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SCUOLA DI INGEGNERIA INDUSTRIALE
E DELL'INFORMAZIONE

Students & Companies

RASD Document
Software Engineering 2 Project

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Contents

1 | Introduction

1.1. Purpose

As the demand for skilled interns in various industries continues to rise, providing students with relevant internship opportunities is essential for their professional growth. Traditionally, students often struggle to find internships that match their skills, experiences, and career aspirations, while companies face challenges in sourcing qualified candidates. Students&Companies (S&C) aims to bridge this gap by creating a dynamic platform that helps the matching of university students with companies offering internships tailored to their profiles.

S&C provides a unified framework for students to search for internships, allowing them to showcase their CVs and preferences. Companies can advertise their internship opportunities, detailing the required skills, tasks, and benefits offered. The platform employs sophisticated recommendation mechanisms, utilizing keyword searches and statistical analyses to enhance the matching process, thereby ensuring a better fit between students and internships. Furthermore, S&C allows for the tracking of the interview process and provides constructive suggestions for improving project descriptions and CVs. Additionally, it facilitates the management of complaints from universities, enhancing overall communication and collaboration.

The main goals of the platform are the following:

1.1.1. Goals

[G1] Companies should be able to advertise the internships they want to offer

[G2] Students should be able to look for internships

[G3] Students should be able to be informed about internships that can be interesting

[G4] Companies should be able to be informed about the availability of a student's CV that its interesting to them

[G5] Students and Companies should be able to accept a recommendation of a possible match

[G6] Students and Companies should be able to establish contact and participate in an interview

[G7] Companies should be able to finalize the selection.

[G8] Students and Companies should be able to provide feedback and suggestions on the provided recommendations

[G9] Students and companies should be able to receive suggestions regarding how to make their submissions (project descriptions for companies and CVs for students)

[G10] Students and companies should be able to keep track of the matchmaking and internship processes

[G11] Students and Companies should be able to complain and communicate problems

[G12] Universities should be able to monitor internships

[G13] Universities should be able to handle complaints

1.2. Scope

Students & Companies (S&C) is a comprehensive platform designed to facilitate the connection between students seeking internship opportunities and corporations offering such positions. This digital interface allows companies to advertise their available internship roles and receive tailored recommendations pertaining to potential candidates.

Conversely, students can engage in both proactive and passive searches for internship opportunities. Proactively, they can explore open positions through customized alerts, while passively, they receive notifications from the system when job offers align with their specified criteria.

Once both parties express interest, the platform facilitates the selection process, assisting companies in conducting interviews and selecting the right candidates. Throughout this process, users can leave comments and suggestions, which the system uses to enhance statistical analysis and provide tips for improving their appeal.

Additionally, while internships are ongoing, the platform monitors the experience and collects feedback or complaints from both students and companies. In this stage, universities are involved in addressing complaints and taking action when necessary.

1.2.1. World Phenomena

[WP1] Students prepare their CVs

[WP2] Students want to take part in an internship experience

[WP3] Companies want to employ a student as an intern

[WP4] Companies interview possible candidates

[WP5] Students inform their university about the internship when it's in the course

[WP6] Companies choose the best candidate

1.2.2. Shared Phenomena

World-controllled

[SP1] Students upload their CVs

[SP2] Students go through available internships

[SP3] Companies advertise their internship

[SP3] Students accept the recommendation of an internship

[SP4] Companies accept the recommendation of a student

[SP5] Companies use the system to manage interviews

[SP6] Companies use the system to finalize the selections

[SP7] Universities monitor the situation of the internship

[SP9] Students and companies use the system to complain, communicate problems, and provide information about the internship status.

Machine-controllled

[SP10] The system informs students when an interesting internship becomes available

[SP11] The system informs companies when an interesting CV becomes available

[SP12] The system asks students and companies to provide feedback and suggestion

[SP13] The system provides suggestions both to companies and students on how to make submissions

[SP14] The system provides a mechanism to monitor the process and internship

1.3. Definitions, Acronymous, Abbreviations

Abbreviation	Description
RASD	Requirements Analysis & Specification Document
G*	Goal
WP*	World phenomena
SP*	Shared phenomena
D*	Domain assumption
R*	Functional requirement
UC*	Use case
S&C	Students & Companies
ST	Students
COM	Companies
UML	Unified Modelling Language
UI	User Interface

