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Requirement Analysis and Specification Document

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1 Introduction

1.1 Purpose

The purpose of the Student&Company (S&C) Platform is to create a system that allows Students to find Internships to enhance their education and improve their curriculum, while allowing Companies to find suitable candidates for their internship programs. All of this is done in a simple and efficient way by providing a series of tools to help both parties in the process.

S&C will support the entire lifecycle of the Internship process for both Students and Companies: from the initial matchmaking that can be done automatically by the system through a proprietary Recommendation Process, or obtained by a Student with a Spontaneous Application to a specific internship offer, to the final selection process done through structured interviews created and submitted by Companies directly on the platform.

In the meantime, Student&Company will also provide a series of Suggestions to improve CVs published by Students and internship offers published by Companies. The platform will also allow the Universities of Students who are actually doing an internship to monitor the progress of such activities and handle any Complaints if necessary, even by terminating the internship if no other solution to the problem can be found.

1.1.1 Goals

- [G1] Companies would like to advertise the internship they offer
- [G2] Students would like to autonomously candidate for available internships
- [G3] Students would like to be matched with internships they might be interested in
- [G4] Companies would like to perform interviews with matched students
- [G5] Students and Companies would like to complain, communicate problems, provide information about an ongoing internship
- [G6] Students and Companies would like to be provided with suggestions about how to improve their submission
- [G7] Universities would like to handle complaints about ongoing internships

1.2 Scope

This section defines the scope of the S&C platform, highlighting the key features and functionalities that enable interactions among students, companies, and universities. The main features to provide in order to satisfy all the goals are the following:

- **Advertise Internship:**
Companies can publish internships offers that:
 - Students can spontaneously apply to;
 - Recommendation process consider while looking for matches.
- **Insert CV:**
Students can provide the platform with their CV that Recommendation process will consider while looking for matches.

- **Spontaneous Application:**
Students can autonomously apply for an available internship offer.
- **Recommendation Process:**
The platform automatically finds matches between available CV and Internships. At the end of the process, provides Students and Companies with a match they can accept or refuse.
- **Interview Process:**
Companies can interview both Student whose Spontaneous Application has been accepted, and Students that accepted a match found by Recommendation Process the company has accepted too, by providing them with Interview. The outcome of the Interview finalizes the selection process that can lead to a confirmed internship experience.
- **Internship Handling:**
Students and Companies can complain, communicate problems, provide information about a confirmed internship.
University can monitor a confirmed Internship and handle complaints, communicated problems and provided information. Handling a complaint, the University can decide to interrupt the Internship.
- **Suggestion Mechanism:**
The platform provide suggestion to both Students and Companies about the manner they respectively provide it with their CV and Internships. The suggestion achievement is to allow Students and Companies to perform better in Recommendation Process.

1.2.1 World Phenomena

1.2.2 Shared Phenomena

1.3 Definitions, Acronyms, Abbreviations

This section offers explanations of terminology to elucidate the terms, acronyms and abbreviations used throughout the document, facilitating easy comprehension and reference for the readers.

1.3.1 Definition

- **University:** An institution that is registered on the S&C platform.
- **Company:** A company that is registered on the S&C platform.
- **Student:** A person who is currently enrolled in a University and is registered on the S&C platform.
- **User:** Any registered entity on the S&C platform.
- **Internship:** The offer of a position provided by a company to one or more students. The position for a single student is temporary, but the offer remains active until it is removed from the platform.
- **Recommendation Process:** The process of matching a Student with an Internship offered by a Company based on the Student's CV and the Internship's requirements made by the S&C platform.
- **Recommendation/Match:** The result of the Recommendation Process. It is the match between a Student and an Internship.
- **Spontaneous Application:** The process of a Student manually applying for an Internship that was not matched through the Recommendation Process.

- **Template Interview:** A collection of open-ended questions, quizzes, and calls that a Company can create. Each time a Company wants to interview a Student, they can select a Template Interview, or create a new one, and assign it to the Student.
- **Interview:** The process of evaluating a Student's application for an Internship done through a Template Interview.
- **Feedback:** Information provided by Students and Companies to the S&C platform to improve the Recommendation Process.
- **Suggestion:** Information provided by the S&C platform to Students and Companies to improve their CVs and Internship descriptions.
- **Complaint:** A report of a problem or issue that a Student or Company has with an ongoing Internship. It can be published on the platform and handled by the University.
- **Confirmed Match:** A match that has been accepted by both a Student and a Company.
- **Rejected Match:** A match that has been refused by either a Student or a Company.
- **Pending Match:** A match that has been accepted only by a Student or a Company, waiting for a response from the other party.
- **Unaccepted Match:** A match that has been refused by either a Student or a Company

