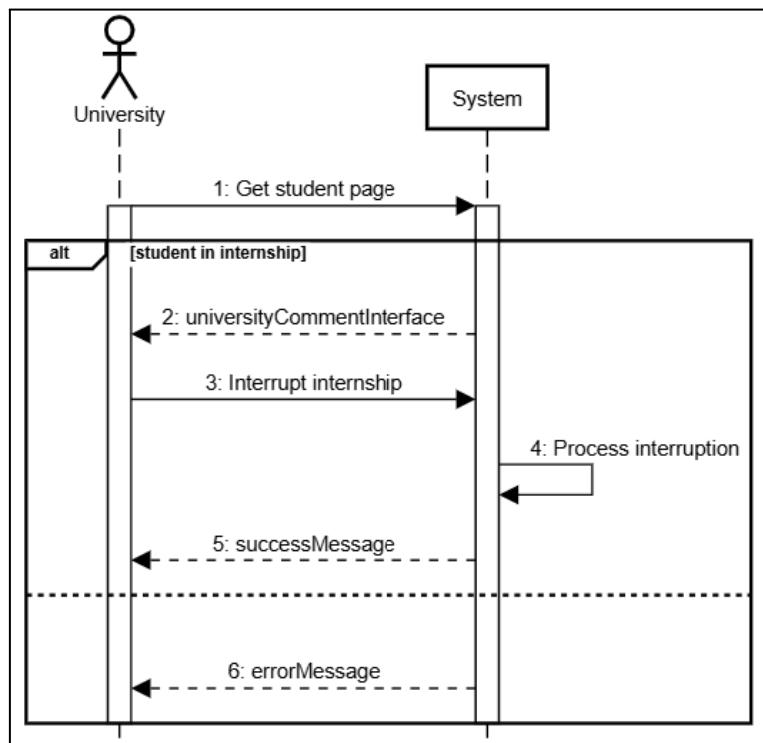


Figure 3.36: SD of the UC30

### 3.2.4 Requirements mapping

<b>Goal</b>	<b>Domain Assumptions</b>	<b>Requirements</b>
[G1]	[D1], [D6]	[R1], [R2], [R3], [R5], [R7], [R8], [R9]
[G2]	[D6]	[R10], [R11]
[G3]	[D2], [D3], [D4], [D5]	[R12], [R13], [R14], [R15], [R16], [R17], [R20]
[G4]	[D6]	[R21], [R22], [R24], [R25], [R32]
[G5]	[D1]	[R26]
[G6]	[D2], [D7]	[R27], [R29], [R30], [R31], [R32], [R34]
[G7]	[D1], [D6]	[R4], [R23]
[G8]	[D8], [D9]	[R18], [R33], [R36], [R37], [R38], [R39], [R42]
[G9]	[D1], [D6]	[R19], [R35], [R40]

Table 3.31: Requirements mapping on Goals

### 3.2.5 Use Case mapping

Use Cases	Requirements
[UC1]	[R1] [R3]
[UC2]	[R1]
[UC3]	[R1]
[UC4]	[R2]
[UC5]	[R4]
[UC6]	[R5], [R6]
[UC7]	[R21],[R22]
[UC30]	[R23]
[UC9]	[R24]
[UC10]	[R7]
[UC11]	[R8], [R10], [R13], [R32]
[UC12]	[R9], [R10], [R13], [R32]
[UC13]	[R14], [R25], [R26]
[UC14]	[R11], [R32]
[UC15]	[R14], [R27]
[UC16]	[R12], [R13]
[UC17]	[R14], [R28], [R34]
[UC18]	[R13], [R15]
[UC19]	[R29], [R34]
[UC20]	[R13], [R16]
[UC21]	[R29], [R34]
[UC22]	[R30], [R34]
[UC23]	[R14], [R31], [R34]
[UC24]	[R13], [R17], [R32], [R41]
[UC25]	[R17], [R32], [R41]
[UC26]	[R20], [R41]
[UC27]	[R19]
[UC28]	[R33]

[UC29]	[R19]
[UC30]	[R14], [R32], [R36], [R37], [R38], [R39]

Table 3.32: Requirements mapping on Use Cases

**Notes:** the requirements [R34] and [R39] do not have a corresponding use case and therefore are not mapped. We considered it unnecessary to make this use case explicit as the user experience is the same as that of the student for this specific case.