Table 1.1: List of Definitions, Acronymous, and Abbreviations

1.4. Revision History

- Version 1.0 (04/11/2024)

1.5. Reference Documents

The document is based on the following materials:

- IEEE Standard Documentation For RASD
- The specification of the RASD and DD assignment of the Software Engineering II course a.a. 2024/25
- Slides of the course on WeBeep

1.6. Document Structure

1. **Introduction**: it aims to give a brief description of the project. In particular, it's focused on the reasons and the goals that are going to be achieved with its development;

2. **Overall Description**: it is a high-level description of how the system works with a detailed explanation of the phenomena that involve the world, the machine, or both, there is also the domain description with its assumptions;
3. **Specific Requirements**: in this section, there is a detailed analysis of the requirements needed to achieve the goals. Moreover, it contains more information useful for developers (i.e constraints about HW and SW);
4. **Formal analysis**: it's a formal description of the world phenomena using Alloy;
5. **Effort spent**: it shows the time spent to realize this document organized by section;
6. **References**: it contains the references to any documents and software used to write this paper.

2 | Overall Description

This section is devoted to an overall description of every part of the system.

2.1. Product Perspective

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2.1.1. Scenarios

a

2.1.2. Class diagram

a

2.1.3. State diagrams

a

2.2. Product Functions

a

2.3. User charatteristic

There are two types of registered users in S&C: Students (STs) and Companies (COMs). Each user type has distinct characteristics and roles within the platform:

- **STs**: Students use S&C to find a company offering internships. To access the platform, they must have a device with an internet connection and an account that includes their email and personal data. Once registered, students can browse available internships, apply for them, and participate in interviews with companies

- **COMs**: Companies join S&C to find students suitable for internships. To use the platform, they need a device with an internet connection and an account that includes their email and company information. Through S&C, companies can view student applications, schedule interviews, and select candidates for internships.

Both STs and COMs must register with the platform to access its services, enabling seamless communication between students seeking internships and companies offering opportunities.

2.4. Assumptions, dependencies, constraints

[DA1] Students and companies need to have a device and an internet connection (?)

[DA2] Companies need to have detailed internship descriptions

[DA3] Students need to have a CV

[DA4] Students need to have an account on S&C

[DA5] Companies need to have an account on S&C

[DA6] Students need to be enrolled at a university

[DA7] Companies need to be able to conduct an interview

[DA8] Companies need to be able to evaluate an interview

[DA9] Universities need to be informed about a current student's internship

[DA10] Universities need to be able to communicate with Students and Companies

3 | Specific Requirements

This section provides a detailed description of the various types of requirements the system must address to achieve all the functionalities outlined. These requirements are essential to ensure the platform operates efficiently, and securely meeting users needs.

3.1. External Interface Requirements

3.1.1. User Interfaces

The Students&Companies (S&C) user interface will be a web app developed to be used by both STs and COMs. It will be accessible to anyone with a device equipped with an internet browser and a reliable internet connection. The platform will provide an intuitive and user-friendly experience, ensuring that users can easily navigate and access its features regardless of their device or operating system.

3.1.2. Hardware Interfaces

The system will be accessible from every device with an Internet Browser to access the website and a reliable Internet connection. The User is free to choose his device like a computer, a tablet, or a smartphone.

The system will be accessible from any device with an internet browser and a reliable internet connection. Users can choose their preferred device, whether it is a computer, tablet, or smartphone. This ensures flexibility and convenience, allowing users to access the platform from anywhere and at any time.

3.1.3. Software Interfaces

The system requires an API to facilitate email sending. These emails can include, for instance, 2FA (two-factor authentication) confirmations or general notifications. This functionality is essential to ensure secure user authentication and to keep users informed about important updates and communications through email.

3.1.4. Communication Interfaces

The communication interfaces needed by the system are the HTTPS (Hypertext Transfer Protocol Secure) protocol and the Mail System Transfer Protocol (SMTP).

- **HTTPS** will be used to ensure secure communication between the client and the server, protecting data integrity and confidentiality during transactions such as login, registration, and other sensitive operations.
- **SMTP** will be used for sending emails, enabling the system to handle tasks such as sending account 2FA confirmations, notifications, and other user-related communications efficiently and securely.