1.3.2 Acronyms

Acronyms	Definition
RASD	Requirements Analysis & Specification Document
CV	Curriculum vitae

Table 3: Acronyms and Definitions

1.3.3 Abbreviations

Acronyms	Definition
S&C	Students&Companies

Table 4: Abbreviations and Definitions

1.4 Revision History

Revised on	Version	Description
?-?-2024	1.0	Initial release of the document

Table 5: Document Revision History

1.5 Reference Documents

- Assignment RDD AY 2024-2025
- Software Engineering 2 A.Y. 2024/2025 Slides “CreatingRASD”
- IEEE Software Requirements Specification Template
- Alloy Documentations: alloy.readthedocs.io

1.6 Document Structure

1. **Introduction:** This section provides an overview of the document and the system. Here the purpose of the platform is explained, along with the goals and phenomena of the system. Finally, essential definitions are provided.
2. **Overall Description:** In this section, a high-level perspective of the system is provided, describing its overall purpose, functionality, and User interactions. It includes an outline of the system’s intended features, user profiles, and assumptions about the domain.
3. **Specific Requirements:** In this section, we focus on the technical and functional details of the system. Here, the external interfaces are specified as well as the functional and non-functional requirements of the system. Diagrams, such as use case and sequence diagrams, have been used to provide a visual representation of the system’s functionality.
4. **Alloy:** This section illustrates code and diagrams of the Alloy formal specification language that has been used to ensure the consistency and correctness of the system’s formalized requirements.
5. **Effort Spent:** This section provides an overview of the time spent by each group member on the project.
6. **References:** This section provides a list of references used in the document.

2 Overall Description

2.1 Product Prospective

2.1.1 User Scenarios

1. Student Sign-up

Mario Rossi is a student that want to improve his ability and education by doing an internship before graduating. He opens the SC platform and select “Student SignUp”. He proved the required personal information such as his name, surname, date of birth, an email, and a password that he will use as login credential. He also select from the list of available university the university he goes to.

If the email address has never been used on the site, Mario will receive an email for confirming the mail address and the registration of the account. Once the registration is confirmed by Mario, the account is created. If the email address is already in use, the platform will show an error that ask to insert a new email address.

2. Company Sign-up

FastRedCar SPA is a world-leading car company that aims to launch an internship program to train new mechanical engineers in their final year of a Bachelor’s or Master’s degree. The company opens the S&C platform and select “Company SignUp” where they provide the required information such as the company name, company headquarters address, company VAT number and also an email address and a password that will be used as login credential.

If the VAT number has never been used on the site, FastRedCar SPA will receive an email for confirming the mail address and the registration of the account. Once the registration is confirmed, the account is created. If the VAT number is already in use on S&C an error will be shown indicating that the company already has an account registered on the platform.

3. University Sign-up

The Technical University of Milan is a prestigious university that wants his students to complete an internship before graduating, believing this experience will enhance their skills and knowledge. The university opens the SC platform and selects “University SignUp” where they provide the required information such as the university name, the university description, the university VAT number, the name of the university office that will manage the internship program and also an email address and a password that will be used as login credential.

If the VAT number has never been used on the site, the Technical University of Milan will receive an email for confirming the mail address and the registration of the account. Once the registration is confirmed, the account is created. If the VAT number is already in use, the platform will show an error indicating the university is already registered on the platform.

4. User Login

A platform user that has already registered an account can log in by providing the email and password used during the registration. If the email and password are correct, matching and entry in the platform DB, the user is redirected to the platform home page. If the email or password are incorrect, the platform will show an error message indicating that the login credentials are wrong.

5. Student Load Curriculum

Stefano is a student who has already registered an account on SC and wants to complete his profile by uploading his CV. From the platform’s homepage, he clicks on the “Upload CV” button. He is then redirected to a page where he can enter his curriculum information, including his current level

of education, languages he knows, technical skills, and, optionally, details about past work experience along with contact information for previous employers. He also adds a photo of himself, a brief description of his interests and hobbies and, as soon as he clicks on the “Submit CV” button, the platform elaborates it and try to find some matching internship based on the given information. A list of five different internships, for which Stefano is a match, is shown to the student in the platform’s homepage where he can decide to apply for one of them, notifying the company. While computing the matching, the platform also provides Stefano with some suggestions on how to improve his CV and matching probability, based on a grammar and lexical analyses and a direct comparing of Stefano’s CV with other similar candidate

6. Company Submit an Internship Insertion

AnanasPhone is a major tech company, specialized in the production of smartphone and tablet, that has an account on the S&C site. The company wants to create an internship program aim to software engineers student in their final year of Master Degree.