### 3.3 Performance Requirements

The platform must ensure response times of under 2 seconds for most user interactions, support scalability during peak periods, and efficiently handle thousands of concurrent applications without any degradation in performance.

## **3.4 Design Constraints**

### **3.4.1 Standards compliance**

The system must adhere to recognized standards to ensure quality and usability and to ISO/IEC 25010, focusing on usability and security aspects. The platform must also respect GDPR regulations to ensure user data is handled securely and in compliance with European privacy laws.

### **3.4.2 Hardware limitations**

The platform should operate on devices with standard hardware configurations, including a minimum of 1GB RAM and single-core processors with a clock speed of at least 1.2 GHz. It must also be compatible with modern web browsers that support HTML5 and CSS3.

### **3.4.3 Any other constraint**

Cross-browser compatibility is required for major browsers such as Chrome, Firefox, Edge, and Safari, supporting at least the two latest versions. Mobile responsiveness is critical, ensuring usability on devices with screen resolutions as low as 320 pixels in width. Additionally, third-party API integrations must meet stringent security and latency requirements to ensure platform stability.

## **3.5 Software System Attributes**

### **3.5.1 Reliability**

The platform should maintain a reliability level of at least 99% uptime. Occasional downtimes are permissible for maintenance or unexpected issues, daily automated backups must enable data recovery within 48 hours in case of failure.

### **3.5.2 Availability**

Availability should focus on core operating hours, typically between 7:00 AM and 11:00 PM. Scheduled maintenance should occur outside these hours to minimize disruptions for users.

### **3.5.3 Security**

Data transmission must use encryption protocols such as TLS 1.2 or later, and data at rest must be secured using AES-128 or stronger encryption standards. Role-based access control should ensure that only authorized users can perform sensitive actions. Security measures must also include regular audits, vulnerability scans, and penetration testing to identify and mitigate potential risks.

### **3.5.4 Maintainability**

A modular architecture should be implemented to allow updates and new feature deployments independently of core functions. Up-to-date documentation for APIs, data models, and workflows is necessary to ensure efficient debugging and smooth onboarding processes.

### **3.5.5 Portability**

The system must ensure compatibility with major operating systems, including Windows, macOS, and Linux, as well as modern web browsers. Additionally, the platform's cloud infrastructure should support migration to alternative providers with minimal configuration changes and downtime.

## 4. FORMAL ANALYSIS USING ALLOY

The formal analysis using the Alloy modelling language aims to prove the correctness and consistency of the system described in the document, so that no logic issues arise. In particular we decided to focus on modelling the SMDs of the selection process and the internship, in order to clarify the workflows and give a more complete view of the possible interactions between the actors involved. Once proven the robustness of the system, a static and a dynamic model are provided.