3.2. Functional Requirements

[R1] When students want to do a proactive research, the system allows them to go through the available internships

[R2] The system allows students to upload their CV

[R3] The system allows companies to publish new internships

[R4] The system allows companies to add a description to their internships

[R5] When doing a search the system allows users to filter internships by a key (?)

[R6] When a new internship that might interest some students becomes avaible, the system notifies them.

(?? students contact a company without recomendations)

[R7] When a student's CV that corresponds to a company's needs becomes available the system informs them.

[R8] The system allows students to accept a recommendation

[R9] The system allows companies to accept a recommendation

[R10] When the two parties have accepted a recommendation the system allows them to establish a contact

[R11] When conducting an interview, the system supports the companies with the interview process

[R12] When conducting an interview, the system supports the companis with the final-

ization of the selection

[R13] The system allows students and companies to provide feedback and suggestions to feed statistical analysis.

[R14] The system provides suggestions to students regarding how to make their CVs more appealing

[R15] The system provides suggestions to companies regarding how to make their project descriptions more appealing

[R16] During the matchmaking process, the system allows all users to keep track of its execution and outcome

[R17] During the internship the system allows all interested parties to monitor it

[R18] During and ongoing internship, the system allows all users to complain

[R19] During and ongoing internship, the system allows all users to communicate problems

[R20] During and ongoing internship, the system allows all users to provide information on its status

[R21] When reports or complaints about the status of an ongoing internship are made, the system allows Universities to see them.

[R22] When complaints about the status of an ongoing internship are made, the system allows Universities to handle them.

3.2.1. Mapping

Goal	Requirements and Domain Assumptions

[G1] Companies should be able to advertise the internships they want to offer	**Requirements:** • **[R3]** The system allows companies to publish new internships • **[R4]** The system allows companies to add a description to their internships **Domain Assumptions:** • **[DA1]** Students and companies need to have a device and an internet connection • **[DA2]** Companies need to have detailed internship descriptions • **[DA5]** Companies need to have an account on S&C
[G2] Students should be able to look for internships	**Requirements:** • **[R1]** When students want to do a proactive research, the system allows them to go through the available internships • **[R2]** The system allows students to upload their CV • **[R3]** The system allows companies to publish new internships • **[R5]** When doing a search the system allows users to filter internships by a key **Domain Assumptions:** • **[DA1]** Students and companies need a device and internet connection • **[DA3]** Students need to have a CV • **[DA4]** Students need to have an account on S&C • **[DA6]** Students need to be enrolled at a university

[G3] Students should be able to be informed about internships that can be interesting	**Requirements:** • **[R2]** The system allows students to upload their CV (?) • **[R3]** The system allows companies to publish new internships • **[R6]** When a new intership that might interest some students becomes avaible, the system notifies them **Domain Assumptions:** • **[DA3]** Students need to have a CV • **[DA1]** Students and companies need a device and internet connection • **[DA4]** Students need to have an account on S&C • **[DA5]** Companies need an account on S&C
[G4] Companies should be able to be informed about the availability of a student's CV that its interesting to them	**Requirements:** • **[R2]** The system allows students to upload their CV • **[R3]** The system allows companies to publish new internships • **[R7]** When a student's CV that corresponds to a company's needs becomes available the system informs them. **Domain Assumptions:** • **[DA1]** Students and companies need a device and internet connection • **[DA4]** Students need to have an account on S&C • **[DA5]** Companies need an account on S&C

[G5] Students and Companies should be able to accept a recommendation of a possible match	**Requirements:** • **[R6]** When a new intership that might interest some students becomes avaible, the system notifies them • **[R7]** When a student's CV that corresponds to a company's needs becomes available the system informs them. • **[R9]** The system allows companies to accept recommendations • **[R8]** The system allows students to accept recommendations **Domain Assumptions:** • **[DA1]** Students and companies need a device and internet connection • **[DA2]** Companies need an account on S&C • **[DA4]** Students need an account on S&C
[G6] Students and Companies should be able to establish contact and participate in an interview	**Requirements:** • **[R10]** When the two parties have accepted a recommendation the system allows them to establish a contact • **[R11]** When conducting an interview, the system supports the companies with the interview process **Domain Assumptions:** • **[DA1]** Students and companies need a device and internet connection • **[DA5]** Companies need an account on S&C • **[DA4]** Students need an account on S&C • **[DA7]** Companies need to be able to conduct an interview

