



POLITECNICO MILANO 1863

Design Document

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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.

1.2 Scope

University students can access a wide range of internship offers to apply for. Additionally, they have the opportunity to be contacted directly by companies interested in their CVs. Companies use the platform to recruit students who best fit their needs. The matching between students and companies is facilitated by the recommendation system, and both parties can enhance their profiles by consulting the suggestions or statistics sections. The platform offers comprehensive management and monitoring of the entire selection process, ensuring both companies and students can track progress effectively. Furthermore, the platform enables universities to monitor the progress of their students' internships and intervene if any issues arise.

1.2.1 Main architectural choices

Given the high number of features and services that the platform intends to offer, it will be developed following a microservices model for optimal efficiency, resilience, better reuse and composability and cost-effectiveness.

This approach allows for independent scaling of individual components based on specific requirements, simplifying the implementation and testing process. It ensures efficient resource utilization by scaling only the necessary components, optimizing performance and cost-effectiveness. Additionally, microservices enhance flexibility and maintainability, as each service can be developed, deployed, and updated independently. This reduces the risk of system failures, as issues within one service are less likely to impact the entire system. Availability is also increased, as the failure or update of one component does not necessarily affect the whole system, but only a limited set of features may be temporarily unavailable.

This document provides an overview of the system's architectural design, detailing the components and their interactions. It also includes user interface mockups and outlines a comprehensive plan for the system's implementation, testing, and integration.

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
- **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

- RASD - Requirement Analysis and Specification Document
- S&C - Students and Companies
- CV - Curriculum Vitae
- API - Application Programming Interface
- RESTful APIs - Representational State Transfer APIs
- UI - User Interface
- UML - Unified Modeling Language
- SD - Sequence Diagram
- DBMS - DataBase Management System
- DB - DataBase

1.3.3 Abbreviations

- [R_i] - i-th Requirement
- [U_{Ci}] - i-th Use Case

1.4 Revision history

- Version 1.0 (07/01/2025)

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

- **Chapter 1 - Introduction:** introduces the system and its purpose, providing an overview of the main architectural choices
- **Chapter 2 - Architectural Design:** provides an in-depth overview of the system's architecture, detailing the high-level components and their interactions, component views, deployment views, component interfaces, runtime views, selected architectural styles and patterns, and other design decisions
- **Chapter 3 - User Interface Design:** shows a detailed overview of UIs with mockups
- **Chapter 4 - Requirements traceability:** provides mapping between requirements and design elements
- **Chapter 5 - Implementation, Integration and test Plan:** describes the order in which each component is implemented along with the integration and test plan
- **Chapter 6 - Effort Spent:** provides an overview of the time invested in the project for each component of the group, divided by chapter
- **Chapter 7 - References:** lists all the resources referenced and the tools used to realize the document

2. ARCHITECTURAL DESIGN

2.1 Overview: High-level components and their interaction

The system will serve the request from the client that contacts the server through the S&C web application UI.

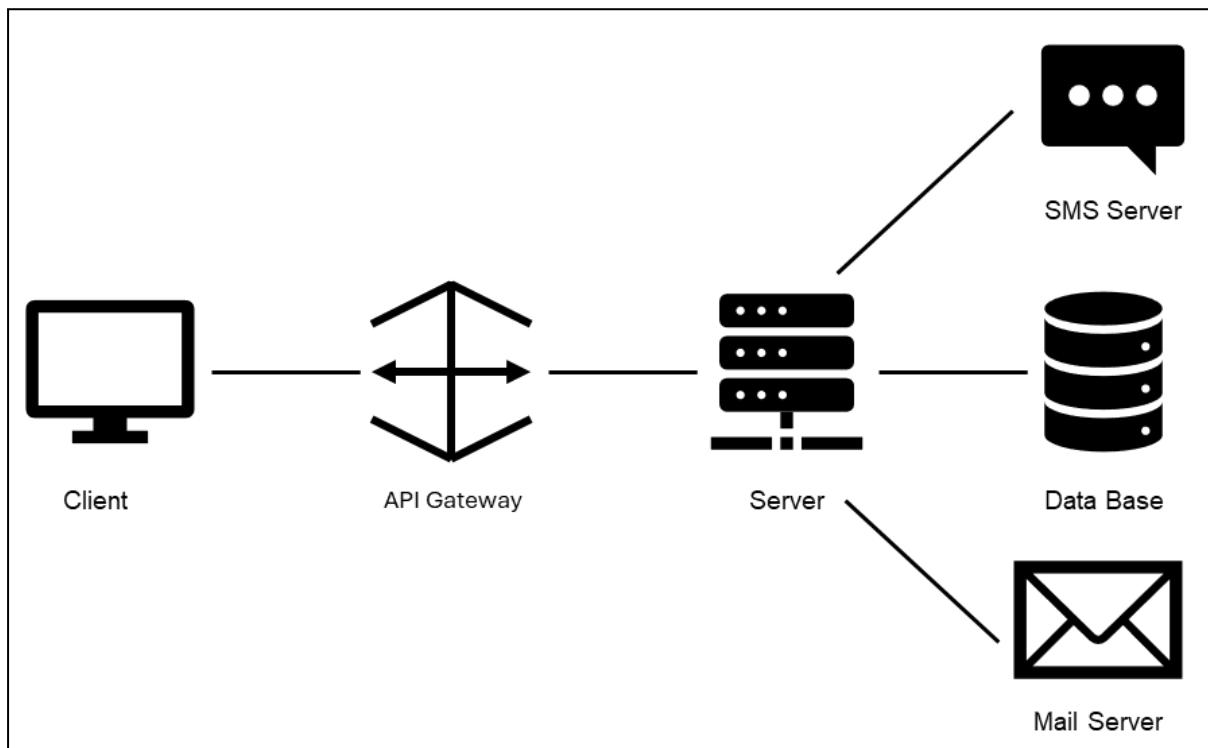


Figure 2.1: High-level components of the S&C platform

Whenever the **Client** sends a request to the system, the request is forwarded to the **API Gateway** which processes it and redirects it towards the service entitled to handle it. Successively, the **Server** may need to interact with other services, such as:

- **Database:** the server can interact with a component of the distributed DB to use the result of a query in order to process the client request
- **Mail server:** the server can interact with a mail server to communicate with the user in one of the following cases:
 - to confirm the User mail address during the registration procedure
 - to notify a User about an event (option enabled by default, can be disabled)
- **SMS server:** the server can interact with an SMS server to communicate with the user to notify a User about an important event (option disabled by default, can be enabled)

2.2 Component view

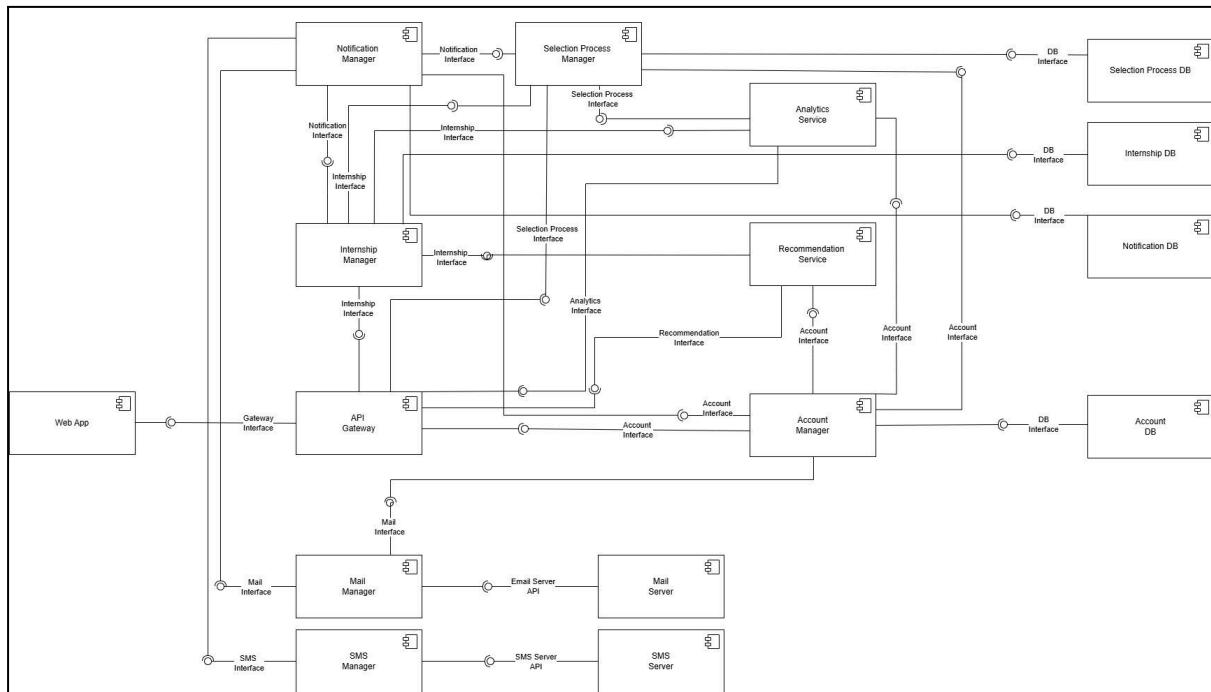


Figure 2.2: Component View diagram

The components in the diagram are explained in detail as follows:

Web App

It represents the website used by each type of user of the system. By using the Gateway Interface, it sends requests to the API Gateway that has the responsibility of redirecting each request to the right microservice that can handle it. Each user would have to use an arbitrary web browser to access it.

API Gateway

The API Gateway routes API requests to the correct components, including the Account Manager, Internship Manager, Selection Process Manager, Recommendation Service and Analytics Service.

Account Manager

The Account Manager is responsible for the creation, updating, and deletion of user accounts, as well as student CV uploads and updates. It connects to the Account DB for storing and managing account data. Also it connects to Notification Manager, Recommendation Service and Mail Manager.

Internship Manager

The Internship Manager handles all actions related to the internships, including creation, updates, filtering, applications and comments. It allows companies to manage their offers and students to apply or filter available internships. It connects to the Internship DB for storing internship data, the Notification Manager for sending updates, the Selection Process Manager for linking internships to selection workflows, the Recommendation Service to allow the visualization of recommendations and to the Analytics Service. It also allows universities to manage their students' internships.

Selection Process Manager

The Selection Process Manager controls the selection workflow for internships, including evaluations and final decisions. It connects to the Internship Manager for linking internships to selection workflows, the Notification Manager for notifying relevant parties, the Account Manager, the Analytics Service, and the Selection Process DB for storing selection data.

Notification Manager

The Notification Manager is responsible for sending notifications to students, companies, and universities regarding applications, selection processes, and internships. Through the Notification Interface it connects to the Selection Process Manager and the Internship Manager. Additionally, it connects to the Account Manager, the Mail Manager and SMS Manager to allow users to receive notifications through external channels outside the platform. It also connects with the Notification DB.

Mail Manager

The Mail Manager handles the generation and management of emails sent to users. It ensures that users receive an email for every notification generated by the Notification Manager, such as updates on applications, selection processes, and internships. Additionally, it manages email confirmations during the registration process to verify user email addresses. It is connected to Notification Manager, Account Manager and Mail Server.

SMS Manager

Handles the generation and management of SMS messages sent to users. It ensures that users receive an SMS for every notification generated by the Notification Manager, such as updates on applications, selection processes, and internships.

Analytics Service

The Analytics Manager processes feedback and other data to generate insights and refine suggestions and statistics. It connects to the Selection Process Manager for accessing feedback, the Account Manager and the Internship Manager for analyzing ongoing internships and CVs.

Recommendation Service

The Recommendation Service processes data from user profiles and internship data to generate relevant internship suggestions. It generates and sends recommended candidates for companies and recommended internships to students. It connects to the Internship Manager and to the Account Manager.

Account DB

The Account DB stores user credentials and profiles. It is accessed by the Account Manager for managing account data.

Internship DB

The Internship DB stores data related to internship offers and applications. It is accessed by the Internship Manager for managing internships.

Selection Process DB

The Selection Process DB is accessed by the Selection Process Manager for the storage of selection-related workflows.

Notification DB

The Notification DB stores data related to notification sent to the user. It is accessed by the Notification Manager.

Mail Server

The Mail Server is responsible for delivering emails to users. It processes requests from the Mail Manager and ensures the dispatching of emails. This includes notification emails triggered by the Notification Manager and registration confirmation emails from the Mail Manager.

SMS Server

The SMS Server is responsible for delivering SMS to users. It processes requests from the SMS Manager and ensures the delivery of SMS. This includes notification SMS triggered by the Notification Manager.

2.3 Deployment view

This deployment diagram illustrates how the system's components are distributed across physical servers and devices. Each critical component is isolated in its own container, allowing independent scaling and maintenance.

The system is structured into layers: the client layer hosts the Web App for user interactions, the API Gateway routes requests to application servers, application servers manage core services such as: authentication, recommendations, notifications, and analytics. In the end database servers handle storage, and the Gmail server supports email notifications to users. Each device in the deployment view is replicated in order to reach the availability requirements defined in the RASD. Moreover, each manager and service is equipped with a dedicated load balancer to distribute traffic evenly across all its replicates. However, to maintain clarity and avoid overcomplicating the diagram, these load balancers have been omitted from the visualization.

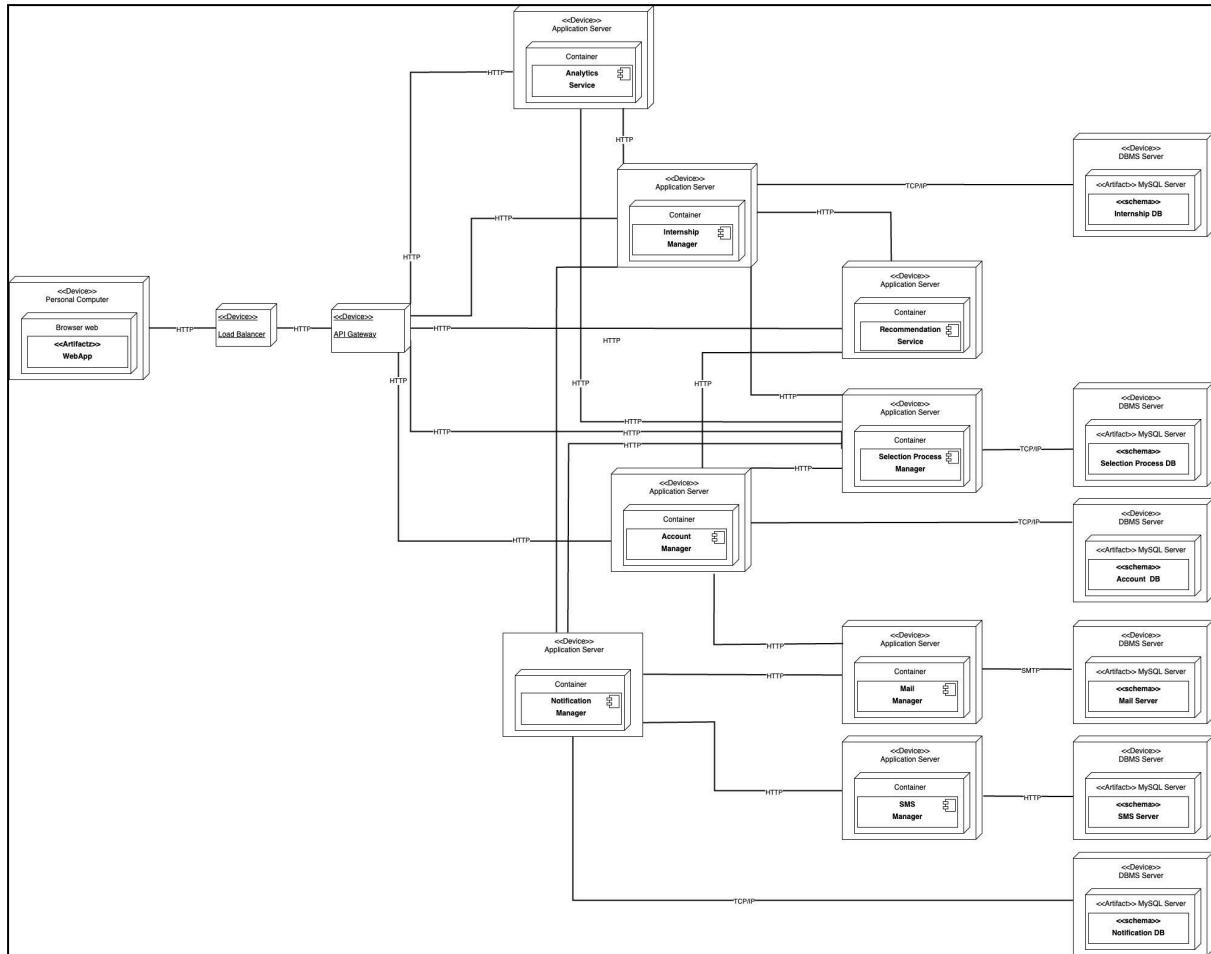


Figure 2.3: Deployment View diagram

2.4 Component interfaces

The section is a summary of all the methods provided by each component, including name, signature and returned object. From the lists are excluded the trivial methods to get from the DBs the data needed to populate the User Interfaces, but are included all the methods used in the Runtime View section.

Note: the possible responses also include the error accessing the database (code 500)

2.4.1 Account Manager

Account Interface

POST: “/api/account/register-student”

- **Purpose:** register a student to the S&C platform
- **Signature:** void registerStudent>Email email, String password, StudentInfo info, File CV
 - Response 201: student registered successfully
 - Response 400: incomplete or invalid data

POST: “/api/account/register-company”

- **Purpose:** register a company to the S&C platform
- **Signature:** void registerCompany>Email email, String password, CompanyInfo info
 - Response 201: company registered successfully
 - Response 400: incomplete or invalid data

POST: “/api/account/register-university”

- **Purpose:** register a university to the S&C platform
- **Signature:** void registerUniversity>Email email, String password, UniversityInfo info
 - Response 201: university registered successfully
 - Response 400: incomplete or invalid data

POST: “/api/account/login”

- **Purpose:** access the user to their personal account
- **Signature:** void login>Email email, String password
 - Response 200: user logged in successfully
 - Response 404: wrong email or password

POST: “/api/account/update-student”

- **Purpose:** update the information of a student account
- **Signature:** void updateStudent>Long studentID, String password, StudentInfo info, File CV
 - Response 201: student profile updated successfully
 - Response 400: incomplete or invalid data

POST: “/api/account/update-company”

- **Purpose:** update the information of a company account
- **Signature:** void updateCompany(Long companyID, String password CompanyInfo info)
 - Response 201: company profile updated successfully
 - Response 400: incomplete or invalid data
 -

POST: “/api/account/update-university”

- **Purpose:** update the information of a student account
- **Signature:** void updateUniversity(Long universityID, String password, UniInfo info)
 - Response 201: university profile updated successfully
 - Response 400: incomplete or invalid data

GET: “/api/account/CV-list”

- Purpose: retrieve the CVs of the list of students provided as input (in the same order)
- Signature: List<File> getStudentsCV(List<Long> studentIDList)
 - Response 200: CVs retrieved successfully
 - Response 404: student not found

GET: “/api/account/all-CV”

- **Purpose:** retrieve all the CVs in the database
- **Signature:** List<File> getAllStudentsCV()
 - Response 200: CVs retrieved successfully
 - Response 404: student not found

GET: “/api/account/student-info”

- **Purpose:** retrieve the info of the student provided as input
- **Signature:** StudentInfo getStudentInfo(Long studentID)
 - Response 200: student info retrieved successfully
 - Response 404: student not found

GET: “/api/account/company-info”

- **Purpose:** retrieve the info of the company provided as input
- **Signature:** CompanyInfo getCompanyInfo(Long companyID)
 - Response 200: company info retrieved successfully
 - Response 404: company not found

2.4.2 Internship Manager

Internship Interface

POST: “/api/internship/upload”

- **Purpose:** upload a new internship offer
- **Signature:** void uploadOffer(Long companyID, Position position, OfferInfo info)
 - Response 201: offer uploaded successfully
 - Response 400: incomplete or invalid data

POST: “/api/internship/update”

- **Purpose:** update the info of an internship offer
- **Signature:** void updateOffer(Long internshipID, OfferInfo info)
 - Response 201: internship offer updated successfully
 - Response 400: incomplete or invalid data

GET: “/api/internship/internship-info”

- **Purpose:** retrieve the info of the list of internship provided as input (in the same order)
- **Signature:** List<InternshipInfo> getInternshipsInfo(List<Long> internshipIDList)
 - Response 200: info retrieved successfully
 - Response 404: internship not found

GET: “/api/internship/internship-status”

- **Purpose:** retrieve the status of the internship provided as input
- **Signature:** InternshipStatus getInternshipsStatus(Long internshipID)
 - Response 200: status retrieved successfully
 - Response 404: internship not found

GET: “/api/internship/internship-ongoing”

- **Purpose:** retrieve the “OnGoing” status internship list associated to a student
- **Signature:** List<Internship> getOnGoingInternships(Long studentID)
 - Response 200: internships retrieved successfully
 - Response 404: internship not found

