



POLITECNICO
MILANO 1863

SCUOLA DI INGEGNERIA INDUSTRIALE
E DELL'INFORMAZIONE

Design Document

Version 1.0

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Contents

1	Introduction	3
1.1	Purpose	3
1.2	Scope	3
1.3	Definitions, acronyms, abbreviations	3
1.4	Revision history	3
1.5	Reference documents	3
1.6	Document structure	3
2	Architectural design	5
2.1	Overview	5
2.2	Component view	5
2.3	Component View	5
2.3.1	Key Components	5
2.3.2	Communication Between Components	6
2.3.3	Design Benefits	6
2.4	Deployment view	6
2.5	Runtime view	6
2.6	Component interfaces	6
2.7	Selected architectural styles and patterns	6
2.8	Other design decisions	6
3	User interface design	7
4	Requirement traceability	14
5	Implementation, integration and test plan	15
6	Effort spent	16
7	References	17

1 Introduction

1.1 Purpose

This design document outlines the architectural framework, user interface design, and other system components necessary to meet the functional and non-functional requirements described in the Requirement Analysis and Specification Document.

It also serves as a foundation for developers, testers, and stakeholders to understand the system's structure and ensures that the final implementation adheres to the defined goals.

The main purpose of the S&C platform is to grant efficient and effective matchmaking between university students seeking experience through internships and companies offering them. The design aims to ensure:

- **Precision in matching:** The system adopts a sophisticated recommendation system to notify students about suitable internships, based on criteria such as skills and experiences.
- **Smooth user experience:** The system shall grant its users the best experience by smoothly managing all internship-related workflows, including searching, application, selection, feedback collection, and monitoring of ongoing internships.
- **Scalability:** The system's design shall accommodate future adjustments, such as advanced data analytics, integration with external tools, or even an expanded scope.

1.2 Scope

Students&Companies (S&C) is an internship platform designed to connect students with companies based on skills, experiences, and interests.

The platform offers two main ways to establish connections:

- **Recommendation system**
- **Proactive searching**

S&C also supports the selection process and gathers feedback on recommendations and provides spaces for users to address issues, share updates, and track internship progress. More details can be found in the RASD document.

1.3 Definitions, acronyms, abbreviations

TBD

1.4 Revision history

Version 1.0 - WIP

1.5 Reference documents

TBD

1.6 Document structure

Section 1: Introduction

This section is presented with a brief overview of this document's content including the description of the purpose, the scope, and all the definitions, acronyms and abbreviations used.

Section 2: Architectural design

This section is presented with a detailed description of the architectural choices for the system, including a high-level description of the system and its components. In addition it is presented a detailed description of the deployment view and the main runtime views of the system.

Section 3: User interface design

This section is presented with a series of prototypes for the most important pages of the software to help graphic designers. Each image is accurately described to avoid any misunderstanding on the pages' available functionalities.

Section 4: Requirements traceability

This section is highly dependent on the RASD, as it provides a complete mapping of both functional and non-functional requirements described in that document, with the modules introduced and described in this document.

Section 5: Implementation, integration and test plan

The last section describes the procedures followed for implementing, integrating and testing the components of the platform.

2 Architectural design

2.1 Overview

The S&C design is based on two architectural choices:

- Microservices architecture
- Thin-client model

This choices were made to ensure scalability and modularity, making it easier to modify the system in the future or simply for maintenance.

Thanks to the microservices approach, the system shall be divided into separate and independent modules, each of which is responsible of a single feature, like user management, recommendation system, internship management and report collection.

The thin-client approach instead, ensures the smoothest experience for the users, by keeping the client-side of the application as lightweight as possible. With this approach the client shall focus solely on the rendering of the user interface and the management of basic interactions, the rest of the computation happens on the server-side.

To facilitate the communication between client and the backend, the system shall implement well-defined RESTful APIs.

2.2 Component view

2.3 Component View

The **Students&Companies (S&C)** platform is built around modular and decoupled components following a microservices architecture. Each component is responsible for specific functionalities, ensuring a clean separation of concerns, scalability, and ease of maintenance.