### 4.1 Alloy code

#### Signatures

```
//////////////////////////////////////////////////////////////////SIGNATURES////////////////////////////////////////////////////////////////

//States of the Selection Process (for clarifications see SMD1: Selection process (Figure 2.2 in chapter 2.1.2))
enum StatusSP {StartingQuestSP, InterviewSP, FeedbackQuestionnaireSP, CompletedSP, InterruptedSP, RejectedSP, AcceptedSP}
//Status of the Starting Questionnaire
enum StatusSQ {NotEvaluatedSQ, NegativeSQ, PositiveSQ}
//Status of the Interview
enum StatusI {NotTerminatedI, Negativel, Positivel}
//States of the Internship (for clarifications see SMD2: Internship (Figure 2.3 in chapter 2.1.2))
enum StatusInt {NotStartedInt, OnGoingInt, InterruptedInt, CompletedInt}
//Boolean values
enum Boolean {True, False}

//Abstract signature representing a generic User
abstract sig User {}

//Signature representing a User of type Student
sig Student extends User {
    //University the Student is enrolled to
    enrolledTo: one University,
    //Selection Processeses the Student partecipate to
    var partecipateTo: set SelectionProcess,
    //Internships the Student took part of (present and past(s))
    var takePartTo: set Internship
}

//Signature representing a User of type Company
sig Company extends User {
    //Internship offers published by the Company
    var published: set Internship,
}

//Signature representing a User of type University
sig University extends User {
    //Comments seen by the University
    var canSee: set Comment
}

//Signature representing an Internship offered by a Company
sig Internship {
    //Status of the Internship
    var status: one StatusInt
}
```

```

//Signature representing a Selection Process for an Internship
sig SelectionProcess {
    //Internship the Selection Process is related to
    relatedTo: one Internship,
    //Starting questionnaire contemplated by the Selection Process
    haveStartingQuestionnaire: one StartingQuestionnaire,
    //Interview(s) contemplated by the Selection Process (cardinality of the relation explaine below)
    requiresInterview: one Interview,
    //Feedback Questionnaires contemplated by the Selection Process (cardinality of the relation explaine below)
    haveFeedbackQuestionnaires: one FeedbackQuestionnaires,
    //True if the Student accepted the final offer for the Internship, False if the Student rejected
    var hasStudentAccepted: lone Boolean,
    //Status of the Selection Process
    var status: one StatusSP
}

//Signature representing the Starting Questionnaire of a Selection Process
sig StartingQuestionnaire {
    //Status of the Starting Questionnaire
    var status: one StatusSQ
}

//Signature representing the Interview(s) of a Selection Process
/*A Selection Process for a specific Internship can contemplate more than one Interview,
but here we represent the entire cycle as a single Interview in order to simplify the model*/
sig Interview {
    //Status of the Interview
    var status: one StatusI
}

//Signature representing the Feedback Questionnaires of a Selection Process
/*A Selection Process for a specific Internship contemplates a Feedback Questionnaire for each the Student and the Company,
but here we represent both as a single Feedback Questionnaire in order to simplify the model*/
sig FeedbackQuestionnaires {
    //True if both the forms have been submitted, false otherwise
    var areSubmitted: one Boolean,
}

//Signature representing a Comment about an Internship
sig Comment {
    //Internship the comment is about
    subject: one Internship
}

```

## Facts

```

//////////////////////////////////////////////////////////////////FACTS////////////////////////////////////////////////////////////////
//////////////////////////////////////////////////////////////////GENERAL CONSTRAINTS////////////////////////////////////////////////////////////////

//Constraints related to the Student signature
fact StudentConstraints {
    //A Student cannot take partecipate to multiple Selection Processes related to the same Internship
    always no disj sp1, sp2: SelectionProcess | sp1.relatedTo = sp2.relatedTo and
        some s: Student | sp1 in s.partecipateTo and sp2 in s.partecipateTo
    //A Student cannnot take part to simultaneous On Going Internships
    always no disj i1, i2: Internship | i1.status = OnGoingInt and i2.status = OnGoingInt and
        some s: Student | i1 in s.takePartTo and i2 in s.takePartTo
    //A Student can take part to an Internship if and only if partecipates to the related Selection Process and accepted the final offer
    always all i: Internship, s: Student | i in s.takePartTo iff
        one sp: SelectionProcess | sp in s.partecipateTo and i = sp.relatedTo and sp.hasStudentAccepted = True
}

//Constraints related to the University signature
fact UniversityConstraints {
    //An Comment cannot be seen by multiple University
    always no disj u1, u2 : University | u1.canSee & u2.canSee != none
    //A University can only see comments about an Internship that an enrolled Student is taking part of
    always all u: University, c: Comment | c in u.canSee iff
        (one s: Student | s.enrolledTo = u and c.subject in s.takePartTo)
}

//Constraints related to the Internship signature
fact InternshipConstraints {
    //An Internship can be published by one and only one Company
    always all i: Internship | one c: Company | i in c.published
}