GET: “/api/internship/all-internship”

- **Purpose:** retrieve all the internships in the database
- **Signature:** List<Internship> getAllInternshipOffers()
 - Response 200: internships retrieved successfully
 - Response 404: internship not found

GET: “/api/internship/internship-position”

- **Purpose:** retrieve the internships with the input position field
- **Signature:** List<Internship> getInternshipPerPosition(Position position)
 - Response 200: internships retrieved successfully
 - Response 404: position not found

GET: “/api/internship/filter”

- **Purpose:** retrieve the internships that satisfy the input filters
- **Signature:** List<Internship> filterInternships(List<Filter> filters)
 - Response 200: filtered internships retrieved successfully
 - Response 404: filtered internship not found

POST: “/api/internship/application”

- **Purpose:** register the student application to an internship offer
- **Signature:** void applyToInternship(Long studentID, Long companyID, Long internshipID)
 - Response 201: application registered successfully
 - Response 400: incomplete or invalid data

POST: “/api/internship/proposal”

- **Purpose:** register the proposal of an offer to a student
- **Signature:** void proposeInternship(Long studentID, Long companyID, Long internshipID)
 - Response 201: proposal registered successfully
 - Response 400: incomplete or invalid data

POST: “/api/internship/start-internship”

- **Purpose:** insert the student selected for the internship and update its status
- **Signature:** void startInternship(Long studentID, Long internshipID)
 - Response 201: internship started successfully
 - Response 404: no internship found

POST: “/api/internship/interrupt-internship”

- **Purpose:** interrupt the internship and update its status
- **Signature:** void interruptInternship(Long studentID, Long companyID, Long internshipID)
 - Response 201: internship interrupting successfully
 - Response 404: no internship found

POST: “/api/internship/student-comment”

- **Purpose:** upload a comment of the student on the internship
- **Signature:** void commentStudent(Long internshipID, Long studentID, Long universityID, String comment)
 - Response 201: internship interrupting successfully
 - Response 404: no internship found

POST: “/api/internship/company-comment”

- **Purpose:** upload a comment of the company on the student
- **Signature:** void commentCompany(Long internshipID, Long studentID, Long universityID, String comment)
 - Response 201: comment interrupting successfully
 - Response 404: no internship found

2.4.3 Selection Process Manager

Selection Process Interface

GET: “/api/selection/positive-SP”

- **Purpose:** retrieve the list of positive SP for internship with the input position
- **Signature:** List<SelectionProcess> getPositiveSP(Position position)
 - Response 200: SPs retrieved successfully
 - Response 404: position not found

POST: “/api/selection/accept-proposal”

- **Purpose:** accept the proposal and create a new selection process for the input student
- **Signature:** void acceptProposal(Long studentID, Long companyID, Long internshipID)
 - Response 201: proposal accepted successfully
 - Response 400: the internship offer is no more available

POST: “/api/selection/accept-application”

- **Purpose:** accept the proposal and creates a new selection process for the input student
- **Signature:** void acceptApplication(Long studentID, Long companyID, Long internshipID)
 - Response 201: application accepted successfully
 - Response 400: the student is already participating to an internship

POST: “/api/selection/submit-SQ”

- **Purpose:** submit the answer of the starting questionnaire by the student
- **Signature:** void submitSQ(Long studentID, Long companyID, Long internshipID, String answer)
 - Response 201: answer submitted successfully
 - Response 400: incomplete answer

POST: “/api/selection/evaluate-SQ”

- **Purpose:** evaluation of the answer to the starting questionnaire by the company
- **Signature:** void evaluateSQ(Long studentID, Long internshipID, Bool evaluation)
 - Response 201: questionnaire evaluated successfully
 - Response 400: error in the evaluation of the starting questionnaire

GET: “/api/selection/company-contact”

- **Purpose:** retrieve the contact of the company that published the internship
- **Signature:** CompanyInfo getCompanyContact(Long companyID, Long internshipID)
 - Response 200: company contact retrieved successfully
 - Response 400: the internship offer is no more available

GET: “/api/selection/student-contact”

- **Purpose:** retrieve the contact of the student in the selection process for the internship
- **Signature:** StudentInfo getStudentContact(Long studentID)
 - Response 200: student contact retrieved successfully
 - Response 400: the student is already participating to an internship

POST: “/api/selection/student-FQ”

- **Purpose:** submit the feedback of the student
- **Signature:** void submitStudentFQ(Long studentID, Long companyID, Long internshipID, String feedback)
 - Response 201: feedback submitted successfully
 - Response 400: incomplete feedback

POST: “/api/selection/company-FQ”

- **Purpose:** submit the feedback of the company
- **Signature:** void submitCompanyFQ(Long studentID, Long internshipID, String feedback)
 - Response 201: feedback submitted successfully
 - Response 400: incomplete feedback

POST: “/api/selection/finalize-company”

- **Purpose:** provide the result of the selection process
- **Signature:** void finalizeOffer(Long studentID, Long internshipID, Bool result)
 - Response 201: finalization registered successfully
 - Response 400: the student is already participating to an internship

POST: “/api/selection/finalize-student”

- **Purpose:** provide the evaluation of the final offer for the selection process
- **Signature:** void evaluateOffer(Long studentID, Long companyID, Long internshipID, Bool decision)
 - Response 201: decision registered successfully
 - Response 400: the internship offer is no more available

POST: “/api/selection/interrupt-process”

- **Purpose:** interrupt the selection process
- **Signature:** void interruptSelectionProcess(Long studentID, Long companyID, Long internshipID)
 - Response 201: selection process interrupted successfully
 - Response 400: the internship offer is no more available

2.4.4 Analytics Service

Analytics Interface

GET: “/api/analytics/CV-suggestions”

- **Purpose:** produce the suggestions to improve a student CV for a certain job position
- **Signature:** CVSuggestion getCVSuggestions(Long studentID, Position position)
 - 200: suggestions elaborated successfully
 - 404: no sufficient data for the suggestions elaboration

GET: “/api/analytics/offer-suggestions”

- **Purpose:** produce the suggestions to improve an internship offer for a certain position
- **Signature:** OfferSuggestion getOfferSuggestions(Long internshipID, Position position)
 - 200: suggestions elaborated successfully
 - 404: no sufficient data for the suggestions elaboration

GET: “/api/analytics/statistics”

- **Purpose:** produce the statistics concerning the input position
- **Signature:** Statistics getStatistics(Position position)
 - 200: statistics elaborated successfully
 - 404: no sufficient data for the statistics elaboration

2.4.5 Recommendation Service

Recommendation Interface

GET: “/api/recommendation/offer-recommendation”

- **Purpose:** produce the internship recommended for the input student
- **Signature:** List<Internship> getRecommendedOffers(Long studentID)
 - 200: recommendations elaborated successfully
 - 404: no sufficient data for the recommendations elaboration

GET: “/api/recommendation/student-recommendation”

- **Purpose:** produce the students recommended for the input internship
- **Signature:** List<Student> getRecommendedOffers(Long internshipID)
 - 200: recommendations elaborated successfully
 - 404: no sufficient data for the recommendations elaboration

2.4.6 Notification Manager

Notification Interface

POST: “/api/notification/notify-student”

- **Purpose:** notify a student with a (predefined) message associated with the input code
- **Signature:** void notifyStudent(Long studentID, int code)
 - 200: notification sent successfully
 - 404: wrong input code

POST: “/api/notification/notify-company”

- **Purpose:** notify a company with a (predefined) message associated with the input code
- **Signature:** void notifyCompany(Long studentID, int code)
 - 200: notification sent successfully
 - 404: wrong input code

POST: “/api/notification/notify-university”

- **Purpose:** notify a university with a (predefined) message associated with the input code
- **Signature:** void notifyUniversity(Long universityID, int code)
 - 200: notification sent successfully
 - 404: wrong input code

2.4.7 Mail Manager

Mail Interface

POST: “/api/email/confirm-mail”

- **Purpose:** send the (predefined) confirmation email to complete the user registration
- **Signature:** void confirmMail(Email email)
 - 200: email sent successfully
 - 404: user not found

POST: “/api/email/send-mail”

- **Purpose:** send a notification email containing the input body to the input email
- **Signature:** void sendMail(Email email, String body)
 - 200: email sent successfully
 - 404: user not found

2.4.8 SMS Manager

SMS Interface

POST: “/api/sms/send-SMS”

- **Purpose:** send a notification SMS containing the input text to the input number
- **Signature:** void sendSMS(CellNumber number, String text)
 - 200: SMS sent successfully
 - 404: user not found

2.5 Runtime view

Here are included the Sequence Diagrams representing the runtime behaviour of the system in the Use Cases defined in the RASD. The diagrams don't represent the flow of events concerning the requests of the pages of the web app, but the focus is on the interactions between the components to satisfy the requirements. This choice is made to avoid the increase of complexity of the SDs and to preserve their readability.

Note : interactions with the DBs are indicated with insert/update/select+"NameOfTheTable" and the parameters used to compose the query, to make clear the type of operation performed

[UC1] Student register

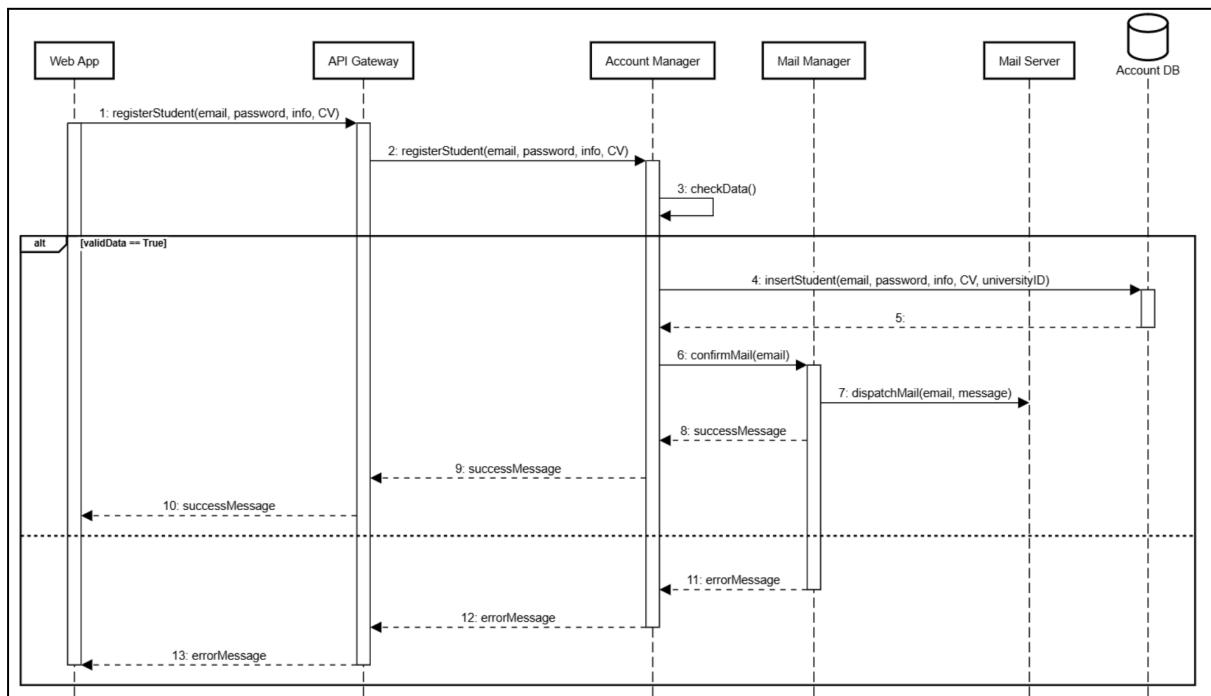


Figure 2.4: SD of the runtime view of UC1

Note: when the Account Manager checks the Data (3) it also checks if the domain of the mail provided by the student belongs to an already registered university, and if it is the case retrieves the universityID to perform the insert in the DB

[UC2] Company register

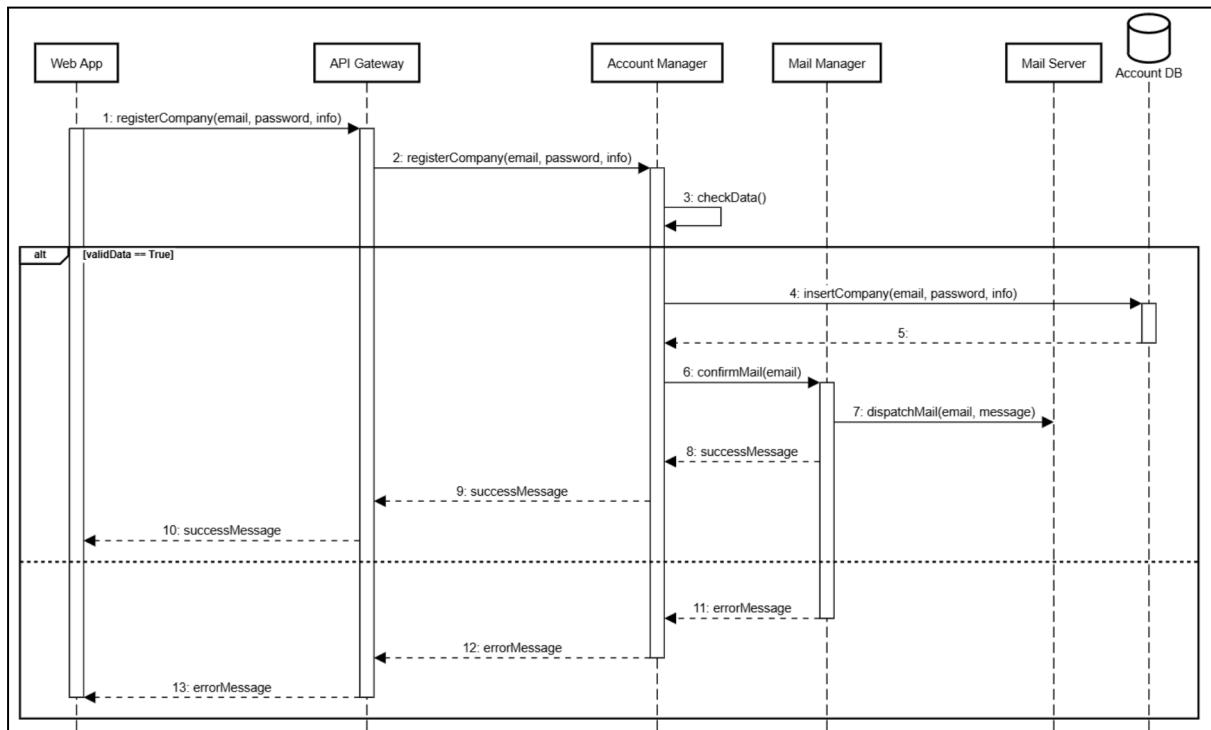


Figure 2.5: SD of the runtime view of UC2

[UC3] University register

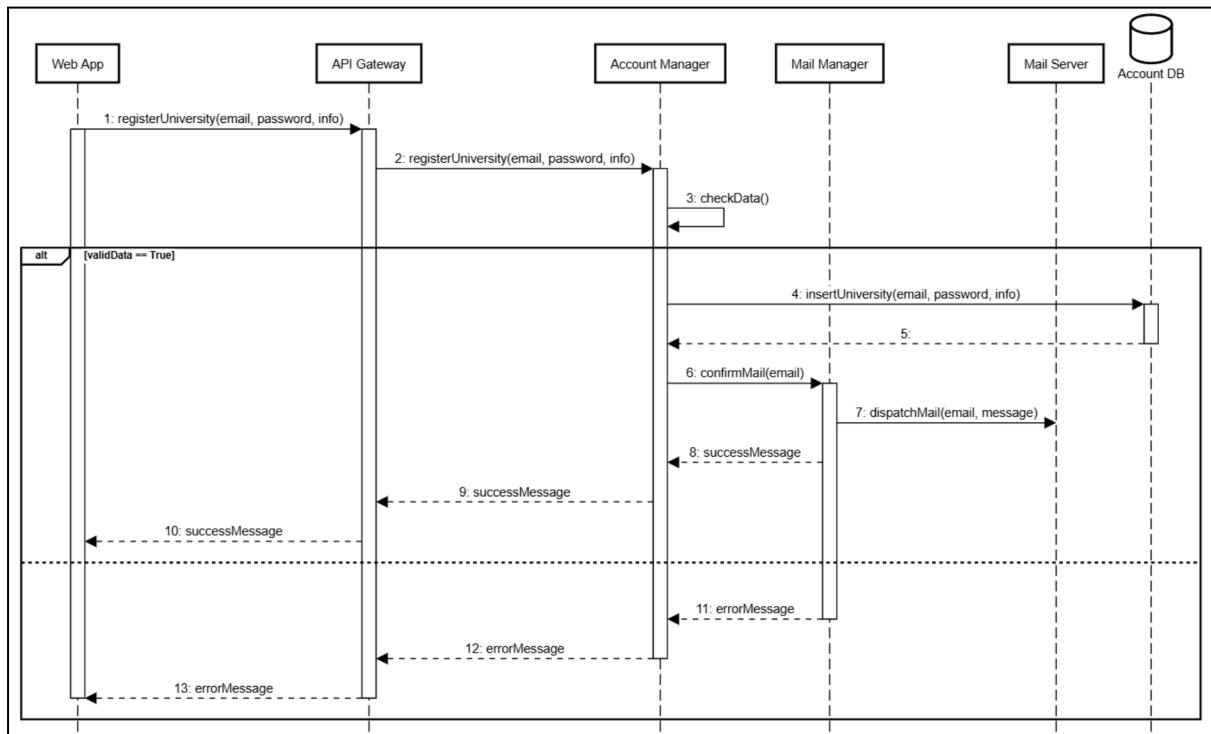


Figure 2.6: SD of the runtime view of UC3

[UC4] User login

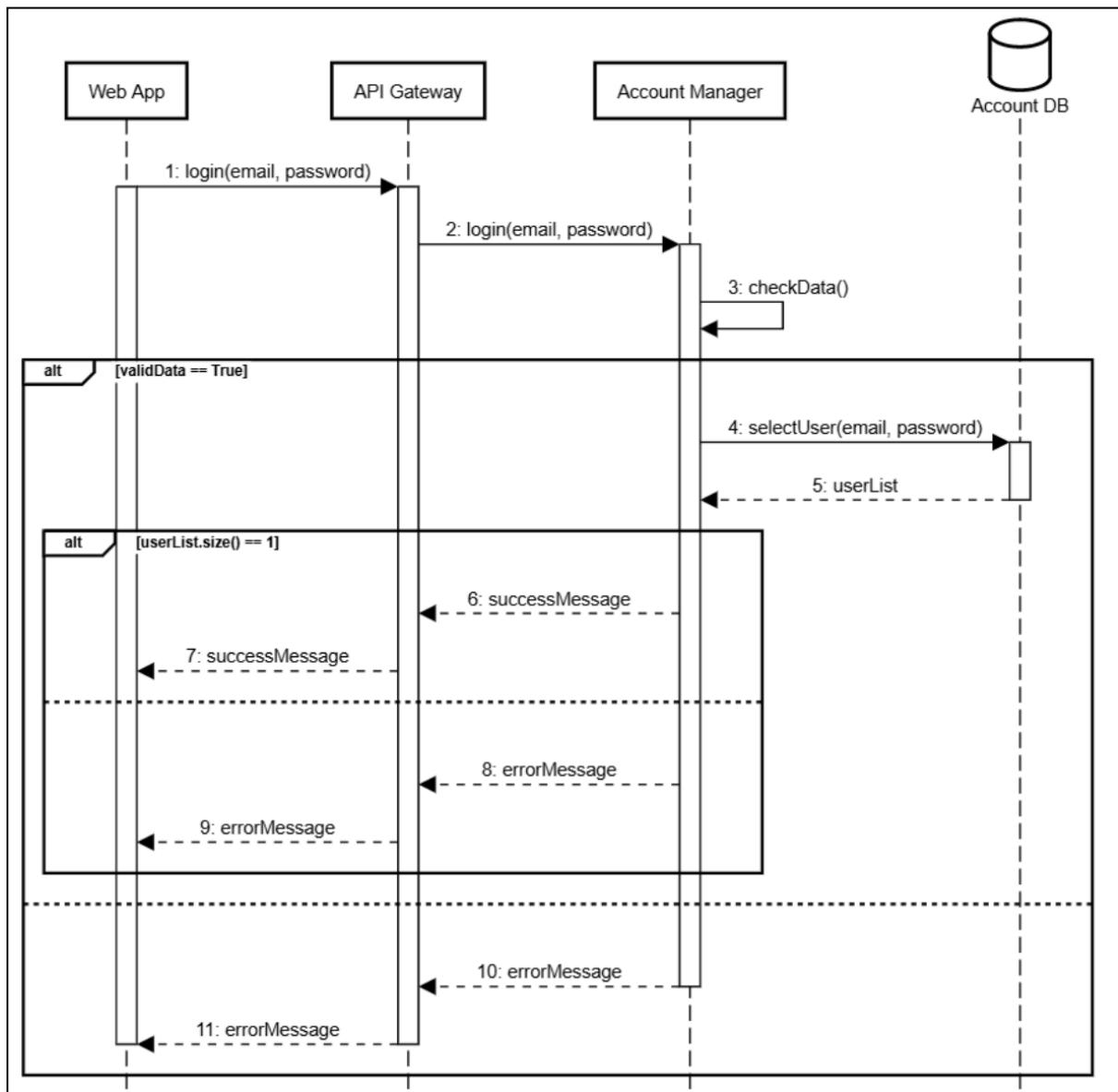


Figure 2.7: SD of the runtime view of the UC4

Note: the Account Manager retrieves the users with the input email and password, if there is a user with the credentials corresponding to the input, the user is logged in