2.3.1 Key Components

• User Management Service

Responsible for managing all user-related operations, including:

- Registration and login processes for students, companies, and universities.
- Authentication and authorization using secure protocols like OAuth 2.0.
- Profile management, enabling users to update personal information, resumes, and company details.

• Internship Management Service

This service handles all functionalities related to internships:

- Creation, modification, and deletion of internship postings by companies.
- Managing application workflows, including CV submissions and application tracking.
- Integration with the recommendation system to notify eligible students.

• Recommendation Service

A core component of the platform, responsible for matching students to internships based on:

- Skills and interests specified by students.
- Requirements defined in internship postings.
- Dynamic filtering and scoring to identify the best candidates.

- **Notification Service**

Ensures timely communication between users and the system. Key responsibilities include:

- Sending real-time notifications about new internships, application updates, and feedback requests.
- Notifying universities about complaints involving their students.

- **Feedback and Complaint Service**

Handles user feedback and complaints to improve system quality and resolve issues:

- Collects feedback on internships and the recommendation system.
- Manages complaints from students and companies, notifying universities when necessary.

- **Form Management Service**

Supports the creation and evaluation of application forms for internship screening:

- Allows companies to design custom forms with open and closed questions.
- Processes and stores completed forms from students.
- Provides tools for companies to grade forms and generate candidate rankings.

- **Database Service**

Manages the persistence layer for storing all user, internship, and system-related data. The database is designed to:

- Support distributed storage for scalability and reliability.
- Enforce strict access controls to ensure data privacy and security.

2.3.2 Communication Between Components

All services communicate via **RESTful APIs**, ensuring interoperability and modularity. Each service exposes specific endpoints to support its operations, allowing:

- Seamless integration between services, ensuring the system functions as a cohesive whole.
- Flexibility for future enhancements or replacement of individual components without impacting the overall architecture.

2.3.3 Design Benefits

The componentized design allows:

- Independent development, deployment, and scaling of services based on demand.
- Enhanced maintainability, as each service is responsible for a specific functionality.
- High availability and resilience, as the failure of one component does not impact the entire system.

2.4 Deployment view

2.5 Runtime view

2.6 Component interfaces

2.7 Selected architectural styles and patterns

2.8 Other design decisions

3 User interface design

The aim of this section is to present the prototypes of the most important pages of the application and explain the features by emulating scenarios of a user interacting with the system.