A Human Resource employee open the S&C platform and select “My Internship” where a list of all the internship already present on S&C are shown. Here he clicks on “Insert Internship” where he provides the required information such as the internship title, the internship description, the start date and duration, the office address, a list of the required skills student need to have in order to be considered for the internship and, possibly, a list of benefits offered to the future intern. Once the internship is created, by clicking on the “Submit Internship” button, the platform will start the recommendation process with the aim to match the internship with all the students that are compatible with such opportunity, based on the given information of both parties.

The platform will also provide AnanasPhone with some suggestion on how to improve the internship description, and matching probability, based on a grammar and lexical analyses and a direct comparing of AnanasPhone’s Internship proposal with other similar companies.

7. Company create structured interview to submit to possible candidate

MacroHard is a world-leading tech company, known for creating its secure and reliable operating system, “Door”. The company has an account on the S&C platform and has already set up an internship program for software engineering students pursuing a Master’s degree. The company wants to create a structured interview to evaluate the technical skills and motivation of the students who apply for the internship.

MacroHard opens the platform and, on the page displaying the lists of matched students, clicks on the “Create Interview” button. This option allows the company to create structured interviews that will be submitted to candidates. The business sets up an “InterviewTemplate”, a collection of questions that includes both quizzes, which the S&C platform can automatically evaluate, and open-ended questions that require manual review. They may also include one or more video calls in the template, the outcomes of which can be recorded on the platform as a grade. The InterviewTemplate tracks each interview’s outcomes, allowing both the candidate and the company to monitor the interview progress.

MacroHard create multiple InterviewTemplates for the same internship, allowing them to submit different templates to different students based on factors such as the student’s CV, method of application (matched or spontaneous), or other criteria. Each template is created only once and can be reused for different students or internship opportunities.

For this internship in particular, MacroHard has created two InterviewTemplates: one for matched students, which includes only a quiz to assess technical skills, and another for spontaneous applicants, which includes both a quiz and a video call to evaluate the student’s motivation.

8. Student accepts a matched internship

Sara is an economic major student that has already uploaded her CV on the S&C platform and is looking for an internship. She has received a notification and, by clicking on it, she sees that a new internship is available for her.

Sara reads the internship information and she decides to accept it. A notification is sent to the company who has created the internship about the acceptance of the match by Sara. If the company also accepts the match, the platform requires the company to initiate the selection process by creating or assigning a structured interview to Sara, who will be notified about it. To both parties, feedback is requested by the platform to improve the Recommendation Process by asking both to rate the matching generated by S&C

- 9. Student manually applies for an internship** Marco is a chemistry student that has already uploaded his CV on the S&C platform and is looking for an internship. Unfortunately, the matching internships provided by the platform do not fully satisfy his needs and he decides to proactively search for another one.

He opens the platform's homepage and click on the "Browse all Internships" button. Here he can see all the internships that are available on the platform and he can filter them by field of study, required skills, location and other parameters. He finds an internship that is not in the matching list provided by the platform, but that is perfect for him, so he clicks on the "Spontaneous Application" button.

The platform notify the company that Marco has applied for the internship and will inform the student if and when the company will start the application process by sending him a structured interview. There is no need for Marco to accept the interview, as a spontaneous application is considered as an implicit acceptance of the match by the student.

- 10. Student see his application interview status**

Stefano is a student who has applied for various internships through the S&C platform. He has submitted applications both by matching with companies through the platform's automated feature and by manually applying, and with some of them he is already in a selection phase and he is currently waiting for updates from the different companies.

When Stefano logs into the platform, he navigates to the "My Applications". In this section, he can view the status of each of his applications, including whether the company has assigned him an interview, whether his interview has been reviewed, and whether he has been accepted or rejected for the position by clicking on each one. In the same section, he can also see if the platform is running the recommendation process matching his profile with all the other possible internship offers.