[UC5] Student asks suggestions

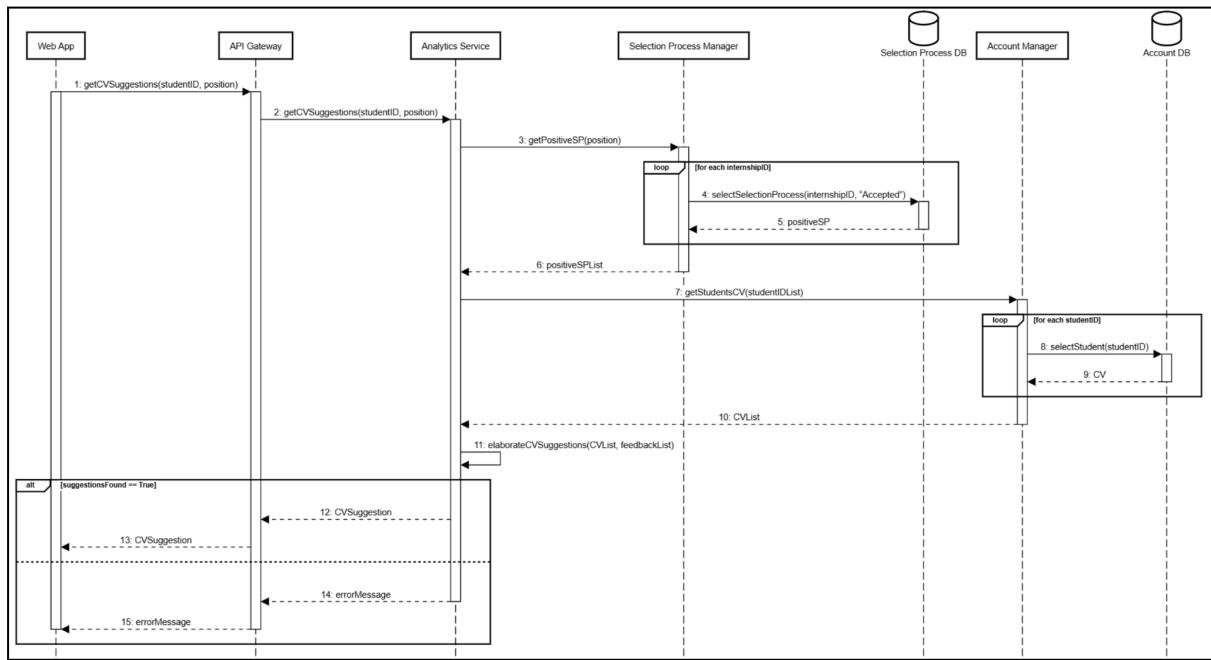


Figure 2.8: SD of the runtime view of the UC5

Note:

- between the messages 3 and 4, the Selection Process Manager contacts the Internship Manager to retrieve the list of internships with the selected position from the Internship DB, then return the internshipIDList o te Selection Process Manager; those messages are not shown in the SD for the sake of its readability
- between the messages 6 and 7, the Analytics Service extracts from the list of positive selection processes the IDs of the students that completed them and the related feedback questionnaires, then adds “studentID” to the list in order to retrieve all the CVs from the Account DB (the CV to “evaluate” and the CV used to elaborate the suggestions)

[UC6] Student updates profile

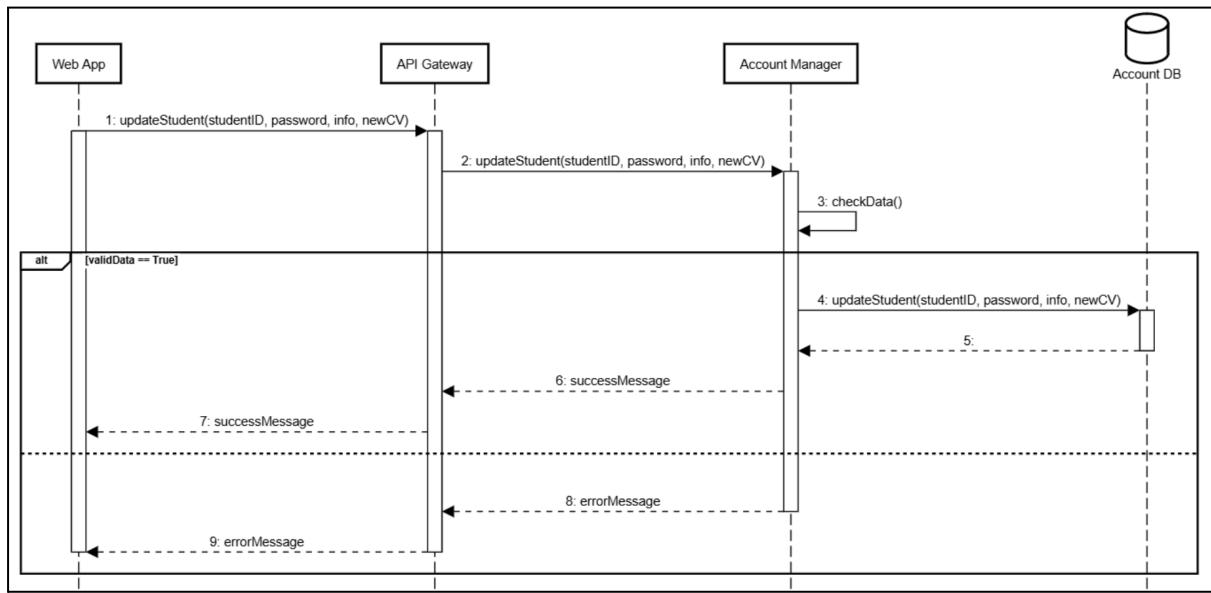


Figure 2.9: SD of the runtime view of UC6

[UC7] Company uploads offer

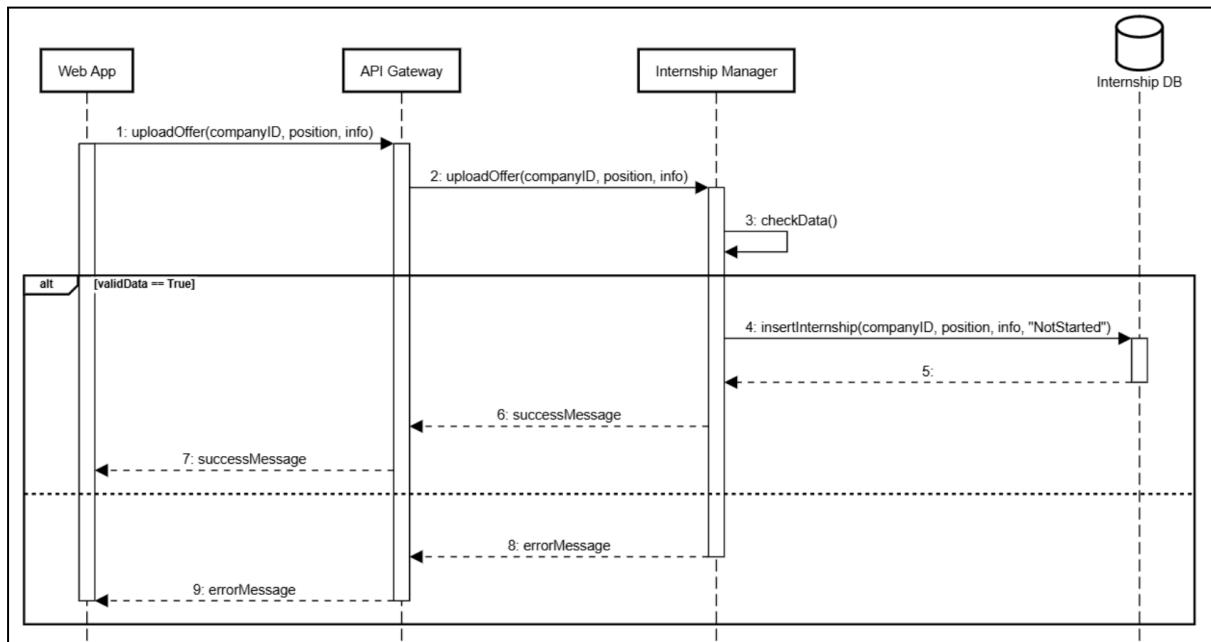


Figure 2.10: SD of the runtime view of the UC7

[UC8] Company visualizes suggestions

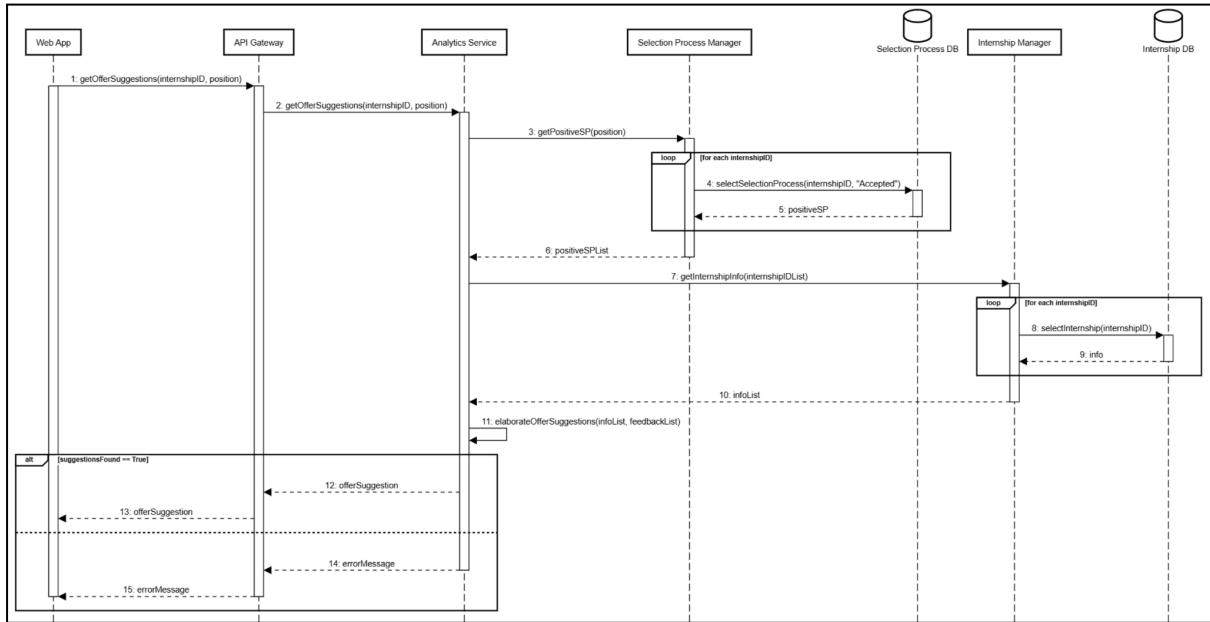


Figure 2.11: SD of the runtime view of the UC8

Note:

- between the messages 3 and 4, the Selection Process Manager contacts the Internship Manager to retrieve the list of internships with the selected position from the Internship DB, then return the internshipIDList o te Selection Process Manager; those messages are not shown in the SD for the sake of its readability
- between the messages 6 and 7, the Analytics Service extracts from the list of positive selection processes the IDs of the internship that they are correlated to and the related feedback questionnaires, then adds “internshipID” to the list in order to retrieve all the info from the Internship DB (the info to “evaluate” and the info used to elaborate the suggestions)

[UC9] Company updates offer

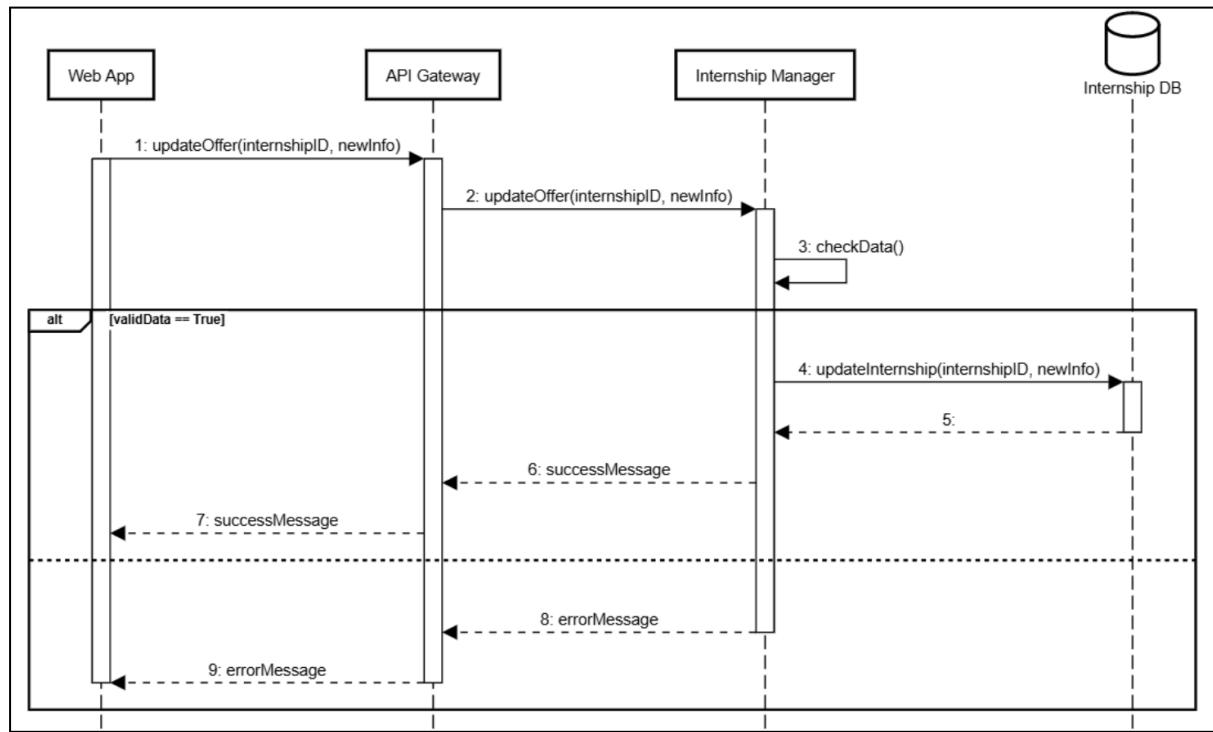


Figure 2.12: SD of the runtime view of UC9

[UC10] Student filters internship

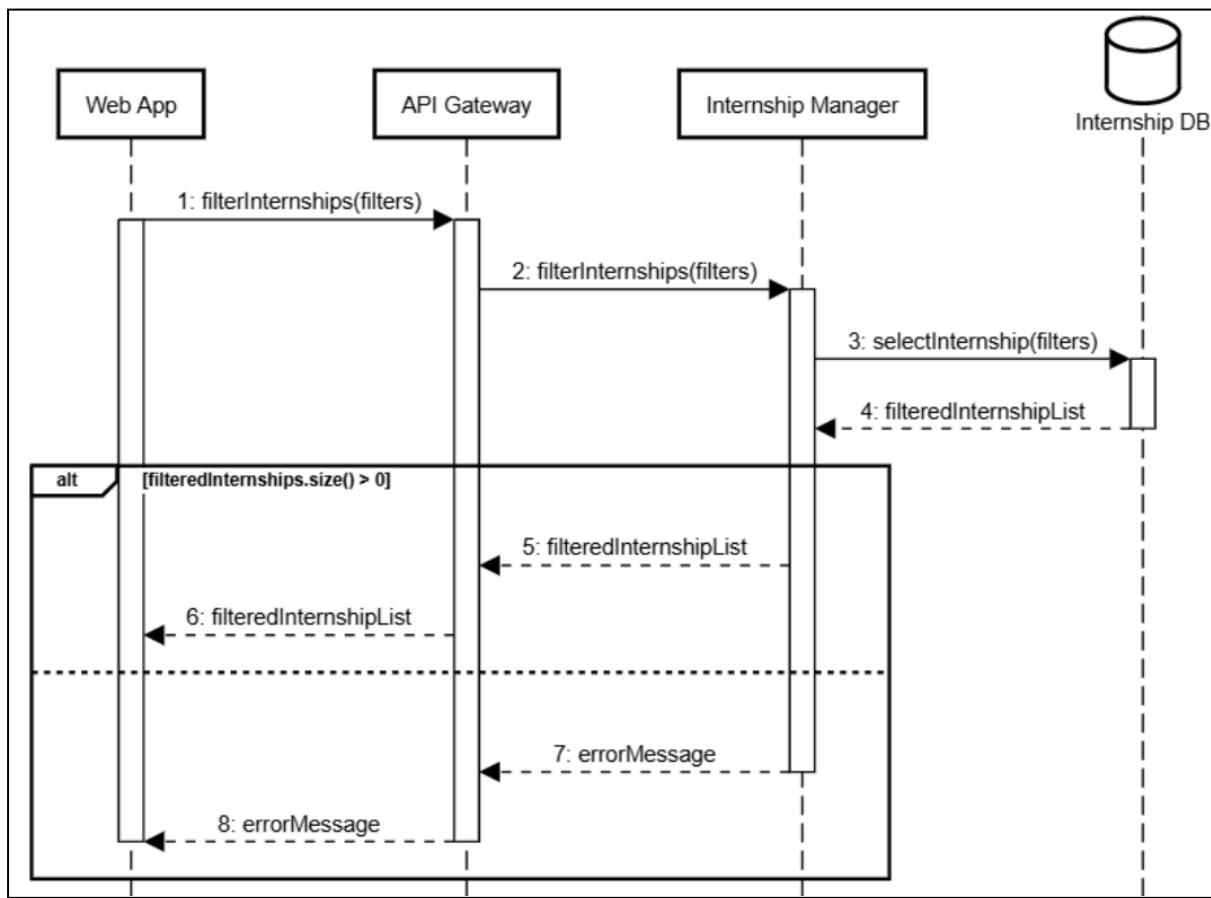


Figure 2.13: SD of the runtime view of UC10

[UC11] Student applies to internship

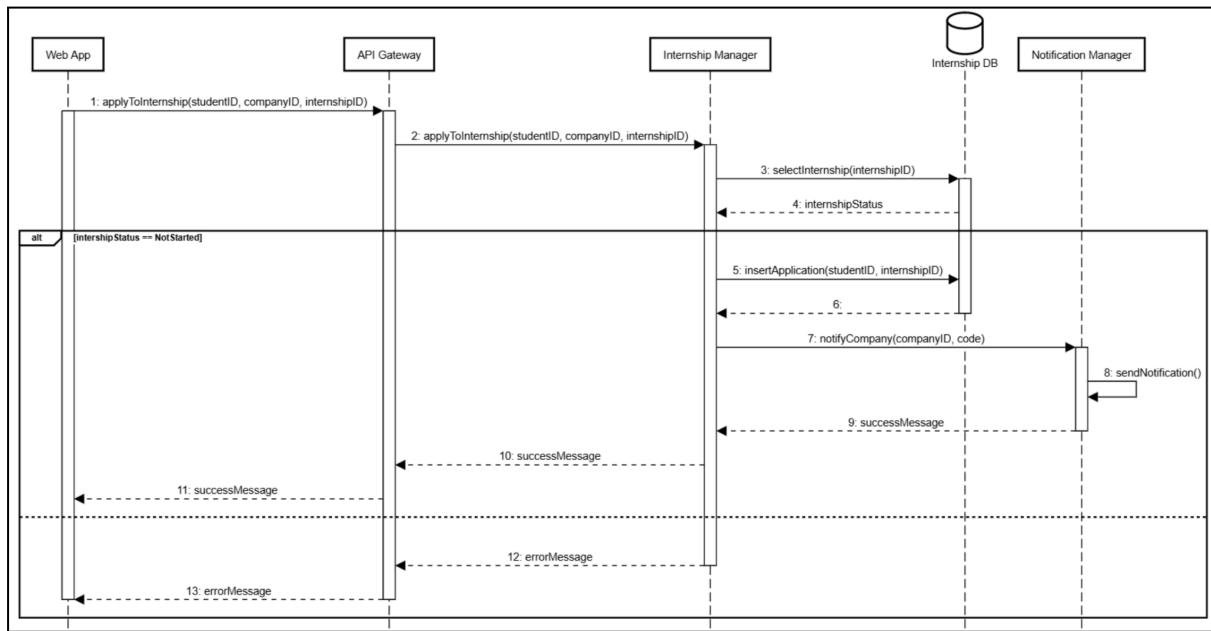


Figure 2.14: SD of the runtime view of UC11

[UC12] Student applies to recommended internship

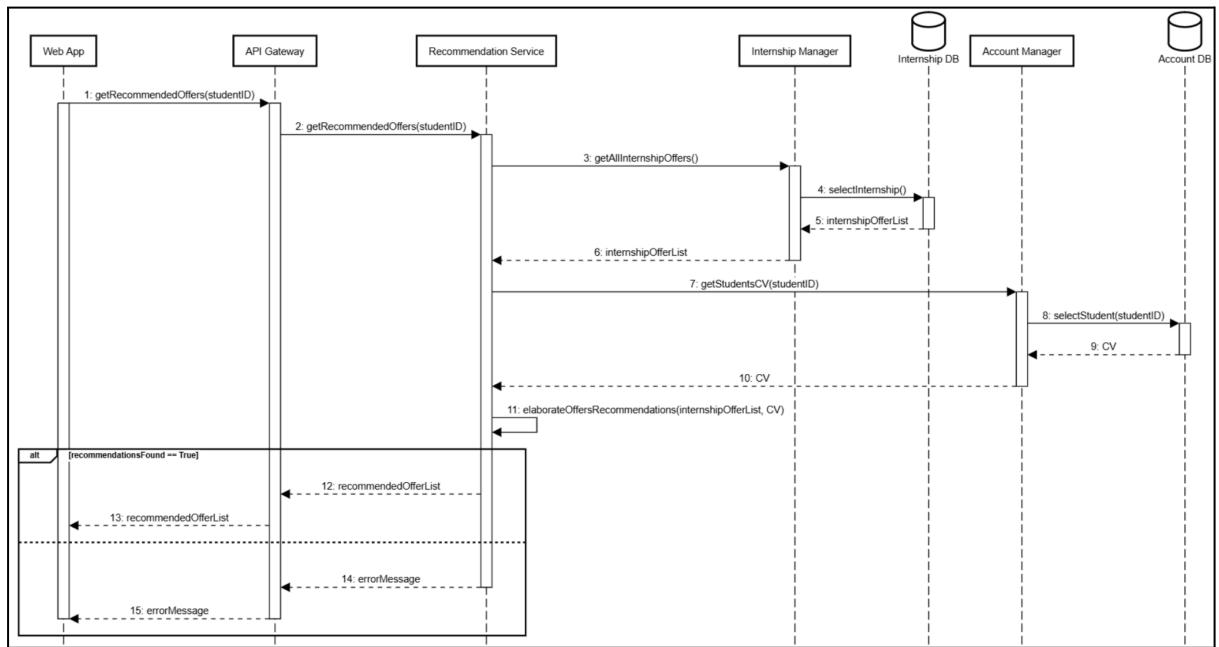


Figure 2.15: SD of the runtime view of the first part of the UC12

Note:

- the method at 7 needs a list as an input, so the studentID is a list with one element
- the sequence diagram represents only the elaboration of the recommended offers, the application to the offer is the same as the UC11 represented in the previous SD (Figure 2.14)

[UC13] Company offers internship to student

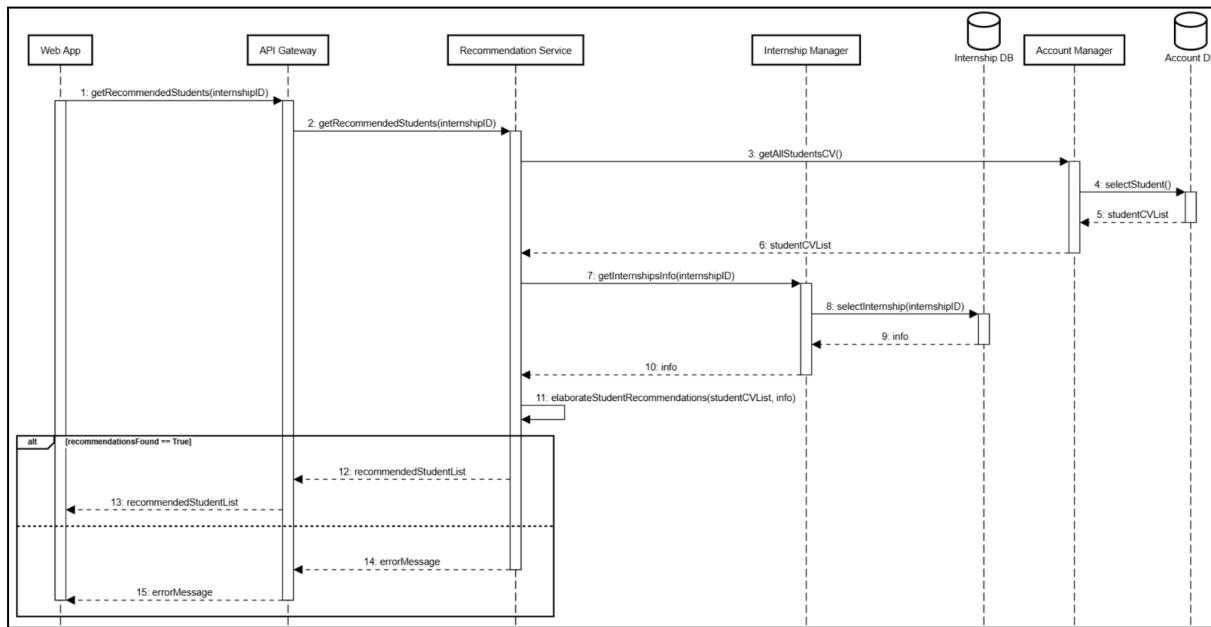


Figure 2.16: SD of the runtime view of the first part of the UC13

Note:

- the method at 7 needs a list as an input, so the internshipID is a list with one element
- the sequence diagram represents only the elaboration of the recommended students, the proposal of the offer is the dual of the UC11 represented in the previous SD (Figure 2.14)

[UC14] Student accepts internship proposal

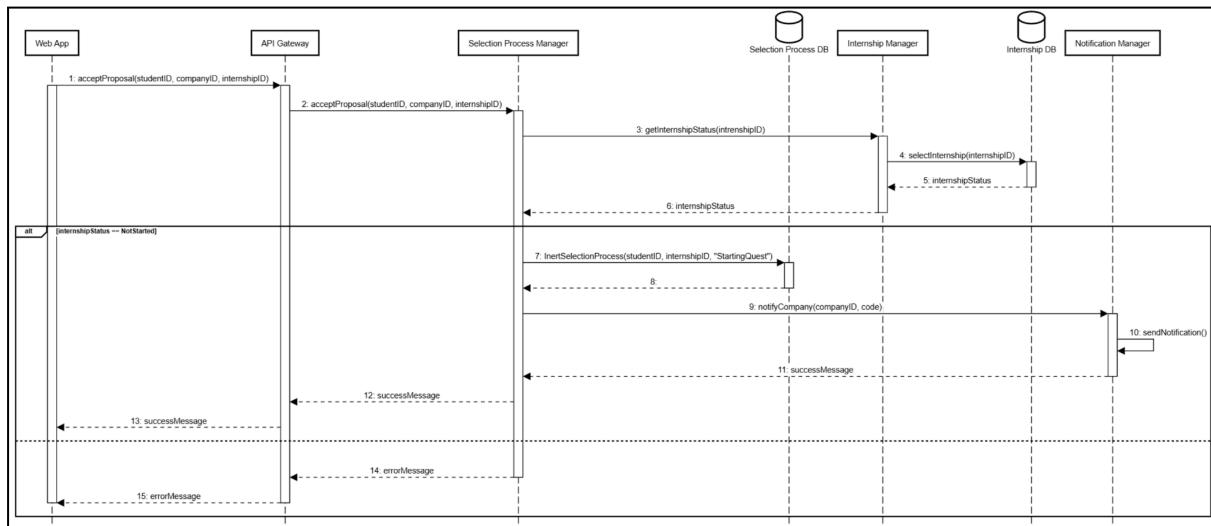


Figure 2.17: SD of the runtime view of the UC14

[UC15] Company accepts student application

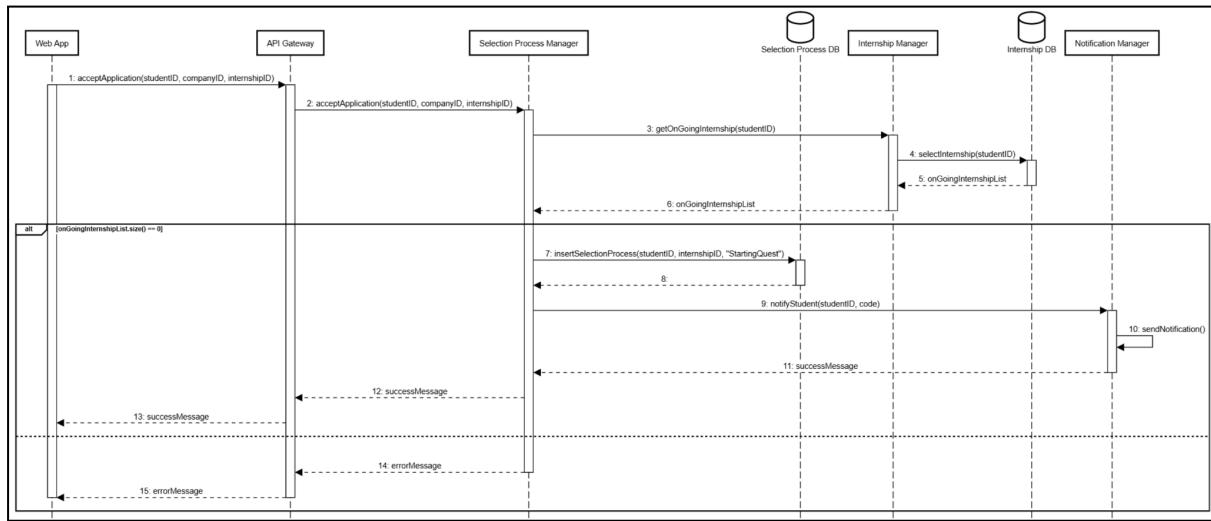


Figure 2.18: SD of the runtime view of the UC15

[UC16] Student fills out starting questionnaire

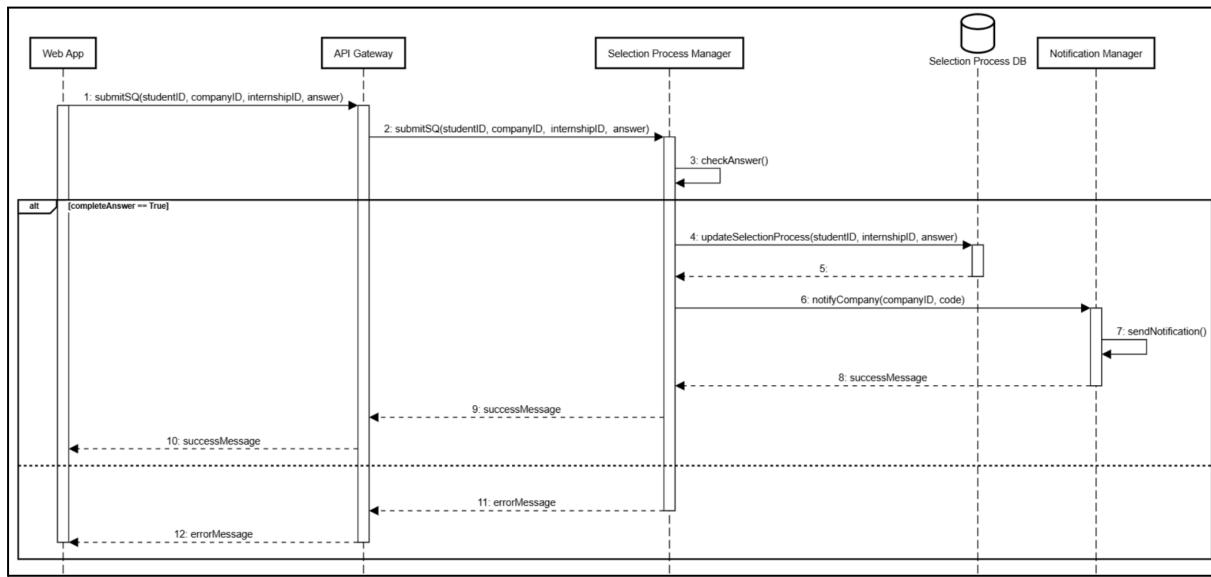


Figure 2.19: SD of the runtime view of UC16

[UC17] Company evaluates starting questionnaire

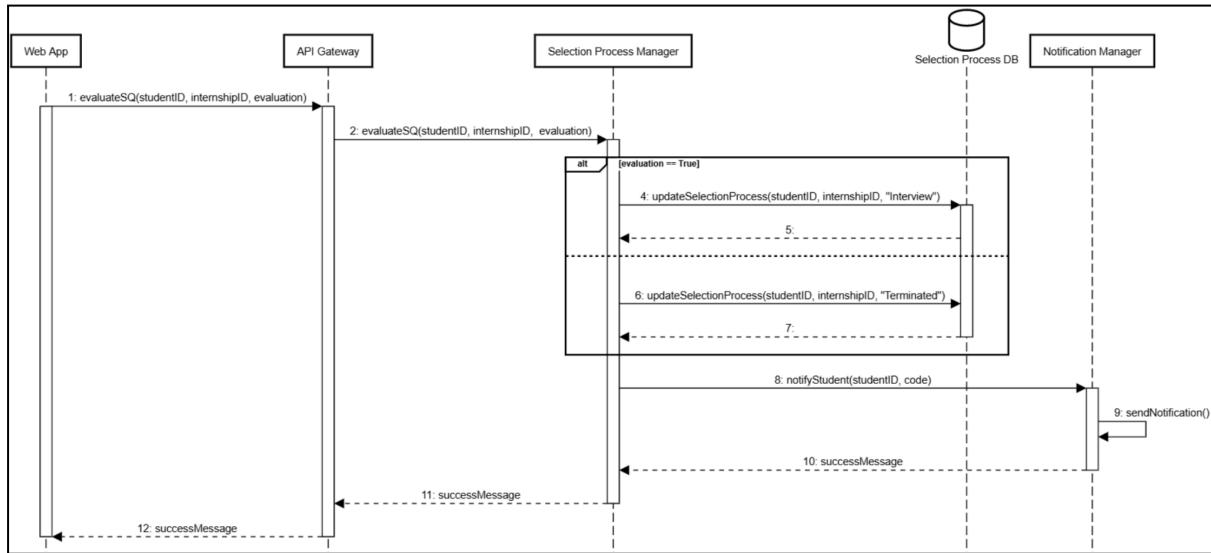


Figure 2.20: SD of the runtime view of UC17

Note: in case of positive evaluation the selection process proceeds to the interview stage (4), otherwise the student is rejected (6)

[UC18] Student visualizes company contact

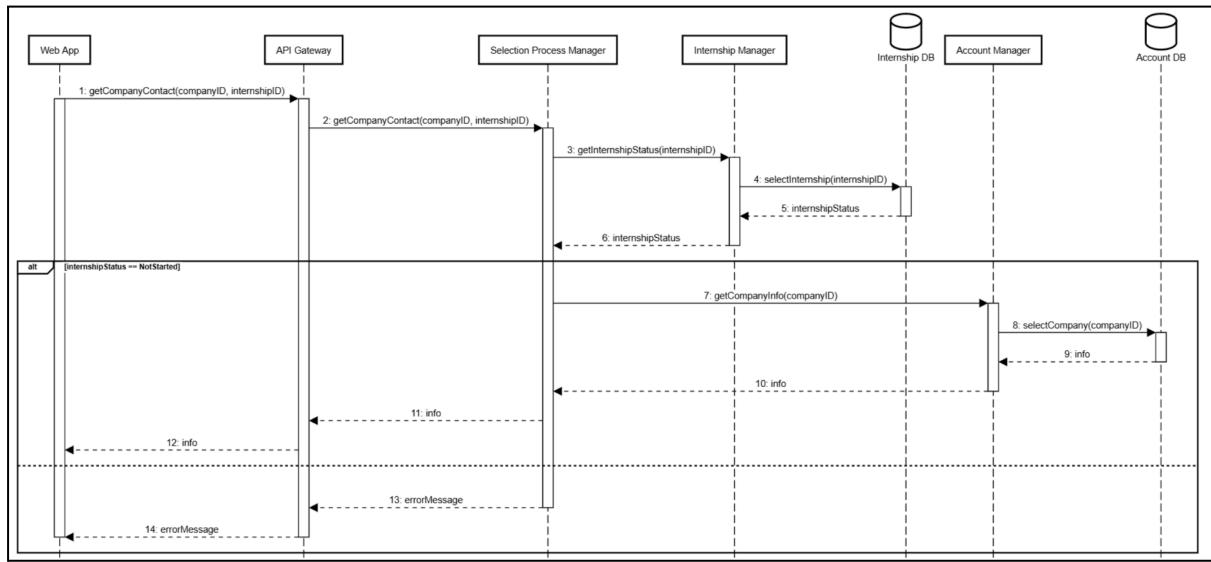


Figure 2.21: SD of the runtime view of UC18

[UC19] Company visualizes student contact

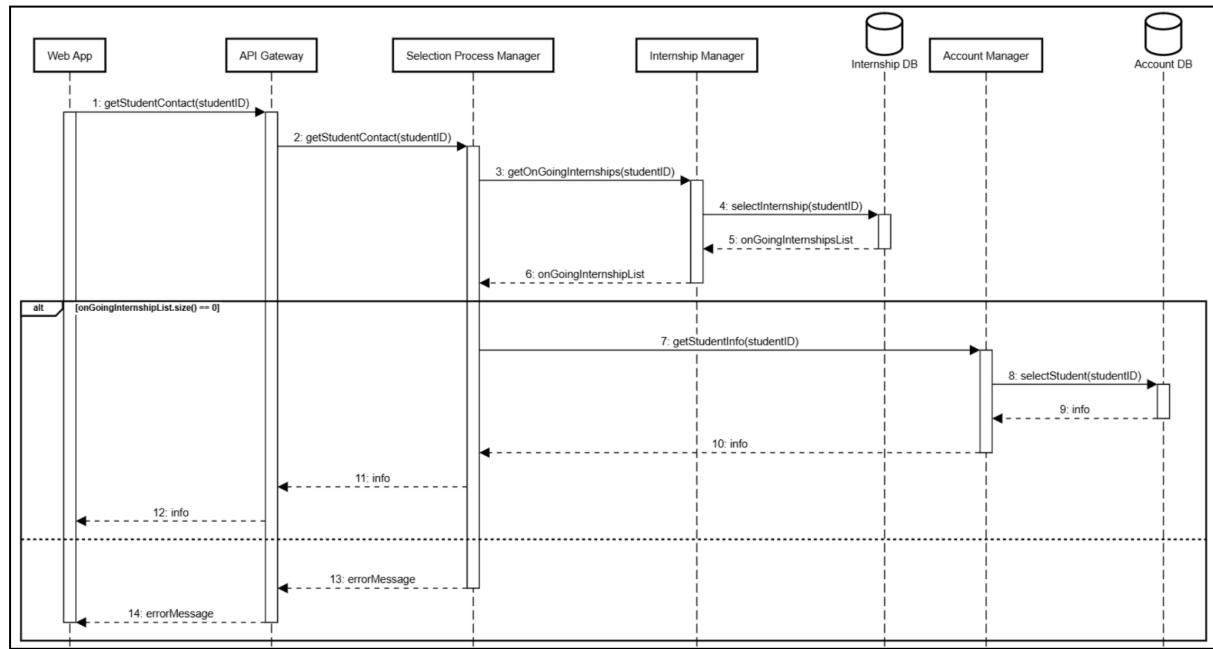


Figure 2.22: SD of the runtime view of UC19

[UC20] Student fills out feedback questionnaire

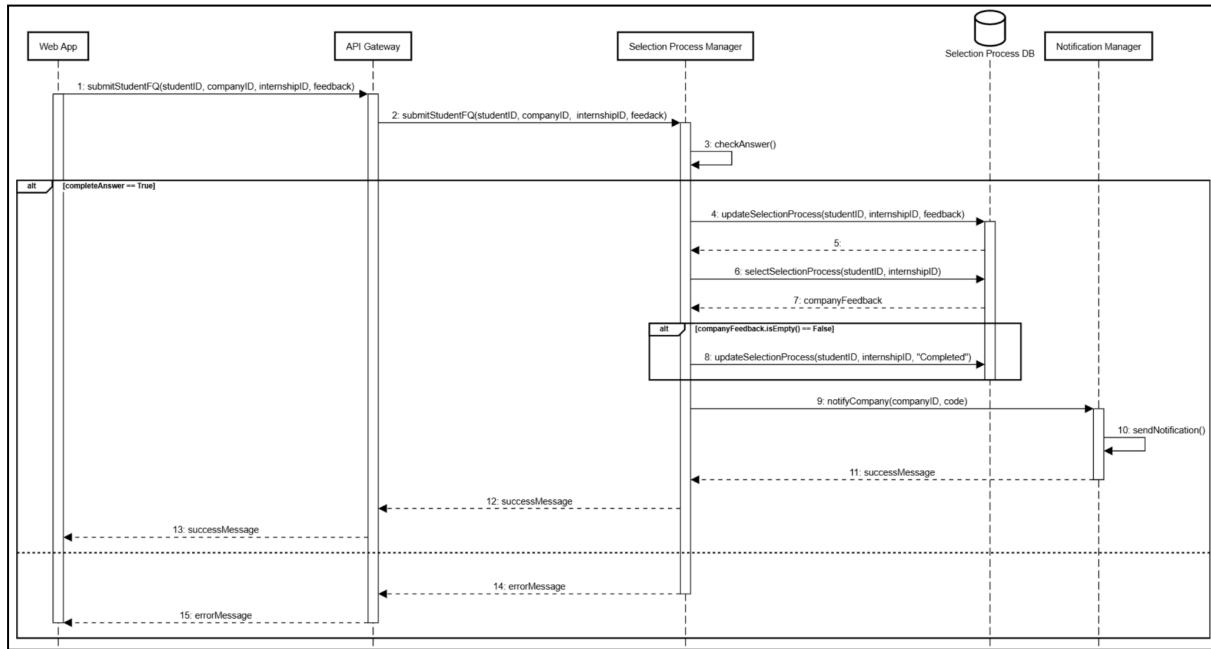


Figure 2.23: SD of the runtime view of UC20

Note: if the feedback form of the company has already been filled out, the selection process gets updated to “Completed” status (8) to proceed to the finalization.