Login and Sign Up page

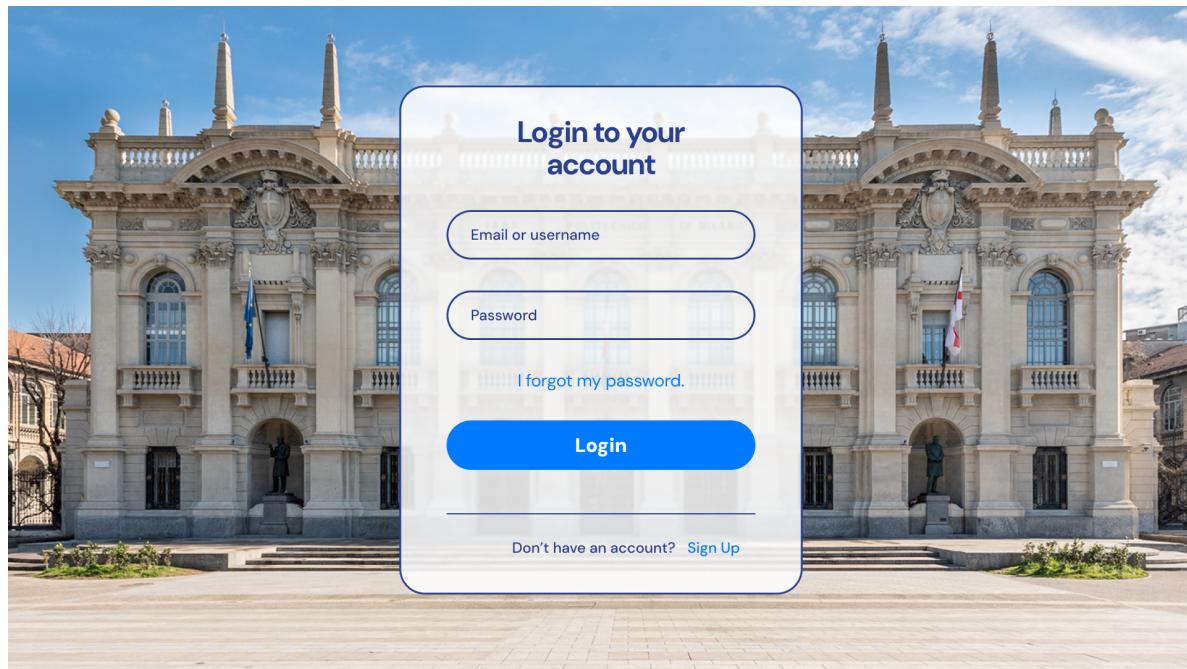


Figure 1: Login prototype page

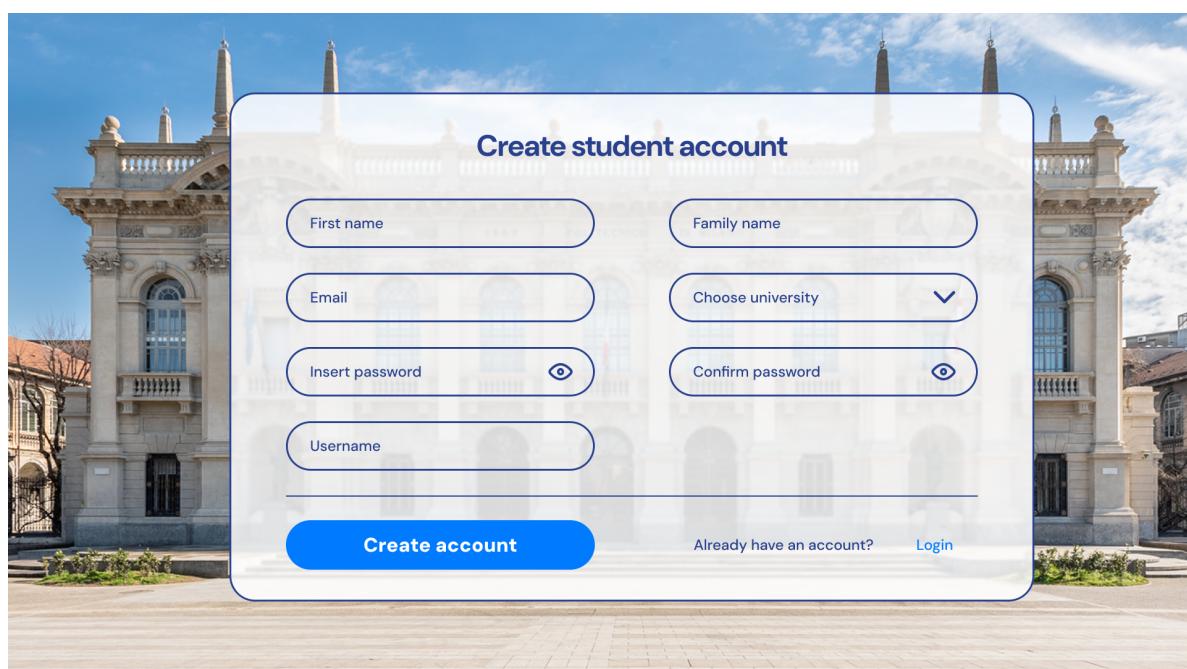


Figure 2: Sign up prototype page

The picture [1] shows the prototype of the login page, allowing to either login by entering the correct credentials, create an account in case the user doesn't have one yet, or reset the password in case it was forgotten.

The picture [2] shows the prototype of the sign up page for students, that allows students to create a new account by entering all the required information. In case the user already has an account there is a button that redirects to the login page. The case of a company creating an account is really similar to the one shown above with the simple difference that the user wont be required to choose a university.