```

```

//Constraints related to the SelectionProcess signature
fact SelectionProcessConstraint {
    //A Selection Process is pursued by one and only one Student
    always all sp: SelectionProcess | one s: Student | sp in s.participateTo
    //Two Selection Processes related to the same Internship cannot be both in Accepted status
    always no disj sp1, sp2: SelectionProcess | sp1.relatedTo = sp2.relatedTo and sp1.status = AcceptedSP and sp2.status = AcceptedSP
    //Every Starting Questionnaire is associated to one and only one Selection Process
    always all sq: StartingQuestionnaire | one sp: SelectionProcess | sp.haveStartingQuestionnaire = sq
    //Every Interview(s) is associated to one and only one Selection Process
    always all i: Interview | one sp: SelectionProcess | sp.requiresInterview = i
    //Every Feedback Questionnaire (couple) is associated to one and only one Selection Process
    always all fqs: FeedbackQuestionnaires | one sp: SelectionProcess | sp.haveFeedbackQuestionnaires = fqs
}

//Constraints related to the Comment signature
fact CommentConstraint {
    //A Comment can be associated only to a started internship
    always all c: Comment, i: Internship | c.subject = i implies i.status != NotStartedInt
}

/////////////////////////////////////////////////////////////////SELECTION PROCESS STATUS////////////////////////////////////////////////////////////////

//If the Selection Process is in Starting questionnaire status, the Starting Questionnaire hasn't been evaluated yet
fact StartingQuestStatus {
    always all sp: SelectionProcess | sp.status = StartingQuestSP
        implies (sp.haveStartingQuestionnaire.status = NotEvaluatedSQ)
}

//If the Selection Process is in Interview status, the Starting Questionnaire has been evaluated positively and the Interview(s) period isn't terminated yet
fact InterviewStatus {
    always all sp: SelectionProcess | sp.status = InterviewSP
        implies (sp.haveStartingQuestionnaire.status = PositiveSQ and sp.requiresInterview.status = NotTerminatedI)
}

//If the Interview(s) period is terminated, the Starting Questionnaire has been evaluated positively
fact NoInterviewWithoutPositiveSQ {
    always all sp: SelectionProcess | sp.requiresInterview.status != NotTerminatedI
        implies sp.haveStartingQuestionnaire.status = PositiveSQ
}

/*If the Selection Process is in Feedback questionnaire status,
the Interview(s) period is terminated (either positively or negatively) and the FeedbackQuestionnaires haven't been submitted yet*/
fact FeedbackQuestionnairesStatus {
    always all sp: SelectionProcess | sp.status = FeedbackQuestionnaireSP
        implies (sp.requiresInterview.status != NotTerminatedI
                and sp.haveFeedbackQuestionnaires.areSubmitted = False)
}

//If the Feedback Questionnaires have been submitted, the Interview(s) period is terminated
//Note that Student and Company submit the Feedback Questionnaire before the Company communicates the esit of the Interview(s) period
fact NoFeedbackWithoutTerminatedInterview {
    always all sp: SelectionProcess | sp.haveFeedbackQuestionnaires.areSubmitted = True
        implies sp.requiresInterview.status != NotTerminatedI
}

//If the Selection Process is in Completed status, the FeedbackQuestionnaires have been submitted
//and the Interview(s) period has been evaluated positively and the Student hasn't evaluated the final offer yet*
fact CompletedStatus {
    always all sp: SelectionProcess | sp.status = CompletedSP
        implies (sp.haveFeedbackQuestionnaires.areSubmitted = True
                and sp.requiresInterview.status = PositiveI and sp.hasStudentAccepted = none)
}

//If the Student received the final offer, the FeedbackQuestionnaires have been submitted and the Interview(s) period has been evaluated positively
fact FinalOfferCondition {
    always all sp: SelectionProcess | sp.hasStudentAccepted != none
        implies (sp.haveFeedbackQuestionnaires.areSubmitted = True and sp.requiresInterview.status = PositiveI)
}

/*The Selection Process is in Accepted status if and only if the FeedbackQuestionnaires have been submitted
and the Interview(s) period has been evaluated positively and the Student accepted the final offer*/
fact AcceptedStatus {
    always all sp: SelectionProcess | sp.status = AcceptedSP iff sp.hasStudentAccepted = True
}

/*If the Selection Process is in Rejected status, either the Starting Questionnaire has been evaluated negatively or the FeedbackQuestionnaires have been submitted
and the Interview(s) period has been evaluated negatively or the Student rejected the final offer*/
fact RejectedStatus {
    always all sp: SelectionProcess | sp.status = RejectedSP implies (sp.haveStartingQuestionnaire.status = NegativeSQ or
        (sp.haveFeedbackQuestionnaires.areSubmitted = True and sp.requiresInterview.status = NegativeI) or
        sp.hasStudentAccepted = False)
}

//If the Selection Process is in Interrupted status, the FeedbackQuestionnaires haven't been submitted yet
fact InterruptedStatus {
    always all sp: SelectionProcess | sp.status = InterruptedSP implies sp.haveFeedbackQuestionnaires.areSubmitted = False
}