[UC21] Company fills out feedback questionnaire

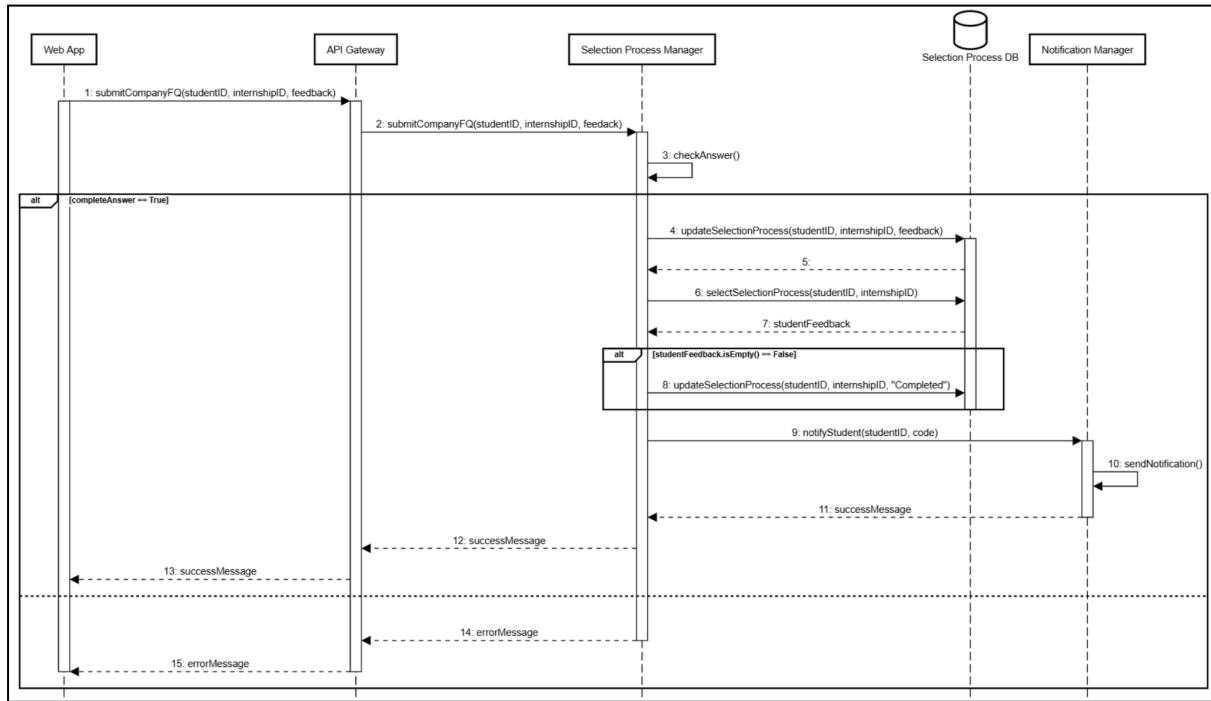


Figure 2.24: SD of the runtime view of UC21

Note: if the feedback form of the student has already been filled out, the selection process gets updated to “Completed” status (8) to proceed to the finalization

[UC22-UC23] Company finalizes the selection process

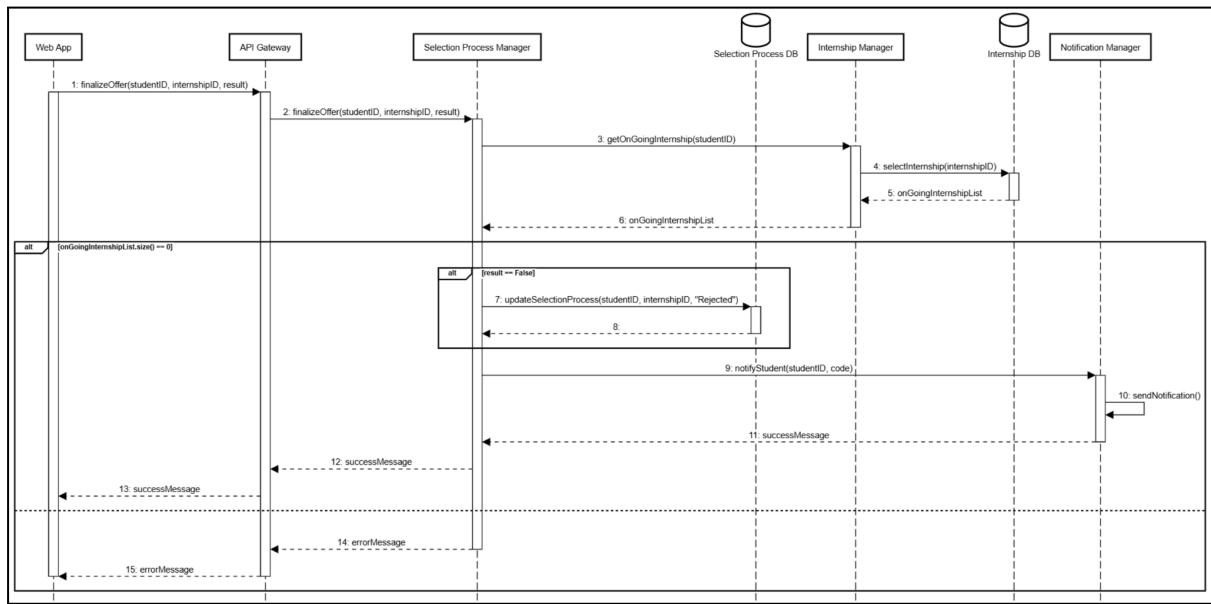


Figure 2.25: SD of the runtime view of UC22-UC23 generalization

[UC24-UC25] Student finalizes the selection process

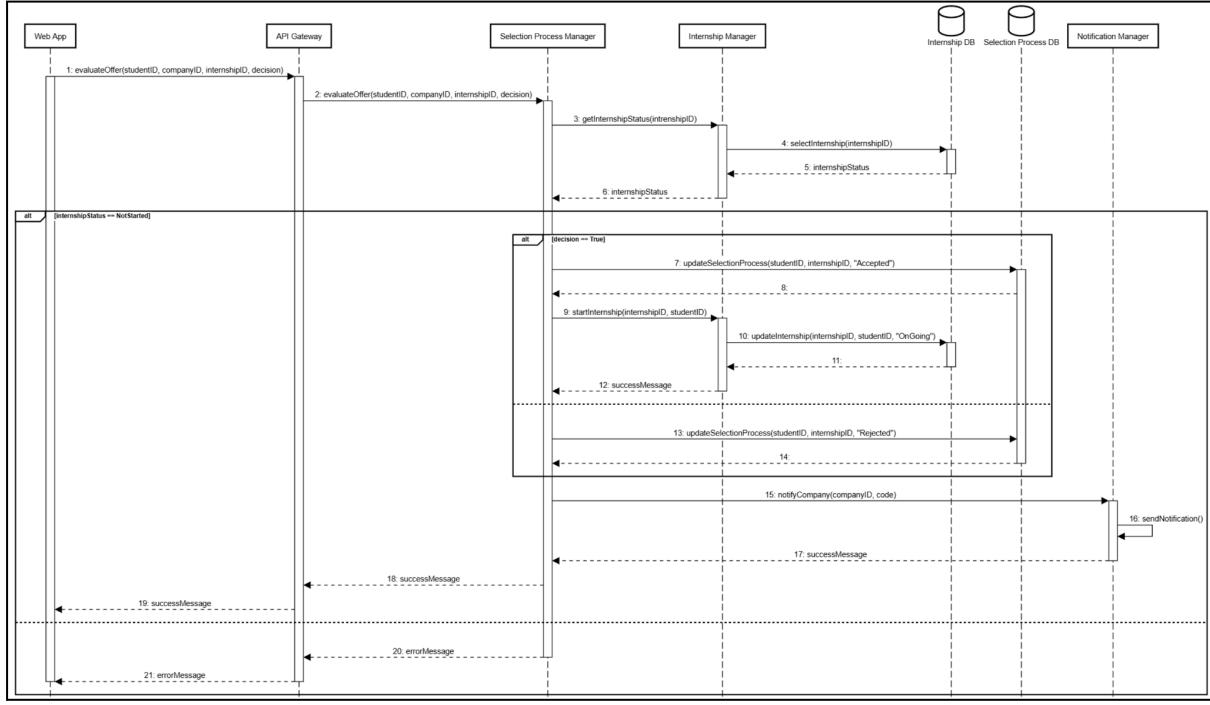


Figure 2.26: SD of the runtime view of UC24-UC25 generalization

Note: in case of offer accepted, the system updates the “expired” field of the Application and Proposal tuple in the DB involving the student and the “status” field (as “Rejected”) of the other SelectionProcess tuple involving the same student and the same internships, then notifies all the companies and student involved; those passages are not shown in the SD for the sake of the diagram readability