Profile page

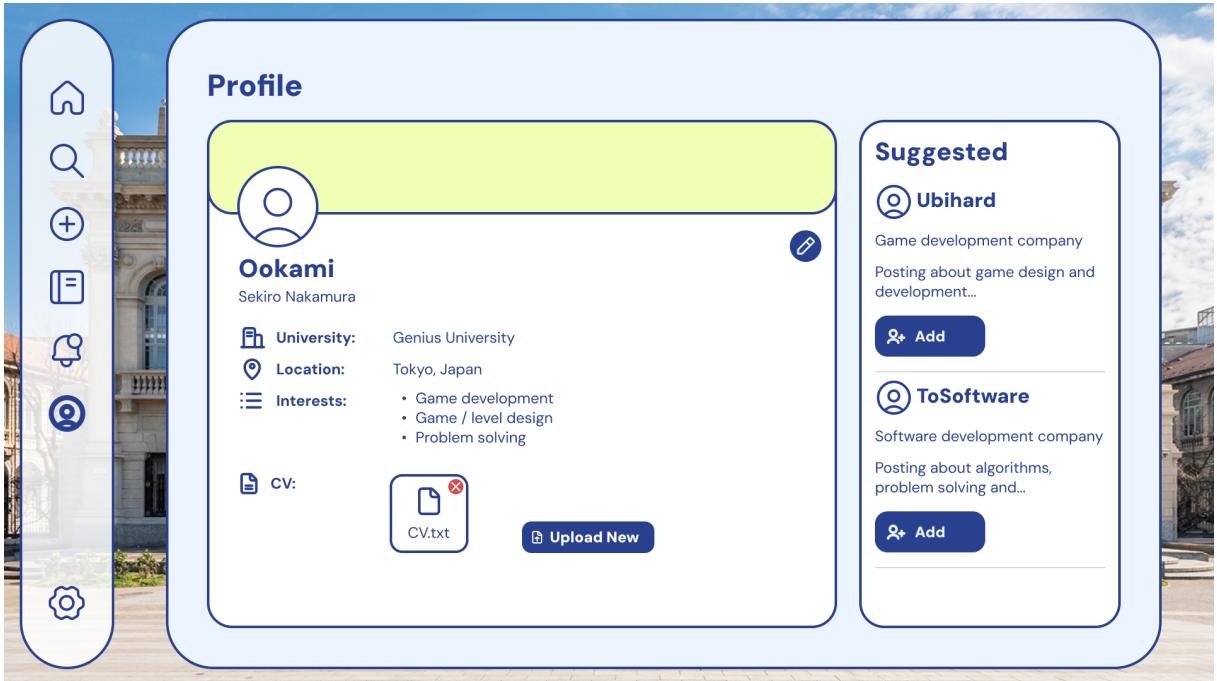


Figure 3: Student profile prototype page

The picture [3] shows the prototype of the profile page of a user logged in as a student. On the left, there is the section containing all the information provided by the user, and through the pencil button on the right, the user can modify the information. On the bottom there is the CV section. By clicking the file icon it opens the file allowing the user to check if the uploaded file is correct, otherwise the button on the right allows to upload a different file.

On the right side of the picture there is the "Suggested" area that show all the companies that might interest the user based on his interests.