- 11. Company see the status of the selection process**

CosmoX, a renowned private space company that specialized in the reuse of rocket, has created an internship on the S&C platform for aspirants Aerospace engineer, has received multiple manual applications from different students and has been match numerous time. The company has already accepted all worthy manual applications and all the matches and has assigned structured interviews to everyone. CosmoX is now waiting for the students to complete the interviews and for the platform to automatically evaluate the quiz answers, while the company is manually reviewing the open-ended questions and grading the different video calls.

When a CosmoX employee logs into the platform, he can navigate to the "My Interview" section. In this section, he can view the status of each interview and the status of each student such as: "SENT" if the student has received the interview but not opened yet, "COMPLETED" if the student has completed the interview and "REVIEWED" if the company has started the review process of the non-automatic part of the interview.

- 12. Student refuse/accept an internship**

Paula is an Art Major that has been matched by S&C with different museums and private art galleries in the city of Florence. She happily accepted all the matched and completed the interviews with all the companies. She did not expect to pass all the interviews and now she has to choose between the different offers.

Paula open the platform and navigate to the “My Applications” section where she can see all of her internships and the status of each one. To refuse an internship from which she was accepted, Paula clicks on it and then clicks on the “Refuse” button and the platform will notify the company about the decision of the student. By doing the same process, but clicking on the “Accept” button, the platform will notify the company that Paula has accepted the internship and will block any other interview process informing the respective company.

By navigating to the “My Interview” section, any company can see, between the different possible state of an application, if the internship of a particular student has been accepted or refused.

13. Company publishes a complaint about a student

PlaneHearts is a company famous for its innovative and multi-platform IDE for the development of mobile application. The company has created an internship on the S&C platform for software engineering students and selected Giovanni, a computer science student, for the internship. However, after the internship started, employees at PlaneHearts noticed that Giovanni was not performing as expected, did not have the required skills, and was not motivated to learn. The company decided to publish a complaint about Giovanni on the platform to inform the student’s university.

For publish the complaint, the people managing PlaneHearts account on S&C, log into the platform and navigates to the “Complaints” section. Here, they can view all the complaints they have published and can create a new complaint by providing the student’s name, the internship title, and describe the problem that has arisen. Once the complaint is submitted, the platform will notify Giovanni and his university.

14. Student responds to a complaint

Giovanni has received a notification from the S&C platform that a complaint has been published about him by PlaneHearts, the company where he is currently doing an internship. The complaint states that Giovanni is not performing as expected, does not have the required skills, and is not motivated to learn during this experience.

The Student will have the opportunity to respond to the complaint and provide his version of the events by navigating to the “Complaints” section of the platform. Here, he can view all the complaints published about him and can respond to each one by providing a description of the situation from his perspective.

15. University handles a complaint

The University of Rome, a prestigious university that has students enrolled in the S&C platform, has received a complaint about one of their students. The carrier advisor at the university opens the S&C platform and navigate to the “Complaints” section. Here, he can view all the complaints published about his students and can handle each one by reviewing the complaint, contacting the student and the company involved, and taking appropriate action to resolve the issue. In this particular carrier advisor and the university have decided to interrupt the internship of the student to protect the student and the company from further issues. The university do so by clicking on the “Interrupt Internship” button in the complaint page. The platform will notify the student and the company about the interruption of the internship and will close the complaint.

2.1.2 Class Diagrams

2.1.3 State Charts

2.2 Product Functions

- 1. User Management:** The platform allows Students, Companies, and Universities to register and log in. It also provides Students the ability to upload and modify their CVs, and Companies the ability to view and manage their internships.

2. **Internship Creation and Management:** Companies can create, publish, and manage internship offers on the platform. They define details such as job description, requirements, deadlines, and benefits. Companies also have the ability to terminate internship offers when they are no longer needed.
3. **Student Application Process:** Students can browse available internships and apply to internships either through automatic matching or by submitting spontaneous applications. They can also track the status of their applications throughout the process.
4. **Automated Recommendations:** The platform matches Students with suitable internships based on their CVs and the specific requirements set by Companies. Once a match is found, both Students and Companies are notified, and they can accept or decline the recommendation.
5. **Interview Management:** Companies can create and assign Template Interviews to Students, which include quizzes, questions, and calls to assess their suitability for an internship. Both Students and Companies can track the interview progress, and Companies can evaluate Student responses manually or automatically.
6. **Feedback and Suggestions for Improvement:** The platform collects feedback from Students and Companies to improve the Recommendation Process. It also provides suggestions to Students on how to enhance their CVs and to Companies on how to improve their internship descriptions.
7. **Complaint Management:** Students and Companies can publish complaints about ongoing internships, which are then handled by Universities. Universities can monitor complaints and interrupt internships if necessary.
8. **Notification System:** Notifications are sent to Students, Companies, and Universities when relevant events occur, such as new internships, matched recommendations, interview assignments, complaints, and sign-up confirmations.