[UC26] Student interrupts the selection process

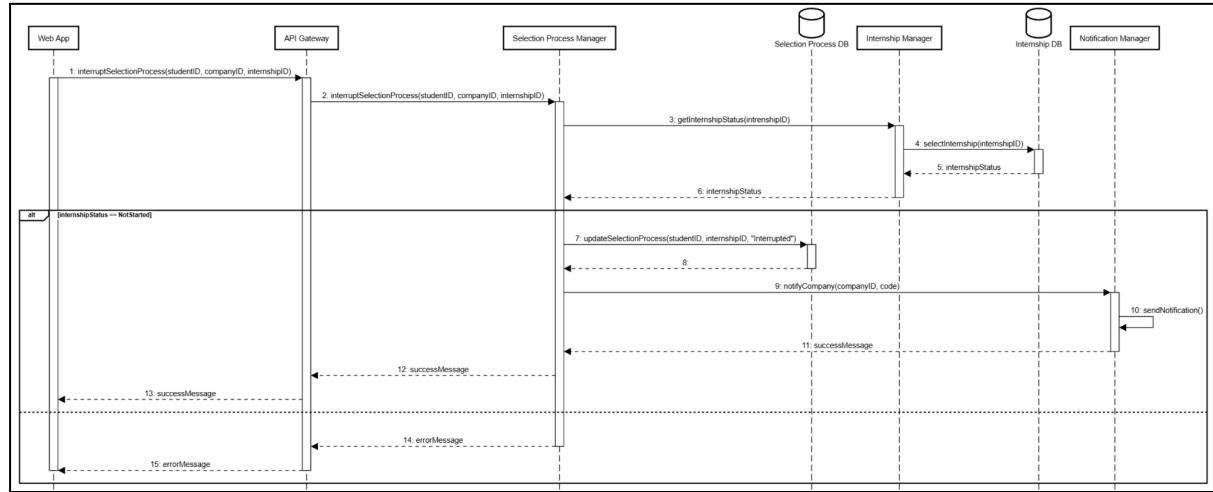


Figure 2.27: SD of the runtime view of UC26

[UC27] Student comments internship

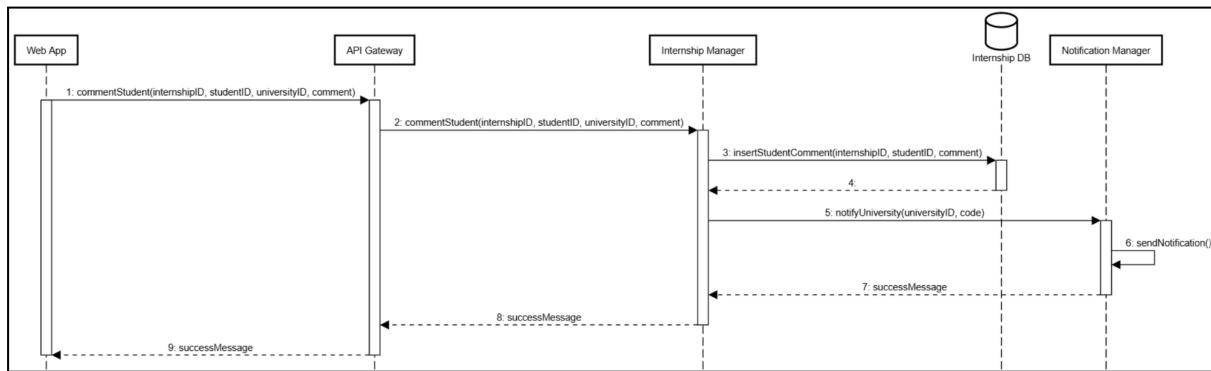


Figure 2.28: SD of the runtime view of UC27

[UC28] Company comments internship

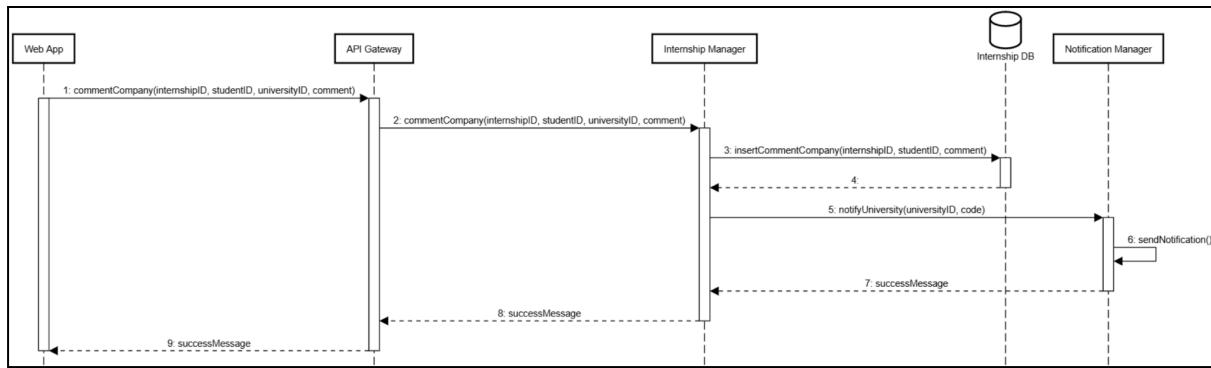


Figure 2.29: SD of the runtime view of UC28

[UC29] Student checks statistics

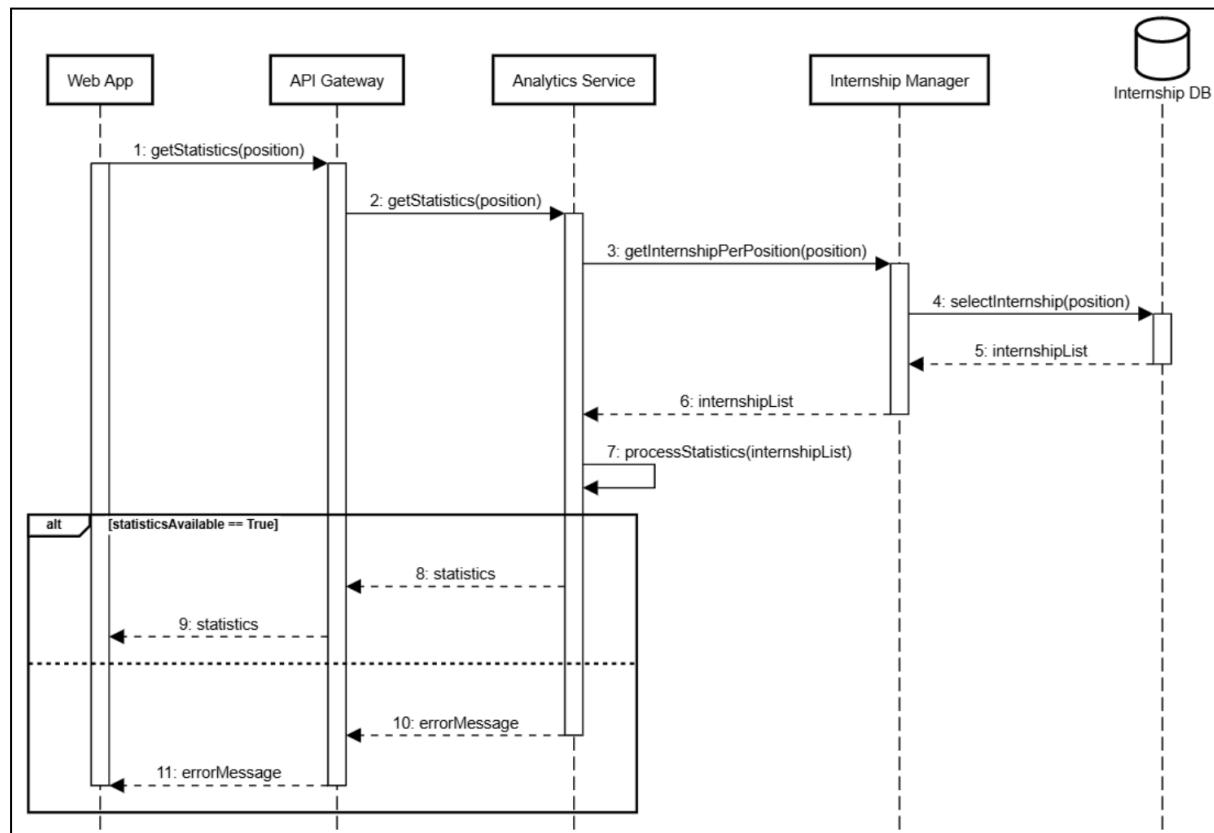


Figure 2.30: SD of the runtime view of UC29

[UC30] University interrupts internship

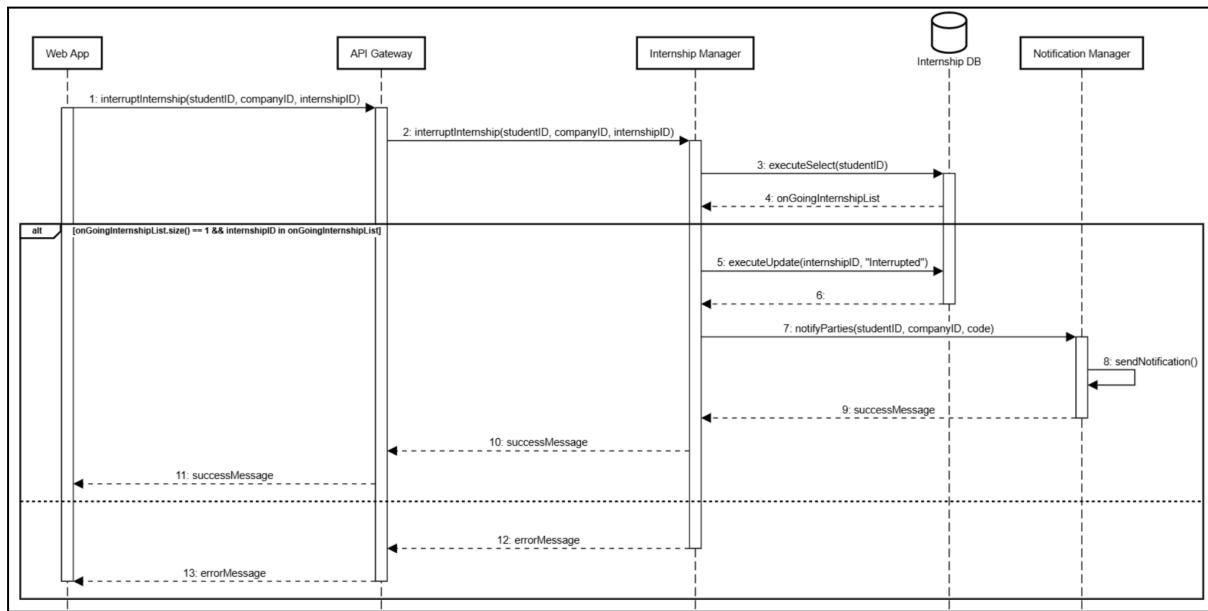


Figure 2.31: SD of the runtime view of UC30

[Focus] Send notification

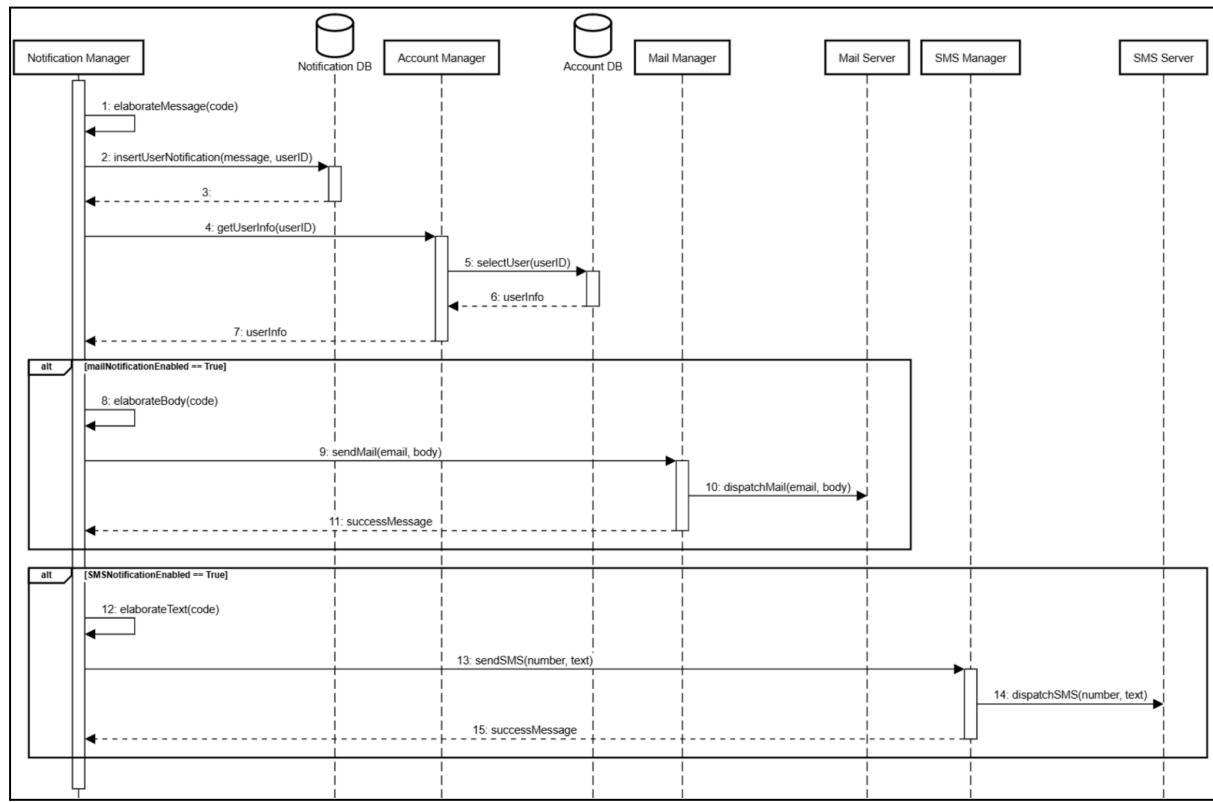


Figure 2.32: SD of the runtime view of the notification mechanism

Note: the SD shows the general behaviour of the system when a notifyStudent/notifyCompany/notifyUniversity method is called, the SD has to be intended with student/company/university where the general term “user” occurs

2.6 Selected architectural styles and patterns

- **Microservices architecture:** the system is designed using a microservices architecture to ensure a high degree of scalability and decoupling. This approach allows the system to be divided into multiple services, each specialized in specific requirements. Consequently, it reduces the synchronization load on teams, allowing for smaller team sizes and smaller codebases. Smaller codebases facilitate easier development, testing, and debugging.
- **REST API:** the system offers a collection of RESTful APIs to facilitate lightweight communication for users interacting with the platform. This approach complements a microservices architecture by providing a technology-neutral communication method, ensuring that the technical implementation details of individual services remain inconsequential.
- **API Gateway:** this design pattern functions as an intermediary between users and the system, offering a unified interface for users while also acting as a gatekeeper for all traffic directed to microservices.
- **Server-side service discovery:** when microservices start, they immediately contact the discovery service, which has a well-known IP address and port, to announce the services they offer along with their IP and open port. If a service needs to communicate with another, it queries the discovery service to obtain the necessary address and port information, allowing direct communication. This design pattern enhances the separation of components by eliminating the need to hard-code service addresses.
- **Security Pattern:** we have implemented the security pattern by replicating the API Gateway to avoid making it a single point of failure for the system. Requests from the Web App are redirected to the active and available instances of the API Gateway by the Load Balancer placed between the two components.

2.7 Other design decisions

2.7.1 Database logical schema

Here is a brief overview on the logical organization of the database, in order to have a clear idea of the results of the queries executed in the runtime view. The tables are distributed on the four DBs which may be collocated on different physical machines.

Account DB

Student(studentID, email, password, studentInfo, CV, university)

Company(companyID, email, password, companyInfo)

University(universityID, email, password, universityInfo)

Internship DB

Internship(internship, company, position, internshipInfo, internshipStatus, student*)

Application(student, internship, expired)

Proposal(student, internship, expired)

StudentComment(student, internship, date, comment)

CompanyComment(student, internship, date, comment)

Selection Process DB

SelectionProcess(student, internship, position, answerSQ, studentFeedback, companyFeedback, selectionProcessStatus)

Notification DB

StudentNotification(notificationID, message, read, date, student)

CompanyNotification(notificationID, message, read, date, company)

UniversityNotification(notificationID, message, read, date, university)

Note: the attributes studentInfo, companyInfo, universityInfo and InternshipInfo are used to summarize all the data inserted by the user in the registration and by the company when an offer is uploaded, the specific attributes refer to the list of fields indicated in the use cases in the RASD (UC1 - UC2 - UC3 - UC7)

Foreign Keys

Student.university -> University.universityID
Internship.company -> Company.companyID
Internship.student -> Student.studentID (optional attribute, inserted when start the internship)
Application.student -> Student.studentID
Application.internship -> Internship.internshipID
Proposal.student -> Student.studentID
Proposal.internship -> Internship.internshipID
StudentComment.student -> Student.studentID
StudentComment.internship -> Internship.internshipID
CompanyComment.student -> Student.studentID
CompanyComment.internship -> Internship.internshipID
SelectionProcess.student -> Student.studentID
SelectionProcess.internship -> Internship.internshipID
StudentNotification.student -> Student.studentID
CompanyNotification.company -> Company.companyID
UniversityNotification.university -> University.universityID

3. USER INTERFACE DESIGN

In this chapter, the user interfaces of the platform will be presented through a series of detailed mockups. These mockups provide a visual representation of the various screens and functionalities available to users, offering a clear and intuitive overview of the user experience. Each mockup is designed to illustrate how users will interact with the platform, highlighting navigation flows, available options, and key features.

3.1 All users

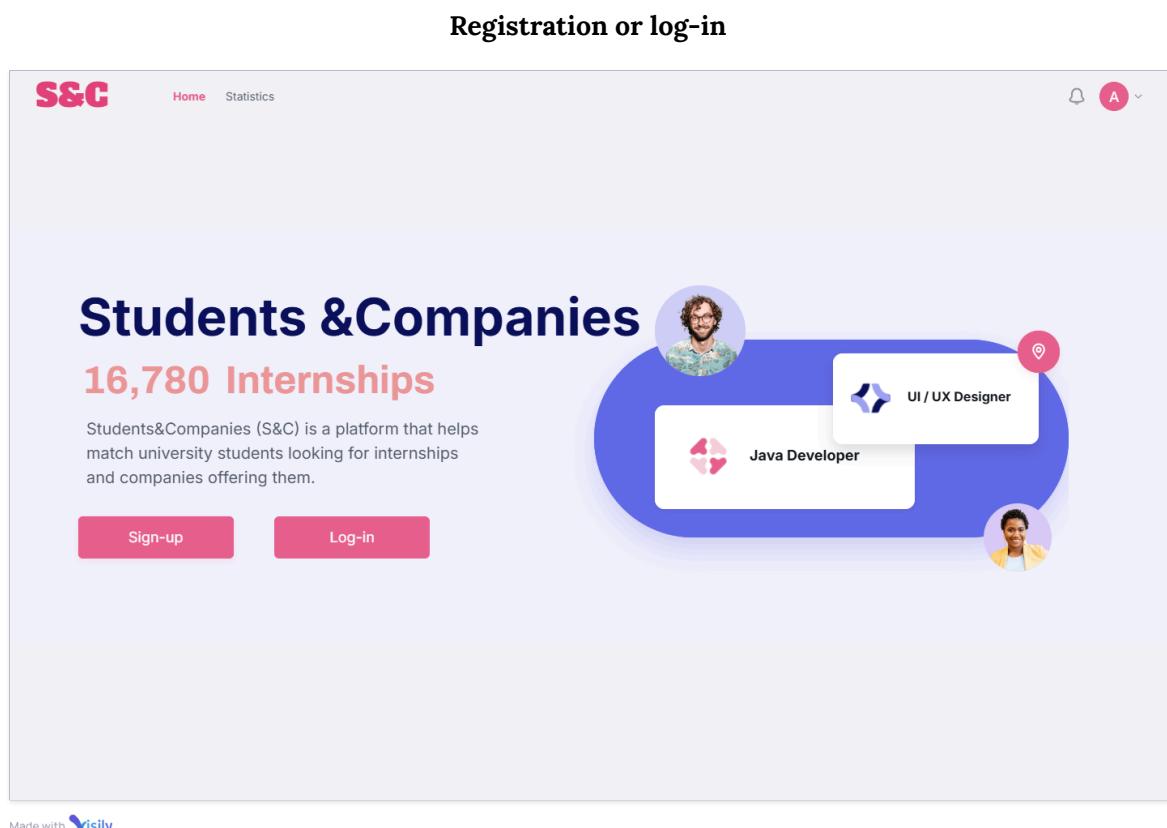


Figure 3.1

Log-In

The screenshot shows a login interface for 'Students&Comapanies'. At the top left is the logo 'S&C'. To its right are links for 'Home' and 'Statistics'. On the far right are icons for notifications and user settings. Below this header is a large title 'Log-in to Students&Comapanies'. Underneath the title are two input fields: one for 'E-mail' and one for 'Password'. Below the 'E-mail' field is a 'Remember me' checkbox. To the right of the 'Password' field is a link 'Forgot password?'. A prominent red button at the bottom right contains the text 'Log-In'.

Log-in to Students&Comapanies

E-mail

Password

Remember me

[Forgot password?](#)

Log-In

Figure 3.2

Registration

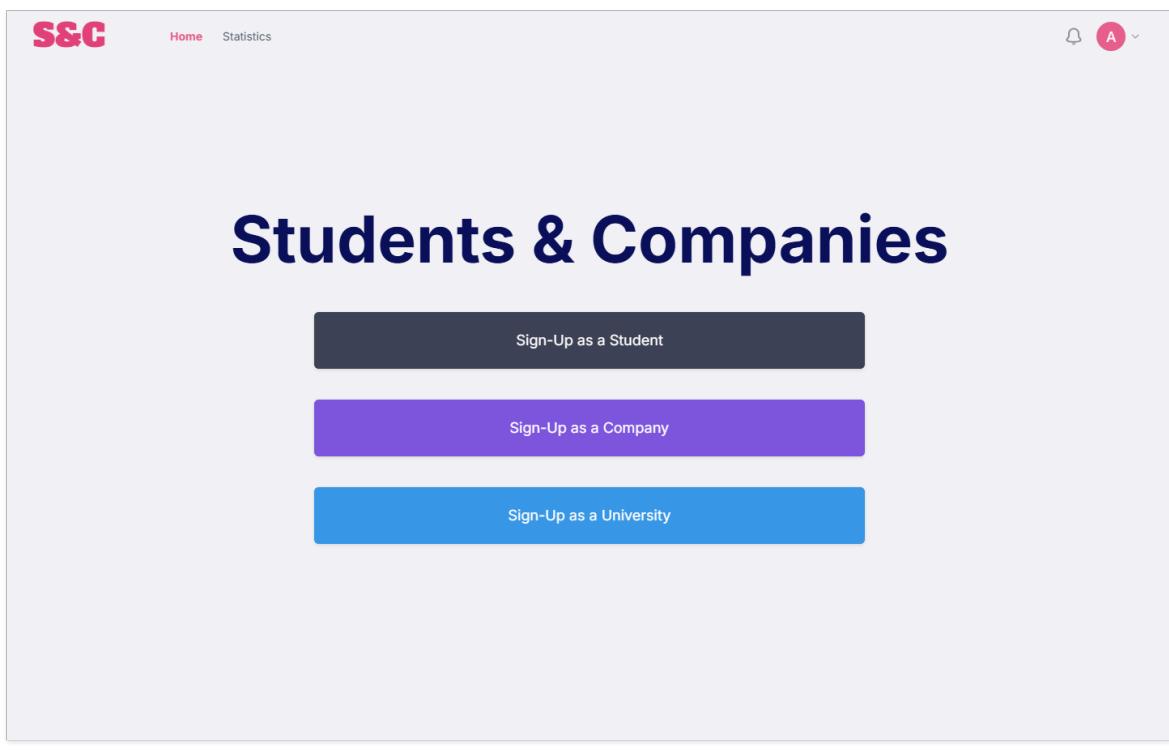


Figure 3.3

3.2 Student

Student Registration

The screenshot shows a registration form for a platform named 'S&C'. At the top, there are navigation links for 'Home' and 'Statistics', and a user profile icon with a notification bell and a dropdown menu. The main title is 'Registration'. Below it, under 'GENERAL INFORMATION', there is a placeholder profile picture with 'Change' and 'Remove' buttons. The form fields include 'Name' (Jay Rutherford), 'Title' (Degree), 'Institutional Email', 'Phone number', and 'Password'. Under 'Professional Skills', there are three tags: 'UX Research X', 'UI Design X', and 'Web Design X', with a '+ Add' button. A 'Curriculum Vitae' section contains a link to 'CV.pdf'. There are also sections for 'EDUCATION' and 'WORKING EXPERIENCE'. A red 'Register' button is located at the bottom right of the form area. The entire form is set against a dark blue background.

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Figure 3.4

Student Home

The screenshot shows the 'Student Home' page of a platform. At the top, there is a navigation bar with links: Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There is also a user profile icon and a search bar labeled 'Search for internships'.

Below the navigation bar, there are two tabs: 'Recommended' (highlighted in blue) and 'All'. A search bar with the placeholder 'Search' is positioned above a list of internship offers.

The main content area displays six internship offers in a grid:

- UI / UX Designer** (Skill 1, Skill 2, Skill 3) - Laborum, Milano, Onsite. Description: Description of the internship offer. Apply button.
- C# Developer** (Skill 1, Skill 2, Skill 3) - Pariatur, Columbus, Hybrid. Description: Description of the internship offer. Apply button.
- ReactJS Developer** (Skill 1, Skill 2, Skill 3) - Aliq, Tulsa, OK, Remote. Description: Description of the internship offer. Apply button.
- UI / UX Designer** (Skill 1, Skill 2, Skill 3) - Deserunt, Santa Ana, Onsite. Description: Description of the internship offer. Apply button.
- IT Director** (Skill 1, Skill 2, Skill 3) - Laboru, Austin, TX, Hybrid. Description: Description of the internship offer. Apply button.
- Product Manager** (Skill 1, Skill 2, Skill 3) - Esse Lorem, Wichita, Remote. Description: Description of the internship offer. Apply button.

A 'See more' button is located at the bottom center of the internship list.

Figure 3.5

Internship Details

The screenshot shows a web interface for managing internships. At the top, there's a navigation bar with links for Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. A user profile icon is also present.

The main content area has a dark blue header with the text "Internship details". Below this, there's a card for a "Data Analyst Intern" position:

- Company:** Tech Innovators Inc.
- Location:** Tucson, AZ
- Type:** Full-time, Remote, 6 months, January 2025
- Requirements for Applicants:** Degree, Problem-solving, Python, Excel
- Internship Description:** We are looking for a motivated Data Analyst Intern to join our dynamic team. The intern will assist in analyzing data, generating reports, and providing insights to support business decisions. This is an excellent opportunity to gain hands-on experience in data analysis and work with cutting-edge technologies.
- Responsibilities:**
 - Collect, clean, and analyze data from various sources.
 - Generate reports and visualizations to present findings.
 - Assist in developing and implementing data models.
- About company:** TECH INNOVATORS INC.
Tech Innovators Inc. is a leading technology company specializing in innovative solutions for businesses worldwide. Our mission is to leverage technology to drive business success and create value for our clients. We pride ourselves on our collaborative work environment and commitment to professional growth and development.
- Outsource:** 100 - 300 employees
- Location:** Tucson, AZ
- Hours:** Mon - Fri

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Figure 3.6

Waiting Applications

The screenshot shows the S&C platform's user interface for managing waiting applications. At the top, there is a navigation bar with links for Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also icons for notifications and a user profile.

Waiting applications

The main content area displays six internship offers arranged in two rows of three. Each offer card includes a skill icon, the job title, an 'Applied' status badge, skill tags, location details, and a placeholder for the 'Description of the internship offer'.

- UI / UX Designer** (Applied)
Skill 1 Skill 2 Skill 3
Laborum Milano Onsite
Description of the internship offer
- C# Developer** (Applied)
Skill 1 Skill 2 Skill 3
Pariatur Columbus, OH Hybrid
Description of the internship offer
- ReactJS Developer** (Applied)
Skill 1 Skill 2 Skill 3
Aliq Tulsa, OK Remote
Description of the internship offer

- UI / UX Designer** (Applied)
Skill 1 Skill 2 Skill 3
Deserunt Santa Ana Onsite
Description of the internship offer
- IT Director** (Applied)
Skill 1 Skill 2 Skill 3
Labor Austin, TX Hybrid
Description of the internship offer
- Product Manager** (Applied)
Skill 1 Skill 2 Skill 3
Esse Lorem Wichita Remote
Description of the internship offer

A pink "See more" button is located at the bottom center of the application list.

Figure 3.7

Student Selection Process

The screenshot shows a web application interface for managing internships. At the top, there is a navigation bar with links: Home, Waiting Applications, Selection Process (which is highlighted in pink), Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also icons for notifications and user profile.

Below the navigation bar is a search bar with the placeholder "Search for internships by status" and a "Search" button.

Selection process

The main content area displays six internship opportunities in a grid:

- UI / UX Designer** (Rejected)
Skill 1 Skill 2 Skill 3
Laborum Milano Onsite
Description of the internship offer
- C# Developer** (Starting quest)
Skill 1 Skill 2 Skill 3
Pariatur Columbus, OH Hybrid
Description of the internship offer
- ReactJS Developer** (Interview)
Skill 1 Skill 2 Skill 3
Aliq Tulsa, OK Remote
Description of the internship offer
- UI / UX Designer** (Starting quest)
Skill 1 Skill 2 Skill 3
Deserunt Santa Ana Onsite
Description of the internship offer
- IT Director** (Feedback quest)
Skill 1 Skill 2 Skill 3
Laboru Austin, TX Hybrid
Description of the internship offer
- Product Manager** (Interview)
Skill 1 Skill 2 Skill 3
Esse Wichita, KS Remote
Description of the internship offer

A "See more" button is located at the bottom center of the grid.

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Figure 3.8

Student Selection Process: Starting Questionnaire

The screenshot shows a web-based application for student selection. At the top, there is a navigation bar with the logo 'S&C' and links for Home, Waiting Applications, Selection Process (which is highlighted in pink), Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also icons for a bell and a user profile.

The main content area has a dark blue header with the text 'Selection process' in white. Below this, there are two main sections:

- Left Panel (UI / UX Designer):** This panel is titled 'Starting quest'. It features a small icon of three overlapping circles in blue, green, and yellow. Below the title, it says 'Starting quest' and lists 'Skill 1', 'Skill 2', and 'Skill 3'. A large text input field is labeled 'Insert here the description of your internship offer'. At the bottom is a red button labeled 'Terminate selection process'.
- Right Panel (Starting questionnaire):** This panel is titled 'Starting questionnaire'. It contains three questions:
 - Question 1:** A text input field labeled 'Input text'.
 - Question 2:** A list of four answer options, each with a checkbox:
 - Answer 1
 - Answer 2
 - Answer 3
 - Answer 4
 - Question 3:** A text input field labeled 'Input text'.

At the bottom right of the right panel is a red 'Submit' button. The entire interface has a light pink background.

Figure 3.9

Student Selection Process: Contacts

The screenshot shows a web application interface for managing student selection processes. At the top, there is a navigation bar with the logo 'S&C' and links for Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also notification and user profile icons.