Notifications page

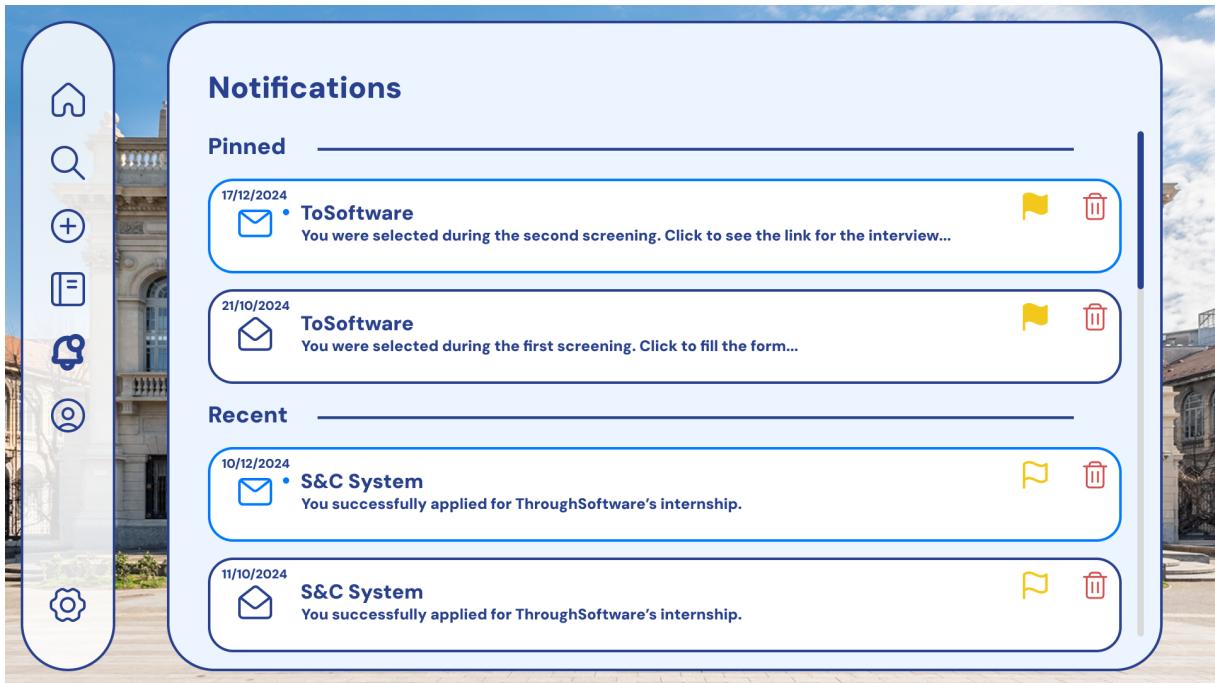


Figure 4: Notifications prototype page

The picture [4] shows the prototype of the notifications page and is show to all three user categories. In general all notifications shown in the page render only a part of the whole message, and clicking on it allows the user to open a page that shows the whole text. In addition, notifications can be pinned to be always shown on top in their specific section by clicking on the yellow flag, or can be also permanently deleted by clicking on the trash can.