2.2.1 Requirements

- [R1] The system shall allow any unregistered students to register by providing personal information and selecting their University.
- [R2] The system shall allow any companies to register by providing company information.
- [R3] The system shall allow any universities to register by providing university information.
- [R4] The system shall send a confirmation email upon registration.
- [R5] The system shall allow Users to log in using their email and password.
- [R6] The system shall provide error messages if login credentials are incorrect.
- [R7] The system shall allow Companies to create and publish Internship offers specifying details.
- [R8] The system shall allow Companies to terminate their Internship offers at their own discretion.
- [R9] The system shall provide Students with automatically Matched Internships obtained by the Recommendation Process.
- [R10] The system shall allow Students to view and navigate all available Internships.
- [R11] The system shall enable Students to submit Spontaneous Applications to Internships they find interesting.

- [R12] The system shall allow Students to submit their CV.
- [R13] The system shall allow Students to modify their CV.
- [R14] The system shall allow Students to monitor the status of their Spontaneous Applications.
- [R15] The system shall allow Students to monitor the status of their Recommendation.
- [R16] The system shall notify Students when an Internship that suits their profile becomes available.
- [R17] The system shall notify Companies when a registered Student's CV suits an Internship requirement.
- [R18] The system shall notify a registered Company and a Student when they both accept a Recommendation.
- [R19] The system shall notify Students when their Spontaneous Application has been accepted by a Company.
- [R20] The system shall notify Students when the Selection Process has been initiated.
- [R21] The system shall display to Companies all the CVs of Matched Students obtained by the Recommendation Process.
- [R22] The system shall allow Students and Companies to accept a Recommendation.
- [R23] The system shall allow Companies to accept a Spontaneous Application.
- [R24] The system shall start a Selection Process only if both the Company and the Student have accepted the Recommendation.
- [R25] The system shall start a Selection Process only if the Company has accepted the Spontaneous Application.
- [R26] The system shall allow Companies to create Template Interviews.
- [R27] The system shall allow Companies to submit Template Interviews to Students they have initiated a Selection Process with.
- [R28] The system shall allow Students to answer Interview questions and submit them.
- [R29] The system shall allow Companies to manually evaluate Interview submissions.
- [R30] The system shall allow Companies to insert the correct answers to a Quiz with the corresponding score to enable automatic evaluation.
- [R31] The system shall allow Students and Companies to monitor the status of their Interviews.
- [R32] The system shall enable Companies to complete the Interview process by submitting the final outcome to each candidate.
- [R33] The system shall collect Feedback from both Students and Companies regarding the Recommendation Process.
- [R34] The system shall provide Suggestions to Students on improving their CVs.
- [R35] The system shall provide Suggestions to Companies on improving Internship descriptions.

- [R36] The system shall allow registered Universities to access and monitor Internship data related to their Students.
- [R37] The system shall provide a platform to Students and Companies to complain, communicate problems, or provide information about the current status of an ongoing Internship.
- [R38] The system shall notify registered Universities of any Complaint issued on their Students.
- [R39] The system shall allow registered Universities to handle Complaints and to interrupt an Internship at their own discretion.

2.3 User Characteristics

2.4 Assumptions, dependencies and constraints

2.4.1 Domain Assumption

2.4.2 Dependencies

3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

3.1.2 Hardware Interfaces

3.1.3 Software Interfaces

3.1.4 Communication Interfaces

3.2 Functional Requirements

This chapter provides a comprehensive overview of the system's use cases, detailing the various interactions between Users and the system. Use Case Diagrams, detailed Use Case Descriptions, Sequence Diagrams and Requirement Mapping are provided for each use case.

3.2.1 Use Case Diagrams

3.2.2 Sequence Diagrams

3.2.3 Requirements Mapping

3.3 Performance Requirements

Given the system's noncritical nature, stringent performance criteria are unnecessary. However, to ensure an optimal User experience, the system should:

3.4 Design Constraints

3.4.1 Standards Compliance

3.4.2 Hardware limitations

3.4.3 Any other constraint

3.5 Software System Attributes

3.5.1 Reliability

3.5.2 Availability

3.5.3 Security

3.5.4 Maintainability

3.5.5 Portability

4 Formal Analysis Using Alloy

5 Effort Spent