The main title 'Selection process' is displayed prominently. On the left, there is a card for a 'UI / UX Designer' position, categorized under 'Interview'. It includes sections for 'Skill 1', 'Skill 2', and 'Skill 3', and a placeholder for 'Insert here the description of your Internship offer'. A red button labeled 'Terminate selection process' is at the bottom of this card.

On the right, there is a section titled 'INTERNAL COMPANY CONTACTS' featuring a profile picture of a woman, her name 'Surname', her professional title, and contact information: phone number +39 3374575881 and email example@mail.com.

At the bottom left, there is a small note 'Made with Visibly'.

Figure 3.10

Student Selection Process: Feedback Questionnaire

The screenshot shows a web application for student selection. At the top, there is a navigation bar with the logo 'S&C' and links for Home, Waiting Applications, Selection Process (which is highlighted in pink), Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also icons for notifications and user profile.

The main content area has a dark blue header with the text 'Selection process' in white. Below this, on the left, is a sidebar for a 'UI / UX Designer' feedback quest. It includes a small icon, three skill levels (Skill 1, Skill 2, Skill 3), a text input field for describing the internship offer, and a red 'Terminate selection process' button.

The main right-hand panel is titled 'Feedback questionnaire' in pink. It contains three sections of questions:

- Question 1**: Four options labeled 'Answer 1' through 'Answer 4' each with a radio button.
- Question 2**: Four options labeled 'Answer 1' through 'Answer 4' each with a radio button.
- Question 3**: Four options labeled 'Answer 1' through 'Answer 4' each with a radio button.

A pink 'Submit' button is located at the bottom right of the questionnaire panel.

Figure 3.11

Student Selection Process: Finalization

The screenshot shows a web application interface for student selection. At the top, there is a navigation bar with the logo 'S&C' and links for Home, Waiting Applications, Selection Process (which is highlighted in red), Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also notification and user profile icons.

The main content area has a dark blue background. A large white rectangular box on the left contains a profile icon, the title 'UI / UX Designer Feedback quest', and three skill categories: Skill 1, Skill 2, and Skill 3. Below this is a text input field placeholder: 'Insert here the description of your Internship offer'.

A central white rectangular box contains the text: 'The company has selected you. Do you want to start the internship?'. It features two buttons at the bottom: a green 'Hire' button and a red 'Decline' button.

At the bottom left of the interface, there is a small note: 'Made with Visibly'.

Figure 3.12

Student Ongoing Internships: Comments

The screenshot shows a user interface for managing internships. At the top, there is a navigation bar with links: Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also icons for notifications and a user profile.

The main content area is titled "Comments on the internship". It features a sidebar on the left containing a logo (three green squares), the title "ReactJS Developer", and three skill categories: Skill 1, Skill 2, and Skill 3. Below this is a text input field with placeholder text: "Insert here the description of your internshp offer".

The main panel on the right has two sections:

- A top section labeled "Comapny comments on the internship" with a placeholder "Input text".
- A bottom section labeled "Make a comment about the internship" with a text input field and a red "Publish" button.

At the bottom left of the page, there is a footer note: "Made with Visibly".

Figure 3.13

Internship Proposals

The screenshot shows a dark-themed user interface for managing internship proposals. At the top, there's a navigation bar with links: Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals (which is the active tab), Suggestions, Profile Management, and Statistics. There are also notification and account settings icons.

The main content area features a heading "Look at companies interested in you". Below it, six internship proposal cards are displayed in a grid:

- UI / UX Designer** (Accept button) - Skill 1, Skill 2, Skill 3. Location: Laborum, Milano, Onsite. Description: Description of the internship offer.
- C# Developer** (Accept button) - Skill 1, Skill 2, Skill 3. Location: Pariatur, Columbus, Hybrid. Description: Description of the internship offer.
- ReactJS Developer** (Accept button) - Skill 1, Skill 2, Skill 3. Location: Aliq, Tulsa, OK, Remote. Description: Description of the internship offer.
- UI / UX Designer** (Accept button) - Skill 1, Skill 2, Skill 3. Location: Deserunt, Santa Ana, Onsite. Description: Description of the internship offer.
- IT Director** (Accept button) - Skill 1, Skill 2, Skill 3. Location: Laboru, Austin, TX, Hybrid. Description: Description of the internship offer.
- Product Manager** (Accept button) - Skill 1, Skill 2, Skill 3. Location: Esse Lorem, Wichita, Remote. Description: Description of the internship offer.

A "See more" button is located at the bottom center of the card grid.

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Figure 3.14

Student Suggestions

The screenshot shows the S&C (Student & Career) platform interface. At the top, there is a navigation bar with links: Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. There are also icons for notifications and a user profile.

The main content area has a pink header "Suggestions". Below it is a "STUDENT CV" section for "BY RESUME GENIUS". The CV includes:

- Contact information: (202) 538-5492, LinkedIn.com/in/yourprofile, your_email@gmail.com, 678 E Ralley Lane, Newark, NJ 07108.
- EDUCATION**: NEW YORK UNIVERSITY, NEW YORK, NY. Bachelor of Art in English. Expected graduation: May 2022. GPA: 3.8/4.0. Attended 4 consecutive semesters. Relevant Courses: Non-fiction and creative writing, Modern American literature and culture, News writing, Multicultural writing. Public affairs reporting.
- WORK EXPERIENCE**: SKYLINE PUBLISHING PRESS, Jersey City, NJ. Journalist Intern. January 2020–present.
 - Prepared and edited press releases, and researched stories to pitch news ideas on trending topics.
 - Assisted reporting team in a 24/7, fast-paced environment with live breaking news, working with news staff and photographers to arrive on-site.
 - Personally wrote, edited, and published 20+ news stories in 1 year.
- WALMART, Newark, NJ. Delivery Driver. January 2016–June 2018.
 - Created an average of 500+ people daily, directing them to different departments or Walmart associates to address their needs.
 - Assisted with diffusing issues that arose between customers and associates.
 - Received 99% satisfaction rating from customers and associates, and received employee of the month award 4 times within a 2 year period.

To the right of the CV, there is a sidebar with a search bar and a suggestion box:

- Search bar: "Select your desired position" and "Search" button.
- Suggestion box: "Our suggestion for your CV". It lists:
 - Include key skills:
 - Statistical Analysis: Knowledge of statistical techniques and tools for data analysis.
 - Programming Languages: Proficiency in Python, R, SQL, and other relevant languages.
 - Data Visualization Software: Experience with tools like Tableau, Power BI, and QlikView.
 - Machine Learning: Knowledge of machine learning algorithms and predictive modeling techniques.
 - Interpersonal Skills: Ability to communicate effectively, solve problems, and work in teams.

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Figure 3.15

Student Profile Management

The screenshot shows the 'Profile Management' section of the 'Student Profile Management' application. At the top, there is a navigation bar with links: Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management (which is highlighted in pink), and Statistics. There are also icons for a bell and a user profile.

The main content area has a dark blue background. On the left, there is a sidebar with tabs: General Information (selected), Education, and Working Experiences. Below these tabs is a small icon of two people at a desk with a computer, followed by the text 'Tips to build an outstanding profile' and a 'Go to suggestions' button.

The central part of the screen is titled 'GENERAL INFORMATION'. It includes fields for Name (Jay Rutherford), Title (Degree dropdown), Institutional Email, Phone number, and Password. Below this is a 'Professional Skills' section with tags: UX Research X, UI Design X, Web Design X, and a '+ Add' button. There is also a 'Curriculum Vitae' section with a file input field containing 'CV.pdf' and a 'Replace' button.

Below the general information is a 'EDUCATION' section, which is currently collapsed (indicated by a downward arrow). At the bottom right of the main content area is a 'Save changes' button.

Figure 3.16

Student Statistics

The screenshot shows the S&C Student Statistics platform. At the top, there's a navigation bar with links: Home, Waiting Applications, Selection Process, Ongoing Internships, Internship Proposals, Suggestions, Profile Management, and Statistics. A user profile icon is also present. Below the navigation, a banner says "Explore more internship offers". There's a search bar with a dropdown arrow and a pink "Search" button. Below the search bar, there are four cards representing different sectors: Finance (1237 offers), Education (3546 offers), IT (5768 offers), and Marketing (2473 offers). Each card has a circular icon representing the sector. A callout box highlights the "Finance" section, listing the most required skills:

Most required skills in Finance

- Financial analysis:** The ability to interpret financial data, create financial models, and make forecasts to support decision-making processes.
- Emotional intelligence:** The capability to recognize, understand, and manage your own emotions, as well as those of others, to foster a positive work environment and improve interpersonal relationships.
- Communication:** The skill to convey information effectively and efficiently, both verbally and in writing, to ensure clear understanding among colleagues, clients, and stakeholders.
- Adaptability:** The ability to adjust to new conditions, technologies, and changing work environments, which is crucial for staying relevant and effective in the dynamic financial sector.

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Figure 3.17

3.3 Company

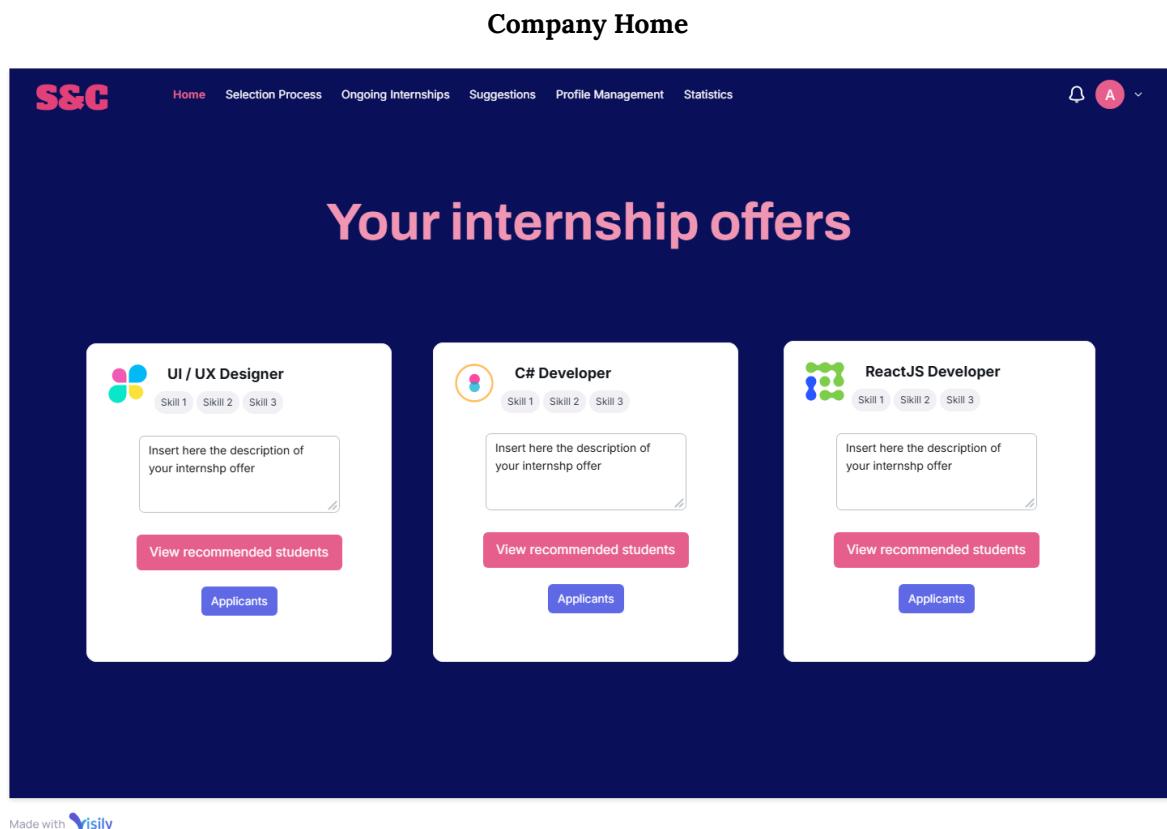


Figure 3.18

Recommended Students

The screenshot shows a dark-themed web application interface for 'S&C recommendations'. At the top, there's a navigation bar with links for Home, Selection Process, Ongoing Internships, Suggestions, Profile Management, and Statistics. A user profile icon is also present.

The main content area features a heading 'S&C recommendations' and a sidebar on the left labeled 'UI / UX Designer' with three skill categories: Skill 1, Skill 2, and Skill 3. Below this is a text input placeholder: 'Insert here the description of your Internship offer' and a 'Published' button.

Three student profiles are listed in cards:

- Diana Ross** (thesis) - UI Designer at Amet Company. Skills: UX Research, UI Design, Web Design. Includes a 'Propose Internship' button.
- Nulla Culp** - UI Designer at Duis Company. Skills: UX Research, UI Design, Web Design. Includes a 'Propose Internship' button.
- Anna Jone** - UI Designer at Labo Company. Skills: UX Research, UI Design, Web Design. Includes a 'Propose Internship' button.

A 'See more' button is located at the bottom right of the card area.

Figure 3.19

Student Details

The screenshot displays the 'Student details' section of the S&C platform. At the top, there is a navigation bar with links for Home, Selection Process, Ongoing Internships, Suggestions, Profile Management, and Statistics. A user profile icon with the letter 'A' is also present. The main title 'Student details' is centered above two side-by-side cards.

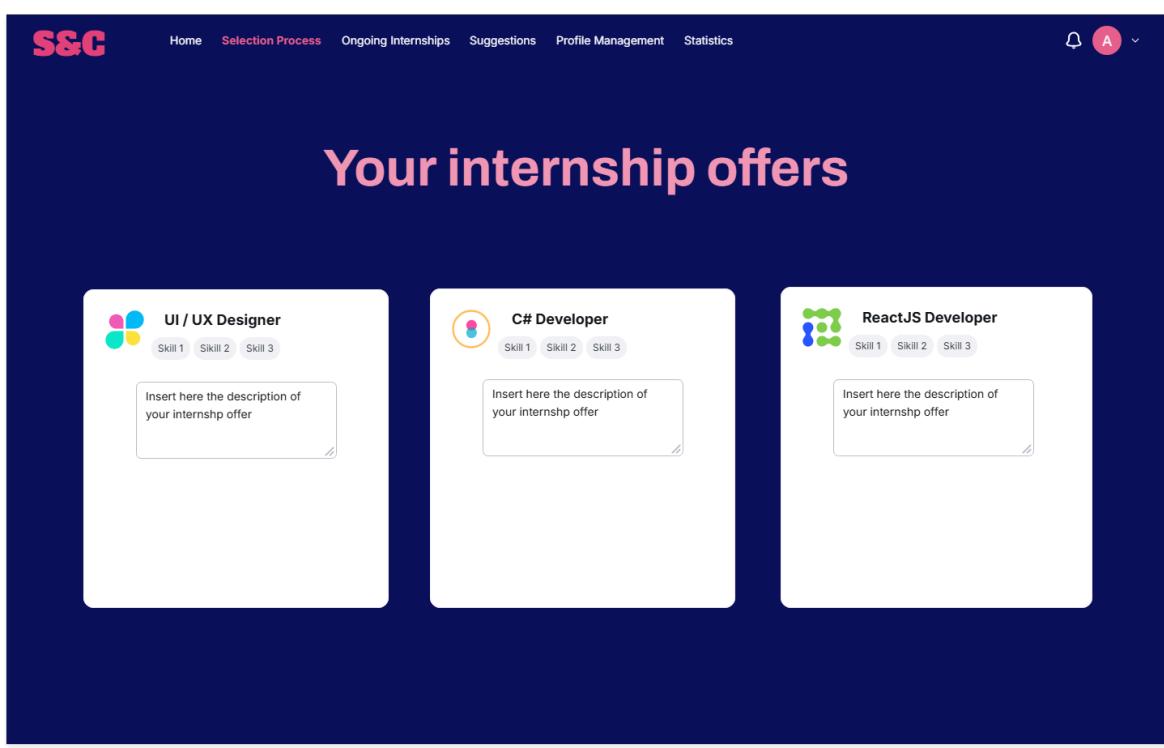
Left Card (Offer): This card is titled 'UI / UX Designer' and features a placeholder for inserting an internship offer description. It includes three skill categories: Skill 1, Skill 2, and Skill 3. A green button labeled 'Published' is at the bottom.

Right Card (Profile): This card shows a circular profile picture of a smiling woman named Jay Rutherford, identified as a UI/UX Designer. Below the profile, there is a section for 'Professional Skills' with links to UX Research, UI Design, and Web Design. Two expandable sections, 'EDUCATION' and 'WORKING EXPERIENCE', are shown with downward arrows. A prominent red button at the bottom right of the card says 'Propose Internship'.

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Figure 3.20

Company Selection Process



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Figure 3.21

Company Selection Process: Students List

The screenshot shows a web application interface for managing student profiles. At the top, there is a navigation bar with links: Home, Selection Process (which is highlighted in pink), Ongoing Internships, Suggestions, Profile Management, and Statistics. On the right side of the header, there are icons for a bell (notifications) and a user profile (A).

Selection Process

UI / UX Designer

Diana Ross Thesis

New York | UI Designer at Amet Company

UX Research | UI Design | Web Design

Starting quest

Nulla Culp

Anna Jone

See more

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This is a template for a student profile card. It includes a placeholder for a profile picture, the title "UI / UX Designer", the name "Diana Ross" with a "Thesis" badge, location "New York", current position "UI Designer at Amet Company", and skills "UX Research", "UI Design", and "Web Design". A button labeled "Starting quest" is also present. Below this card are two more cards for "Nulla Culp" and "Anna Jone", each with their own profile picture, name, location, current position, skills, and a status indicator (e.g., "Interview"). A "See more" button is located at the bottom right of the main content area.

Figure 3.22

Company Selection Process: Starting Questionnaire

The screenshot shows a web application interface for a company selection process. At the top, there is a navigation bar with the logo 'S&C' and links for Home, Selection Process, Ongoing Internships, Suggestions, Profile Management, and Statistics. On the right side of the header is a user profile icon with a notification bell and a dropdown menu.

The main content area is titled 'Selection process'. On the left, there is a sidebar for a 'UI / UX Designer' position, showing 'Starting quest' and three skill levels: Skill 1, Skill 2, and Skill 3. A placeholder text box says 'Insert here the description of your internship offer'.

The main panel is titled 'Starting questionnaire' and contains three questions:

- Question 1:** 'Answers from the student' (text input field)
- Question 2:** A list of four answer options:
 - Answer 1
 - Answer 2
 - Answer 3
 - Answer 4
- Question 3:** 'Answers from the student' (text input field) with 'Accept' and 'Reject' buttons below it.

At the bottom left of the main panel, it says 'Made with Visibly'.

Figure 3.23

Company Selection Process: Contacts

The screenshot shows a web application interface for managing internships. At the top, there is a navigation bar with the logo 'S&C' and links for Home, Selection Process, Ongoing Internships, Suggestions, Profile Management, and Statistics. On the right side of the header is a user icon with a notification bell and a dropdown menu.

The main content area has a dark blue background. In the center, the title 'Selection process' is displayed in a large, bold, white font. To the left, there is a card for a 'UI / UX Designer' position, which includes a small profile icon, the job title, an interview status, and three skill categories: Skill 1, Skill 2, and Skill 3. Below this is a placeholder text box for an internship offer description.

To the right, there is a section titled 'STUDENT CONTACTS' featuring a profile picture of a woman, her name 'Surname', and her professional title. It also lists her phone number and email address.

At the bottom left of the main content area, there is a small note 'Made with Visibly'.

Figure 3.24

Company Selection Process: Feedback Questionnaire

The screenshot shows a web-based feedback questionnaire for a UI/UX Designer. At the top left is the S&C logo. The top navigation bar includes links for Home, Selection Process, Ongoing Internships, Suggestions, Profile Management, and Statistics. On the top right are a notification bell icon and a user profile icon with the letter 'A'.

The main title "Selection process" is centered at the top of the page. Below it, the section title "Feedback questionnaire" is displayed. To the left, there is a sidebar for "UI / UX Designer Feedback quest" which includes three skill categories: Skill 1, Skill 2, and Skill 3. A text input field is provided for describing the internship offer.

The main content area contains three questions, each with four answer options:

- Question 1**:
□ Answer 1
□ Answer 2
□ Answer 3
□ Answer 4
- Question 2**:
□ Answer 1
□ Answer 2
□ Answer 3
□ Answer 4
- Question 3**:
□ Answer 1
□ Answer 2
□ Answer 3
□ Answer 4

A red "Submit" button is located at the bottom right of the main content area.