Search page

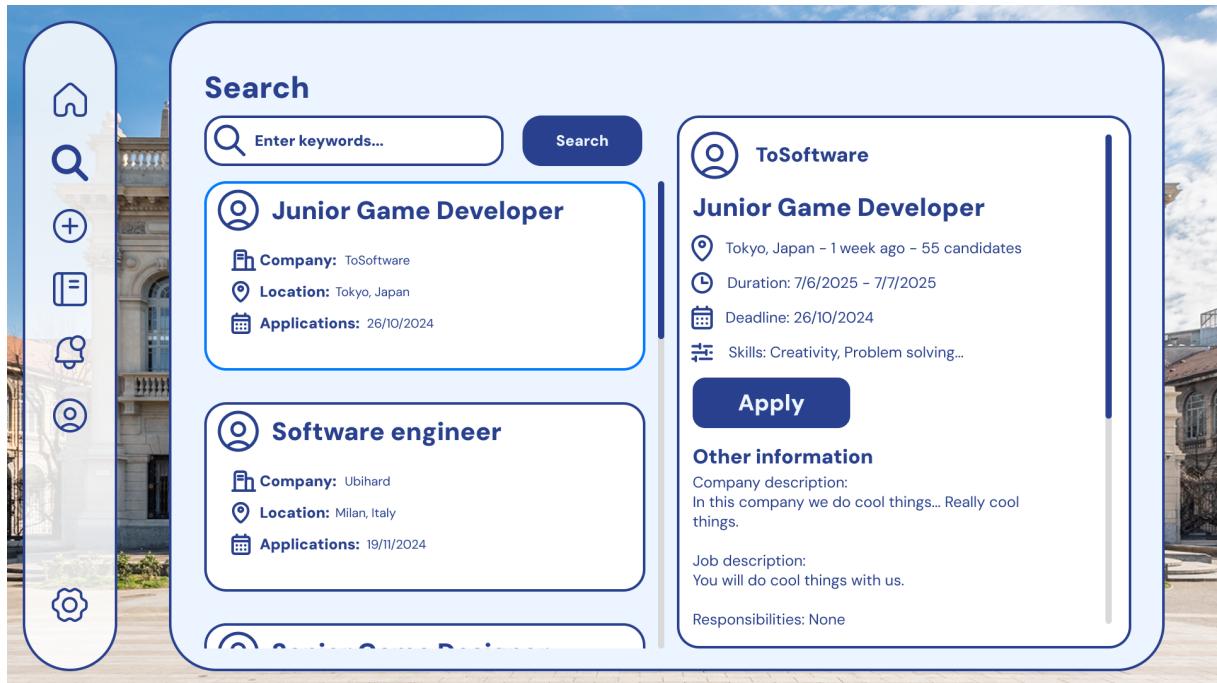


Figure 5: Search prototype page

The picture [5] shows the prototype of the search page, that allow students to proactively search for internship by entering keywords in the search bar.

Right after searching the keywords the internship found are displayed on the left side and only show the basic details. By clicking on the desired internship, all the additional information entered by the company are displayed on the right side. Only when visualizing the details of an internship it is possible to apply for said offer through a dedicated button.

Form creation page

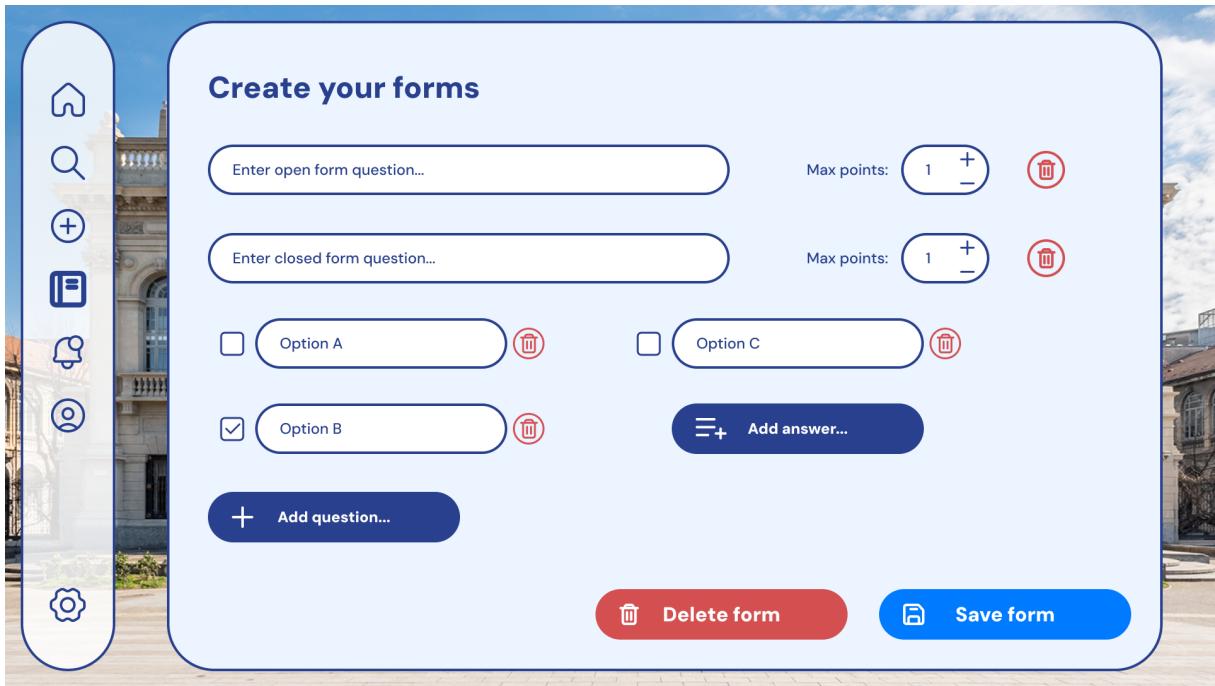


Figure 6: Form creation prototype page

The picture [6] shows the prototype of the form creation page that allows only companies to create custom forms for the candidates to fill during an application. In the form can be added two different types of questions: open and closed.