```

```
//////////////////////////////////////////////////////////////////INTERNSHIP STATUS////////////////////////////////////////////////////////////////
//The Internship is in Not Started status if and only if there is no Selection Process with an accepted final offer
fact NotStartedStatus {
    always all i: Internship | i.status = NotStartedInt iff no s: Student | i in s.takePartTo
}

//An Internship is not in Not Started status if and only if there is one related Selection Process in Accepted status
fact StartedInternship {
    always all i: Internship | i.status != NotStartedInt iff one sp: SelectionProcess | sp.relatedTo = i and sp.status = AcceptedSP
}

//If the Internship is in Interrupted status, the University or the Student that is taking part of the Internship have seen a Comment regarding the Internship
fact InterruptedStatus {
    always all i: Internship | i.status = InterruptedInt implies one s: Student | i in s.takePartTo and s.enrolledTo.canSee.subject = i
}
```

## Assertions

```
//////////////////////////////////////////////////////////////////ASSERTIONS////////////////////////////////////////////////////////////////
//No Internship offer can be published by multiple Companies
assert NoCommonOffers {
    always no disj c1, c2 : Company | c1.published & c2.published != none
}

//No Selection Process can be in Accepted status without a positive Starting Questionnaire
assert NoAcceptedWithoutPositiveSQ {
    always no sp: SelectionProcess | sp.status = AcceptedSP and sp.haveStartingQuestionnaire.status != PositiveSQ
}

//No Selection Process can be in Accepted status without the submission of the Feedback Questionnaires
assert NoAcceptedWithoutFeedback {
    always no sp: SelectionProcess | sp.status = AcceptedSP and sp.haveFeedbackQuestionnaires.areSubmitted != True
}

//No Selection Process can be in Accepted status without a positive Interview
assert NoAcceptedWithoutPositiveInterview {
    always no sp: SelectionProcess | sp.status = AcceptedSP and sp.requiresInterview.status != PositiveI
}

//No internship can start without a related Selection Process in Accepted status
assert NoInternshipWithoutAcceptedSP {
    always no i: Internship | i.status != NotStartedInt and no sp: SelectionProcess | (sp.relatedTo = i and sp.status = AcceptedSP)
}

//No Selection Processes can be pursued by multiple Students
assert NoCommonSP {
    always no disj s1, s2 : Student | s1.partecipateTo & s2.partecipateTo != none
}

//No Internships can be pursued by multiple Students
assert NoCommonInternships {
    always no disj s1, s2: Student | s1.takePartTo & s2.takePartTo != none
}

//A Student can take part only to started Internships
assert OnlyStartedInternships {
    always no i: Internship | i.status = NotStartedInt and some s: Student | i in s.takePartTo
}
```

## Predicates

```
//////////////////////////////////////////////////////////////////PREDICATES////////////////////////////////////////////////////////////////
//Predicate to show a static configuration of the model
pred showStatic {
    #Student = 2
    #Company = 1
    #University = 1
    #Internship = 3
    #SelectionProcess = 2
    #Comment = 3
}

run showStatic for 4
```

```

//Predicate to show the dynamic evolution of he model
pred showDynamic [sp: SelectionProcess, i: Internship] {

    #Internship = 1
    #SelectionProcess = 1

    //Entire evolution from the starting of the Selection Process to the end of the related Internship
    sp.status = StartingQuestSP;                                //Step 1
    sp.status = InterviewSP;                                  //Step 2
    sp.status = FeedbackQuestionnaireSP;                      //Step 3
    sp.status = CompletedSP;                                 //Step 4
    sp.status = AcceptedSP and i.status = OnGoingInt;        //Step 5
    i.status = CompletedInt                                  //Step 6

}

run showDynamic