Figure 3.25

Company Selection Process: Finalization

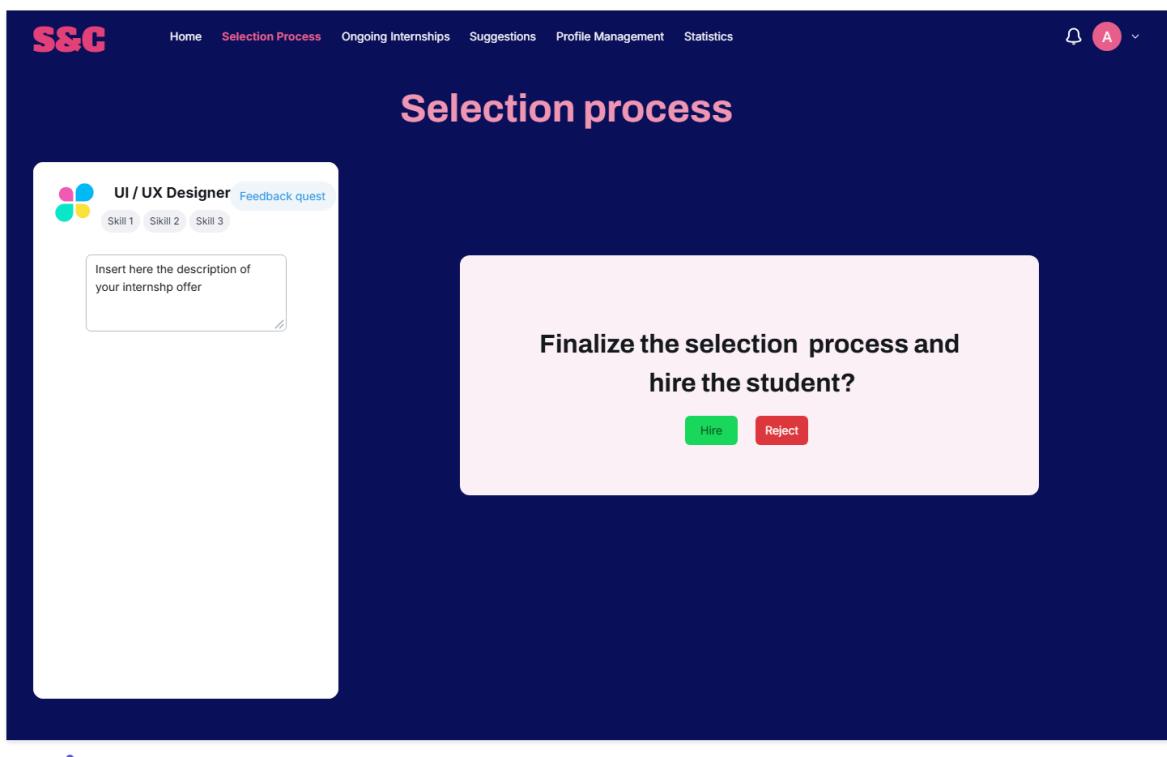


Figure 3.26

Company Ongoing Internships

The screenshot shows a dark-themed web application interface. At the top, there is a navigation bar with links: Home, Selection Process, Ongoing Internships (which is the active page), Suggestions, Profile Management, and Statistics. On the right side of the header, there are icons for notifications, a user profile, and a dropdown menu.

Ongoing Internships

The main content area displays three internship offers in cards:

- UI / UX Designer**: Includes a blue and green icon, three skill badges (Skill 1, Skill 2, Skill 3), and a text input field for the internship description. Below the input field is a placeholder "Insert here the description of your internship offer". A profile picture of Diana Ross is shown, along with the name "Diana Ross" and a "Thesis" badge. A "Comment" button is at the bottom.
- C# Developer**: Includes an orange and yellow icon, three skill badges (Skill 1, Skill 2, Skill 3), and a text input field for the internship description. Below the input field is a placeholder "Insert here the description of your internship offer". A profile picture of Nulla Culp is shown, along with the name "Nulla Culp". A "Comment" button is at the bottom.
- ReactJS Developer**: Includes a green and blue icon, three skill badges (Skill 1, Skill 2, Skill 3), and a text input field for the internship description. Below the input field is a placeholder "Insert here the description of your internship offer". A profile picture of Anna Jone is shown, along with the name "Anna Jone". A "Comment" button is at the bottom.

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Figure 3.27

Company Ongoing Internships: Comments

The screenshot shows a dark-themed user interface for a platform called "S&C". At the top, there is a navigation bar with links: Home, Selection Process, Ongoing Internships (which is the active page), Suggestions, Profile Management, and Statistics. There are also icons for notifications and a user profile.

The main content area has a title "Comments on the internship". On the left, there is a sidebar for a "ReactJS Developer" position, featuring a logo, three skill categories (Skill 1, Skill 2, Skill 3), and a placeholder text area for the internship offer description.

The right side displays a student profile for "Diana Ross" from New York, who is a UI Designer at Amet Company, specializing in UX Research, UI Design, and Web Design. Below the profile, there are two input fields: one for "Student comments on the internship" and another for "Make a comment about the student". A "Publish" button is located at the bottom right of the second input field.

A small note at the bottom left indicates the interface was "Made with Visibly".

Figure 3.28

Company Suggestions

The screenshot shows a dark-themed web application interface. At the top, there is a navigation bar with the logo "S&C" and links for "Home", "Selection Process", "Ongoing Internships", "Suggestions" (which is highlighted in pink), "Profile Management", and "Statistics". On the right side of the header, there are icons for notifications and a user profile.

The main content area has a pink header "Suggestions". Below it, there is a card for a "UI / UX Designer" position. The card includes a small icon of three overlapping circles, the job title "UI / UX Designer", and three small buttons labeled "Skill 1", "Skill 2", and "Skill 3". A text input field is labeled "Insert here the description of your internship offer". A green button labeled "Published" is visible. At the bottom of the card is a pink button labeled "Pick another internship offer".

To the right of the card, there is a sidebar with the heading "Our suggestion for your Internship offer" and several instructions:

- Try to include:
 - Benefits and compensation: Specify the salary or salary range, benefits (e.g., health insurance, retirement plans, vacation), and any other incentives offered.
 - Opportunities for growth: Mention any career advancement opportunities within the company and professional development or training programs.
 - Position details: Specify the work location (company headquarters or remote work option), work schedule (full-time, part-time), and contract duration (permanent, temporary, internship).
 - Company culture: Briefly describe the company culture and work environment, including information about company events, team building activities, and inclusivity policies.

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Figure 3.29

Company Profile Management: Internships List

The screenshot shows the 'Profile Management' section of the S&C platform. On the left sidebar, there are two buttons: 'Internships offers' (highlighted in pink) and 'Company profile'. The main content area is titled 'Working Internships offer' and displays three internship listings:

- Senior UX UI Designer**: Fulltime, Bytedance, Jan 2021 - Present · 1 yr 7 mos. Internship description. Buttons: Update, See more.
- Junior UX UI Designer**: Fulltime, ConocoPhillips, Aug 2018 - Nov 2020 · 2 yrs 4 mos. Internship description. Buttons: Update, See more.
- UX UI Designer**: Fulltime, Brex, Jun 2017 - May 2018 · 1 yr. Internship description. Buttons: Update, See more.

At the bottom of the list is a pink button labeled 'Add internship offer'.

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Figure 3.30

Company Profile Management: Add Internship Offer

The screenshot shows the 'Profile Management' section of the S&C platform. On the left, there's a sidebar with 'Internships offers' and 'Company profile'. The main area is titled 'Internship offer Information' and contains fields for 'Internship title' (Software engineer), 'Duration' (Duration in months), 'Location' (Rochester, NY), 'Employment Type' (Full-time), 'Starting Date' (00/00/0000), 'Internship Description' (empty), 'Remuneration' (\$), 'Requirements' (Bachelor degree, B2 English, C++), 'Contacts' (Email and Phone number), 'Starting questionnaire' (button to 'Make starting questionnaire'), and 'Available positions' (empty). A 'Publish' button is at the bottom right.

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Figure 3.31

Company Notifications

The screenshot displays a web-based application interface for managing internships. At the top, there is a navigation bar with links: Home, Selection Process, Ongoing Internships, Suggestions, Profile Management, and Statistics. A user profile icon is also present in the top right corner.

The main content area features three large cards, each representing an internship offer:

- UI / UX Designer**: Includes a placeholder for "Insert here the description of your internship offer". Below it are buttons for "View recommended students" and "Applicants".
- C# Developer**: Similarly, it has a placeholder for "Insert here the description of your internship offer". Below it are buttons for "View recommended students" and "Applicants".
- ReactJS Developer**: This card is partially visible on the right side of the screen.

To the right of these cards is a sidebar titled "Company Notifications" containing a list of recent activity:

- Romy Murray applied for UI / UX Designer (1:17 PM)
- Annie Haley submitted the starting questionnaire for ReactJS Developer (Mon)
- Jevon Raynor submitted the feedback questionnaire for C# Developer (Sun)
- Selina Rutherford applied for C# Developer (Fri)
- New recommended student for UI / UX Designer (take a look to Emilia Rowe's CV) (Nov 4)

At the bottom left of the interface, there is a small note: "Made with Visibly".

Figure 3.32

3.4 University

University Home

The screenshot shows a dark-themed web application for managing students. At the top left is the logo 'S&C'. To its right are navigation links for 'Home' and 'Statistics'. On the far right are icons for notifications and user settings. The main title 'Your students' is centered above a search bar with a placeholder 'Search student' and a pink 'Search' button. Below the search bar are three student profiles, each in its own white card with rounded corners. Each card contains a circular profile picture, the student's name, their location ('New York'), their current job ('UI Designer at Amet Company'), and three interest tags ('UX Research', 'UI Design', 'Web Design'). A pink 'Show details' button is located in the bottom right corner of each card. At the very bottom left of the page, there is a small watermark that says 'Made with Visily'.

Figure 3.33

University Home: Comments

The screenshot shows a user interface for managing internship comments. At the top, there's a header with the logo 'S&C' and navigation links for 'Home' and 'Statistics'. A notification bell icon with a red badge and a user profile icon are also present.

The main content area is titled 'Comments on the internship'. On the left, there's a sidebar for a 'ReactJS Developer' listing, which includes a skills section ('Skill 1', 'Skill 2', 'Skill 3') and a text input field for 'Description of your internship offer'. Below this are buttons for 'Ongoing' (green) and 'Interrupt' (red). A 'Pick another student' button is at the bottom.

The right side features a profile card for 'Diana Ross' (UI Designer at Amet Company, New York, Thesis), followed by sections for 'Student comments on the internship' (with an 'Input text' placeholder), 'Company comments on the internship', 'Company contacts', and 'Student contacts'.

Figure 3.34

4. REQUIREMENTS TRACEABILITY

In this paragraph, we will illustrate how the system's functional and non-functional requirements are mapped onto the various architectural components. This mapping process is essential to ensure that each requirement is adequately met by the system's components, guaranteeing a coherent and complete design. It will highlight how each component contributes to fulfilling specific requirements.

Sign-up and log-in

Requirements	<ul style="list-style-type: none"> [R1] The system allows users to sign-up [R2] The system allows users to log-in
Components	<ul style="list-style-type: none"> Web App Mail Manager Account Manager DBMS

Table 4.1

Student Profile Management

Requirements	<ul style="list-style-type: none"> [R3] The system allows students to upload the CV [R5] The system allows students to update the CV [R6] The system allows students to manage their profile information
Components	<ul style="list-style-type: none"> Web App Account Manager DBMS

Table 4.2

Student finds internship

Requirements	<ul style="list-style-type: none"> [R7] The system allows students to filter internship offers [R8] The system allows students to visualize all internship offers
Components	<ul style="list-style-type: none"> Web App Internship Manager DBMS

Table 4.3

Student applies to an internship

Requirements	<ul style="list-style-type: none"> • [R10] The system allows students to apply to internship offers • [R11] The system allows students to accept proposals from companies
Components	<ul style="list-style-type: none"> • Web App • Internship Manager • DBMS

Table 4.4

Student Recommendations

Requirements	<ul style="list-style-type: none"> • [R9] The system allows students to visualize only recommended internship offers
Components	<ul style="list-style-type: none"> • Web App • Internship Manager • Account Manager • Recommendation Service • DBMS

Table 4.5

Student Selection Process

Requirements	<ul style="list-style-type: none"> • [R12] The system allows students to receive and fill out the starting questionnaire • [R13] The system allows students to check their applications status • [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) • [R20] The system allows the student to terminate the selection process before the end
Components	<ul style="list-style-type: none"> • Web App • Selection Process Manager • DBMS

Table 4.6

All Users Notifications

Requirements	<ul style="list-style-type: none"> • [R14] The system allows students to receive notifications • [R32] The system allows companies to receive notifications • [R41] The system allows universities to receive notifications
Components	<ul style="list-style-type: none"> • Web App • Notification Manager • Mail Manager • SMS Manager

Table 4.7

Comments on internship or student

Requirements	<ul style="list-style-type: none"> • [R18] The system allows students to write comments on ongoing/past internships • [R33] The system allows companies to write comments on ongoing/past internships
Components	<ul style="list-style-type: none"> • Web App • Internship Manager • DBMS

Table 4.8

Suggestions

Requirements	<ul style="list-style-type: none"> • [R4] The system allows students to ask tailored suggestion on their CV • [R23] The system allows companies to ask tailored suggestion on their internship offers
Components	<ul style="list-style-type: none"> • Web App • Analytics Manager • DBMS

Table 4.9

Company Profile Management

Requirements	<ul style="list-style-type: none"> • [R21] The system allows companies to upload internship offers • [R22] The system allows companies to create the starting questionnaire • [R24] The system allows companies to update internship offers
Components	<ul style="list-style-type: none"> • Web App • Account Manager • Internship Manager • DBMS

Table 4.10

Companies Recommendations

Requirements	<ul style="list-style-type: none"> • [R25] The system allows companies to visualize recommended students
Components	<ul style="list-style-type: none"> • Web App • Recommendation Service • DBMS

Table 4.11

Companies offer internship to a student and manage applications

Requirements	<ul style="list-style-type: none"> • [R26] The system allows companies to offer an internship to recommended students • [R27] The system allows companies to accept/decline students applications
Components	<ul style="list-style-type: none"> • Web App • Internship Manager • Recommendation Service • DBMS

Table 4.12

Companies Selection Process

Requirements	<ul style="list-style-type: none"> • [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 • [R34] The system allows to check all the students in the selection process
Components	<ul style="list-style-type: none"> • Web App • Selection Process Manager • DBMS

Table 4.13

All Users Statistics

Requirements	<ul style="list-style-type: none"> • [R19] The system allows students to see statistics regarding a specific internship position • [R35] The system allows companies to see statistics regarding a specific internship position • [R40] The system allows universities to see statistics regarding a specific internship position
Components	<ul style="list-style-type: none"> • Web App • Analytics Manager • DBMS

Table 4.14

Universities Features

Requirements	<ul style="list-style-type: none"> • [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
Components	<ul style="list-style-type: none"> • Web App • Internship Manager • DBMS

Table 4.15

To simplify and condense the information, the figure below illustrates the same relationships in a more compact format, utilizing a traceability matrix (Table 4.16)

	Web App	Email Manager	Account Manager	Internship Manager	Recom. Service	SMS Manager	Notification Manager	Selection Process Manager	Analytics Service	DBMS
[R1]	X	X	X							X
[R2]	X	X	X							X
[R3]	X		X							X
[R4]	X								X	X
[R5]	X		X							X
[R6]	X		X							X
[R6]	X									
[R7]	X			X						X
[R8]	X			X						X
[R9]	X		X	X	X					X
[R10]	X			X						X
[R11]	X			X						X
[R12]	X							X		X
[R13]	X							X		X
[R14]	X	X				X	X			
[R15]	X							X		X
[R16]	X							X		X
[R17]	X							X		X
[R18]	X			X						X
[R19]	X								X	X
[R20]	X							X		X
[R21]	X		X	X						X
[R22]	X		X	X						X
[R23]	X								X	X
[R24]	X		X	X						X
[R25]	X				X					X
[R26]	X			X						X
[R27]	X			X						X
[R28]	X							X		X
[R29]	X							X		X
[R30]	X							X		X
[R31]	X							X		X
[R32]	X	X				X	X			
[R33]	X			X						X
[R34]	X							X		X
[R35]	X								X	X
[R36]	X			X						X
[R37]	X			X						X
[R38]	X			X						X
[R39]	X			X						X
[R40]	X					X	X		X	X
[R41]	X	X								

5. IMPLEMENTATION, INTEGRATION AND TEST PLAN

We have adopted a microservices architecture, therefore, the implementation of individual services can occur in parallel. Each service can be tested individually before being integrated with the others. Once multiple services that are dependent on each other have been tested and their correct functioning has been verified, they can be integrated together.

With a sufficient number of integrated components, we can proceed with integration testing to verify that the components function adequately even when integrated. During development and testing, interactions between services can be simulated using mock servers to ensure that each service responds correctly and meets the required specifications.

Furthermore, we will use a CI/CD pipeline to automate the process of continuous integration and deployment. This will allow us to automatically test every code change to ensure that no issues arise following an integration or modification. The use of a CI/CD pipeline will improve the efficiency of the software development process, providing continuous and rapid feedback, and reducing the risk of errors.

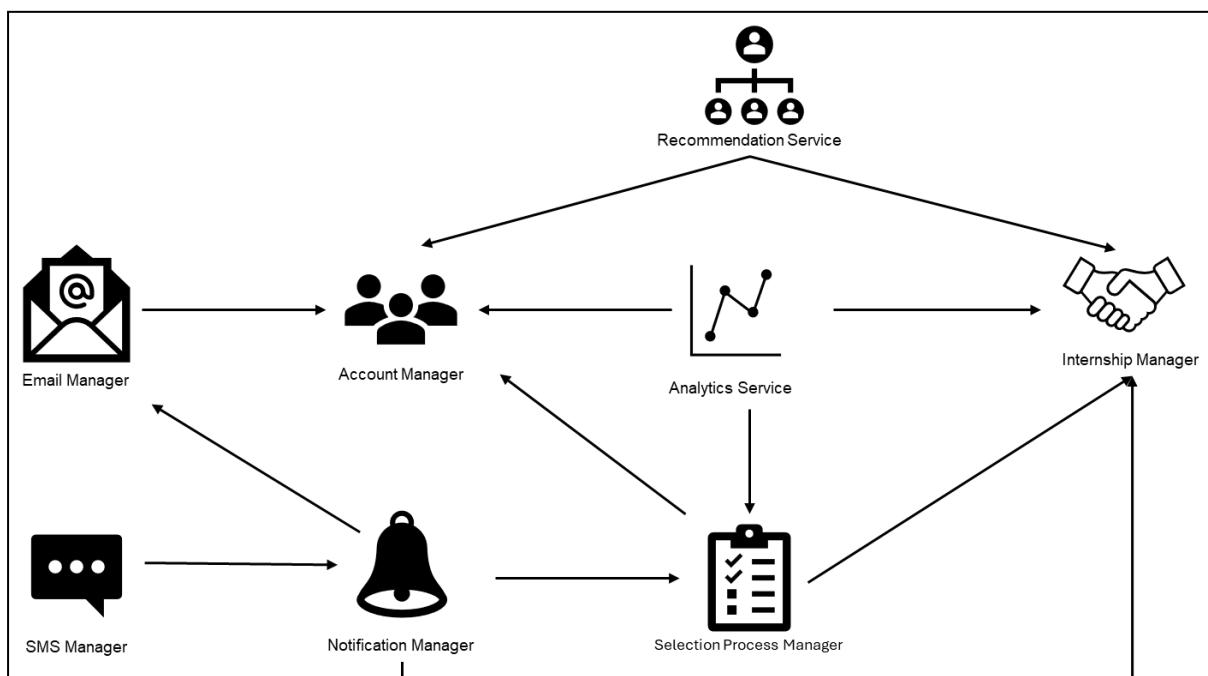


Figure 5.1: Integration plan of the services, the arrows point to the service to which the source service is integrated

Since microservices can be designed independently, we propose the parallel development of each service following a specific integration order. Upon completion of the core components necessary for the platform's operation, these core components will be integrated with each other. Subsequently, those directly dependent on them will be integrated.

The initial components to be implemented in parallel are the Account Manager, the Internship Manager, and the Selection Process Manager. Once these components have been independently tested, the Internship Manager and the Selection Process Manager will be integrated with each other. Meanwhile, the Account Manager will be integrated with the Mail Manager. These two blocks will then be tested and subsequently integrated with each other. Following this, the Recommendation Service will be integrated. Finally, the remaining components—Analytics Manager, SMS Manager, and Notification Manager—will be integrated, with the SMS Manager and Notification Manager being integrated beforehand. In the end, the final integration test is performed to verify the functioning of the integrated components.

6. EFFORT SPENT

	Alberti	Gaudiano	Pazienza
Introduction	2	2	1
Architectural Design	32	15	40
User Interface	0	22	1
Requirements Traceability	6	4	1
Implementation, Integration and Test Plan	4	4	1
Miscellaneous	5	2	5
Total	49	49	49

Table 6.1: Effort spent by each member of the group (in hours)

7. REFERENCES

- Overview (section 2.1) and Implementation, integration and test plan (section 5) figures made with: [Microsoft PowerPoint, software per presentazioni | Microsoft 365](#)
- Component View and Deployment View diagrams (section 2.2 and 2.3) made with: [draw.io](#)
- SDs (section 2.5) made with: [SequenceDiagram.org - UML Sequence Diagram Online Tool](#)
- UIs (section 3) made with: <https://app.visily.ai>