Open question only require the question text and the number of maximum point. The closed ones not only require the question text and the maximum points like the open ones, but they also need the options the candidates have to choose from. Each option can be either deleted, marked as correct with the checkbox on the left, or can have its text changed. In addition the company can choose to add more options to the closed question with the "*Add answer...*" button.

Lastly the company can decide to either add questions with the "*Add question...*" button or delete them with the trash can icon on the right.

Once the form has been completed it can be saved or deleted by using the dedicated buttons.

Home page



Figure 7: Home prototype page

The picture [7] shows the prototype of the home page that allows students to see all the available internships posted by various companies.

The section on the left shows all the internships and by interacting with them the student can access a page that shows more details about the post and apply for the internship.

On the right there is a panel that shows the basic data regarding the user that is currently logged in.

Internship creation page

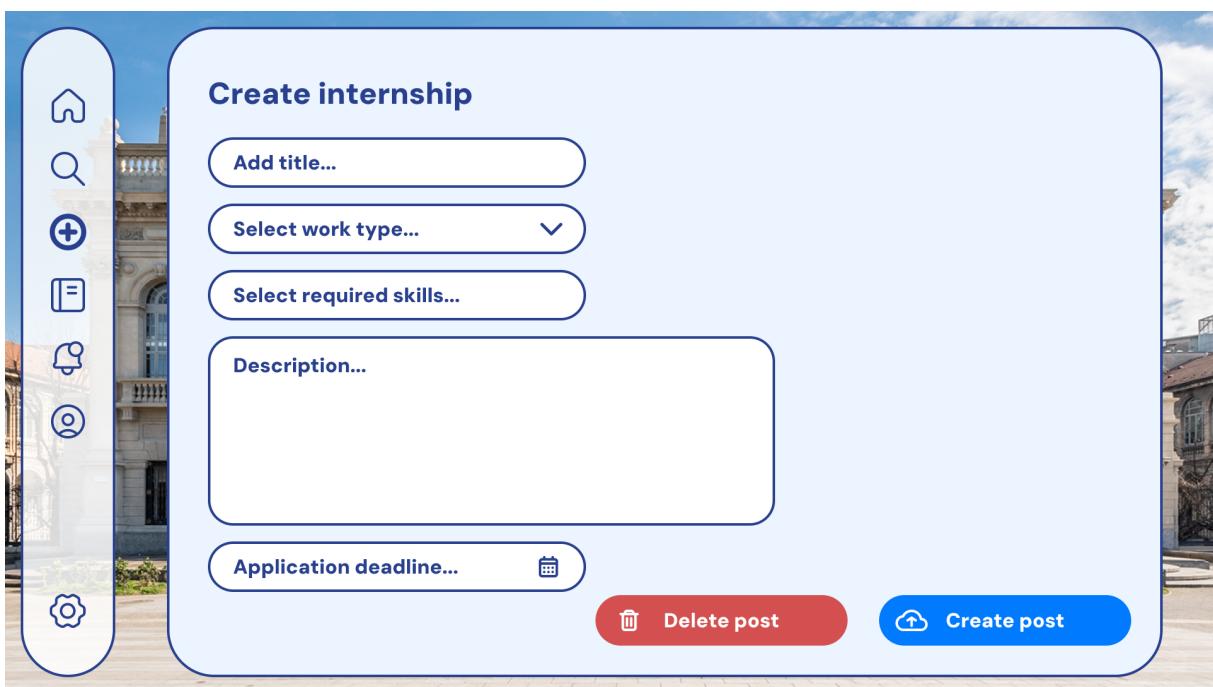


Figure 8: Internship creation prototype page

The picture [8] shows the prototype of the page that allows companies to create and post about an internship.

In this page the company can add all the required information that allows the system to select the suitable students and notify them.

4 Requirement traceability

5 Implementation, integration and test plan

6 Effort spent

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Chapter	Effort
1	0 h
2	0 h
3	0 h
4	0 h
5	0 h

- Daniel Bonardi

Chapter	Effort
1	0 h
2	0 h
3	0 h
4	0 h
5	0 h

7 References

N-tier architectures

<https://dev.to/3bdelrahman>

<https://blog.nginx.org/blog>

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