```

## 4.2 Generated models

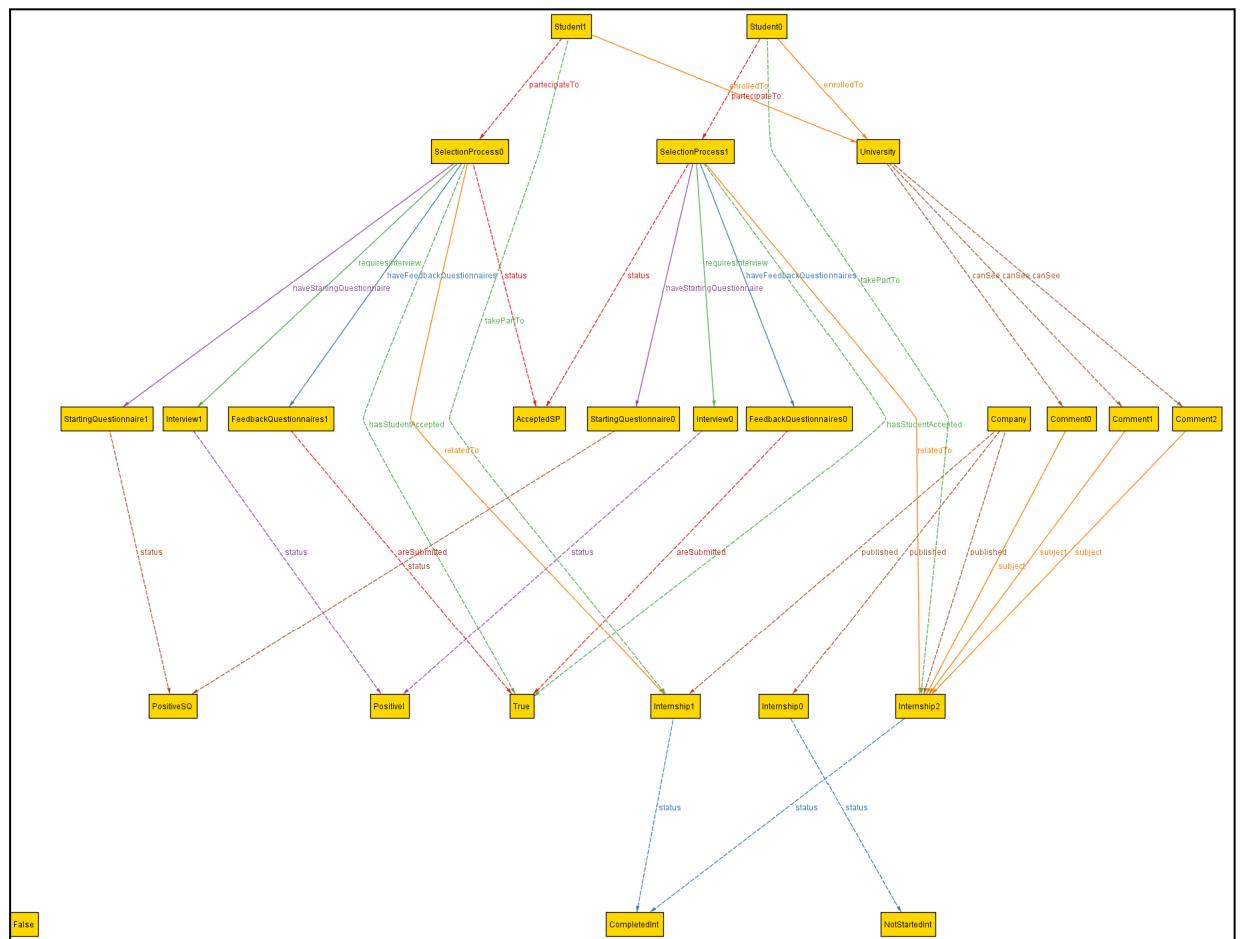
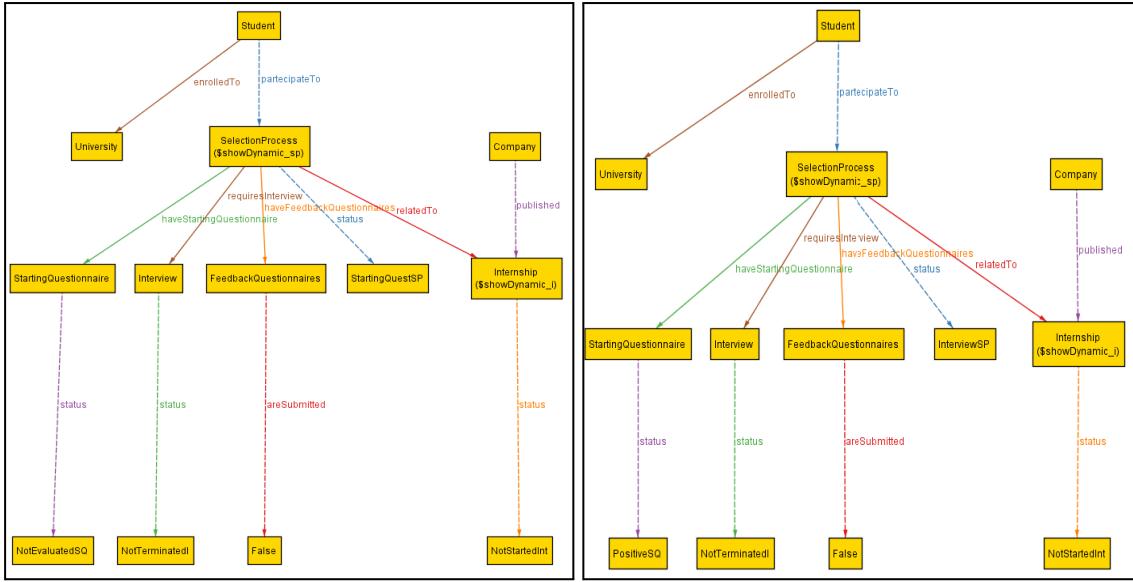