[G7] Companies should be able to finalize the selection.	**Requirements:** • **[R12]** When conducting an interview, the system supports the companis with the finalization of the selection **Domain Assumptions:** • **[DA1]** Students and companies need a device and internet connection • **[DA5]** Companies need an account on S&C • **[DA4]** Students need an account on S&C • **[DA8]** Companies need to be able to evaluate an interview
[G8] Students and Companies should be able to provide feedback and suggestions on the provided recommendations	**Requirements:** • **[R13]** The system allows students and companies to provide feedback and suggestions to feed statistical analysis. **Domain Assumptions:** • **[DA1]** Students and companies need a device and internet connection • **[DA5]** Companies need an account on S&C • **[DA4]** Students need an account on S&C
[G9] Students and companies should be able to receive suggestions regarding how to make their submissions (project descriptions for companies and CVs for students)	**Requirements:** • **[R14]** The system provides suggestions to students regarding how to make their CVs more appealing • **[R15]** The system provides suggestions to companies regarding how to make their project descriptions more appealing **Domain Assumptions:** • **[DA1]** Students and companies need to have a device and an internet connection • **[DA5]** Companies need an account on S&C • **[DA4]** Students need an account on S&C

[G10] Students and companies should be able to keep track of the matchmaking and internship processes	**Requirements:** • **[R16]** During the matchmaking process, the system allows all users to keep track of its execution and outcome • **[R17]** During the internship the system allows all interested parties to monitor it **Domain Assumptions:** • **[DA1]** Students and companies need to have a device and an internet connection • **[DA5]** Companies need an account on S&C • **[DA4]** Students need an account on S&C
[G11] Students and Companies should be able to complain and communicate problems	**Requirements:** • **[R18]** During and ongoing internship, the system allows all users to complain • **[R19]** During and ongoing internship, the system allows all users to communicate problems • **[R20]** During and ongoing internship, the system allows all users to provide information on its status **Domain Assumptions:** • **[DA1]** Students and companies need to have a device and an internet connection • **[DA5]** Companies need an account on S&C • **[DA4]** Students need an account on S&C
[G12] Universities should be able to monitor internships	**Requirements:** • **[R21]** When reports or complaints about the status of an ongoing internship are made, the system allows Universities to see them. **Domain Assumptions:** • **[DA9]** Universities need to be informed about a current student's internship • **[DA10]** Universities need to be able to communicate with Students and Companies • **[DA6]** Students need to be enrolled at a university

[G13] Universities should be able to handle complaints	**Requirements:** • **[R21]** When reports or complaints about the status of an ongoing internship are made, the system allows Universities to see them. • **[R22]** When complaints about the status of an ongoing internship are made, the system allows Universities to handle them. **Domain Assumptions:** • **[DA9]** Universities need to be informed about a current student's internship • **[DA10]** Universities need to be able to communicate with Students and Companies • **[DA6]** Students need to be enrolled at a university

3.3. Performance Requirements

- **Number of concurrent Users**: According to recent research, websites with similar goals as S&C have approximately 1.8 million users. Our target is to attract at least 25% of this user base, which means that S&C should be capable of handling up to 500,000 concurrent users. This is crucial to ensure the platform operates efficiently and provides a seamless, enjoyable experience for a substantial number of users.
- **Data storage**: The S&C platform needs to store and manage extensive data related to both STs and COMs. Additionally, it must handle data pertaining to interviews, complaints, issues, data analytics, and other critical information. This requires robust data storage solutions that ensure data integrity, security, and scalability.
- **Time response**: All operations directly executed by S&C, such as user registration, login, file upload, and evaluation, should have response times within the range of milliseconds. This quick response time is essential to deliver a smooth user experience and maintain user satisfaction.

3.4. Design Constraints

3.4.1. Standards Compliance

The S&C platform is designed to strictly follow several standards to ensure quality, security, and interoperability.