Figure 4.1: Static model generated by the showStatic predicate



Figures 4.2 and 4.3: Step 1 and step 2 of the dynamic model

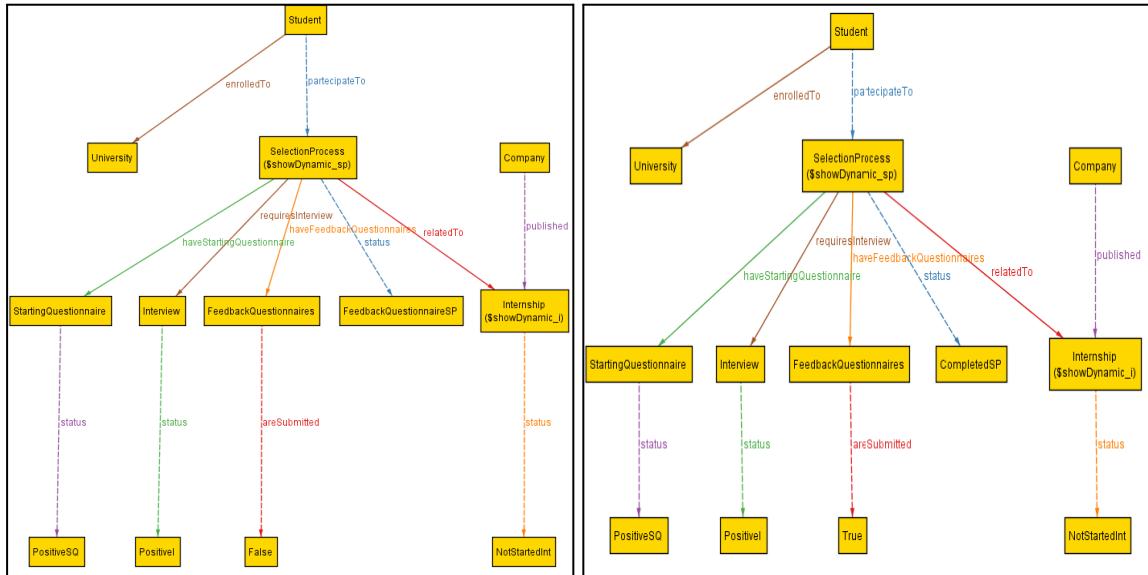


Figure 4.4 and 4.5: Step 3 and step 4 of the dynamic model

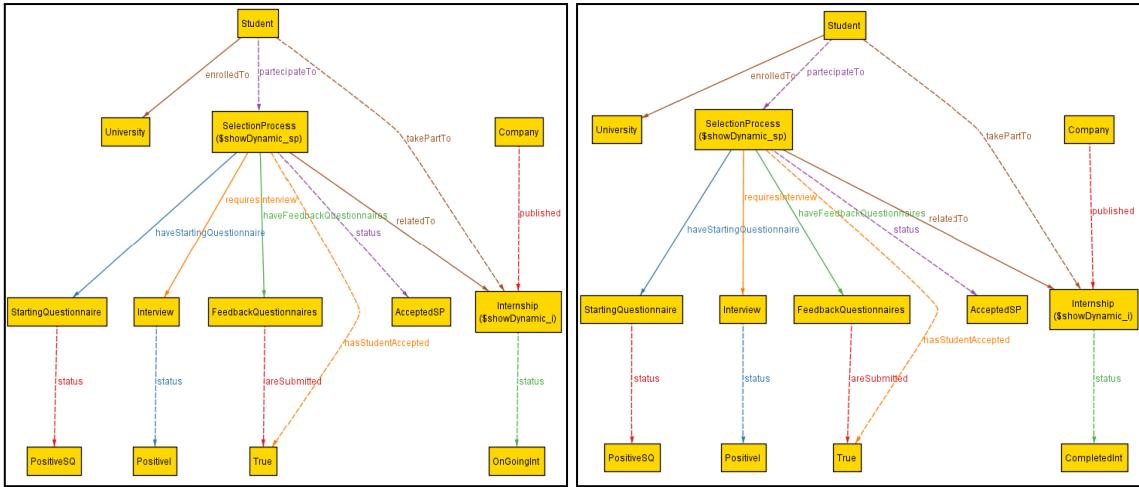


Figure 4.6 and 4.7: Step 5 and step 6 of the dynamic model

<b>Executing "Check NoCommonOffers"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 99598 vars. 6425 primary vars. 203348 clauses. 724ms. No counterexample found. Assertion may be valid. 15ms.	<b>Executing "Check NointernshipWithoutAcceptedSP"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 101274 vars. 6395 primary vars. 206314 clauses. 785ms. No counterexample found. Assertion may be valid. 61ms.
<b>Executing "Check NoAcceptedWithoutPositiveSQ"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 101062 vars. 6395 primary vars. 206037 clauses. 753ms. No counterexample found. Assertion may be valid. 44ms.	<b>Executing "Check NoCommonSP"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 99598 vars. 6425 primary vars. 203348 clauses. 539ms. No counterexample found. Assertion may be valid. 9ms.
<b>Executing "Check NoAcceptedWithoutFeedback"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 100820 vars. 6395 primary vars. 205600 clauses. 662ms. No counterexample found. Assertion may be valid. 38ms.	<b>Executing "Check NoCommonInternships"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 99598 vars. 6425 primary vars. 203348 clauses. 541ms. No counterexample found. Assertion may be valid. 6ms.