- **HTTPS Protocol**: The platform implements the HTTPS protocol according to the cryptographic standards established by the Internet Engineering Task Force (IETF), ensuring secure communication between users and the platform.
- **Accessibility Stand**: S&C complies with the Web Content Accessibility Guidelines (WCAG) to ensure that the platform is accessible to all users, including those with disabilities.
- **Security Standards**: The platform follows security best practices as defined by OWASP (Open Web Application Security Project) and NIST (National Institute of Standards and Technology). This includes password storage encryption using HASH512 + Salt, SSL certificates, and end-to-end communication encryption to protect user data.
- **API Standard**: The platform uses open standards for API design, such as RESTful APIs, and adheres to specifications like OpenAPI (Swagger) to ensure smooth integration with other systems.
- **Coding Standards**: S&C follows universally accepted coding guidelines for the primary programming languages used in system development (e.g., Python, Java). This includes adherence to coding conventions such as PEP 8 for Python and Java Coding Conventions for Java.
- **Compliance and Privacy**: The platform complies with privacy regulations such as the General Data Protection Regulation (GDPR) for European citizens, ensuring the protection of user privacy and data rights.

3.4.2. Hardware Limitations

To access the S&C platform, both students and companies must have an electronic device, such as a computer, tablet, or smartphone, with a reliable internet connection.

- **STs**: Students need a device that allows them to access the platform, upload applications, attend interviews, and perform other required activities. They must also have the ability to upload and download files, such as resumes or application documents.

- **COMs**: Companies also need a device with internet access to view applications, schedule interviews, and manage internship postings.

Both types of users must have devices that enable them to receive notifications from the platform, ensuring they stay informed about important updates and actions required. The devices should be able to support modern web browsers to access the S&C platform effectively.

3.5. Software System Attributes

3.5.1. Reliability

The S&C platform does not manage critical operations. If an operation fails, it can be re-executed without any significant consequences. For example, if the curriculum upload fails, students can simply re-upload it without any issues. Given this non-critical nature, it is reasonable to permit a failure rate of around 1%, as it does not adversely impact the overall user experience or platform functionality.

3.5.2. Availability

The S&C platform should have high availability, aiming for 24/7 uptime. This is essential to provide continuous access to users without unexpected interruptions, ensuring they can reliably access services whenever needed.

To achieve this, techniques such as load balancing to distribute traffic evenly, failover systems to switch to backup resources during outages, and regular data backups to protect against data loss should be implemented. These measures help maintain seamless operation and ensure that the platform remains robust and dependable at all times.

3.5.3. Securuty

Communication between the user and the S&C platform is encrypted to avoid data breaches, and unauthorized access, and to ensure the confidentiality and integrity of information shared on the platform.

Furthermore, users must only be able to perform operations that they are authorized to do. For example, a student must not be able to publish an internship, as this function should be restricted to users with specific permissions, such as platform administrators or authorized representatives. Proper access controls and role-based permissions must be

implemented to ensure that only authorized users can perform specific actions within the platform

3.5.4. Maintainability

The system should be divided into scalable and reusable modules, making it easier to maintain and replace components in case of failure. This modular approach enhances the platform's flexibility and simplifies the process of updating or scaling specific parts without affecting the entire system.

Ordinary maintenance, including bug fixes and improvements, will be scheduled during nighttime hours when user traffic is minimal to minimize disruption and maintain a smooth user experience. This strategy ensures that the system remains reliable and maintainable while supporting continuous service improvements.

3.5.5. Portability

The S&C platform does not require any specific hardware or software and must be accessible from any operating system with a modern web browser. This ensures broad compatibility and ease of use for all users. Additionally, a mobile application can be developed to allow users to view the state of battles and other platform activities. Since the mobile app does not require any specialized functions, a non-native approach can be used. This makes it feasible to leverage cross-platform development tools, which can accelerate the development process and reduce the resources needed for maintaining separate codebases for different platforms.

4 | Formal Analysis using Alloy

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5 | Effort Spent

Member of group	Effort spent	
Arianna Paone	Introduction	6h
	Overall description	2h
	Specific requirements	5h
	Formal analysis	0h
	Reasoning	0h
	Homework	3h
Matteo Pasqual	Introduction	6h
	Overall description	2h
	Specific requirements	3h
	Formal analysis	0h
	Reasoning	0h
	Homework	3h
Matilde Restelli	Introduction	7h
	Overall description	1h
	Specific requirements	5h
	Formal analysis	0h
	Reasoning	0h
	Homework	3h

Table 5.1: Effort spent by each member of the group.

6 | References