<b>Executing "Check NoAcceptedWithoutPositiveInterview"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 101062 vars. 6395 primary vars. 206037 clauses. 566ms. No counterexample found. Assertion may be valid. 23ms.	<b>Executing "Check OnlyStartedInternships"</b> Solver=sat4j Steps=1..10 Bitwidth=4 MaxSeq=4 SkolemDepth=1 Symmetry=20 Mode=batch 1..10 steps. 100406 vars. 6425 primary vars. 204726 clauses. 672ms. No counterexample found. Assertion may be valid. 19ms.

Figure 4.8 and 4.9: Validation of the assertions' correctness

## 5. EFFORT SPENT

	Alberti	Gaudiano	Pazienza
Text comprehension	4	4	4
Introduction	7	1	5
Overall description	10	19	8
Specific requirements	25	32	25
Formal Analysis using Alloy	10	2	17
Miscellaneous	8	6	5
<b>Total</b>	<b>64</b>	<b>64</b>	<b>64</b>

Table 5.1: Effort spent by each member of the group (in hours)

## 6. REFERENCES

- CD (section 2.1.2) and SMDs (section 2.1.3) made with: [draw.io](https://draw.io)
- UIs (section 3.1.1) made with: <https://app.visily.ai>
- UCDs (section 3.2.1) made with: [PlantUML Web Server](#)
- SDs (section 3.2.3) made with: [SequenceDiagram.org - UML Sequence Diagram Online Tool](#)