IS 2901 – Software Development Project

Interim Report

Marketplace for Doctors

Mora Bytes

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University of Moratuwa 2023

Declaration

We declare that this report is our own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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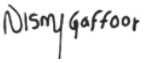
225078F	A.G.F. Nishmy	

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Abstract

Effectively connecting doctors, medical students, recruiters, and educational institutions is a difficulty for the healthcare sector. It can be challenging for recruiters to find qualified candidates and for doctors to find appropriate job opportunities due to the fragmented nature of traditional recruitment and career development processes. Career progression is often hampered by the lack of knowledge about further education.

This project suggests MediConnect, a web-based platform created with the MERN (MongoDB, Express.js, React.js, Node.js) stack that is intended to help medical professionals with their job search, internship applications, and higher education research. Doctors and students can compare resumes, manage professional profiles, get employment suggestions, and research advanced medical programs on the portal. Institutions may advertise their programs and handle applications, while recruiters can post job positions, select applicants, and rate resumes.

The system ensures a seamless user experience through role-based dashboards, real-time notifications, and direct communication tools. By leveraging modern web technologies, MediConnect aims to enhance efficiency in medical recruitment, improve hiring decisions, and support career growth in the healthcare sector.

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Chapter 1: Introduction

1.1 Introduction

The MediConnect project is a game-changing initiative in the fields of career development and healthcare hiring. By offering a centralized platform that expedites internship applications, employment placements, and access to further education possibilities, it seeks to close the gap between medical practitioners, recruiters, and educational institutions. MediConnect is intended to offer a user-friendly, effective, and extremely accessible experience for all parties involved by utilizing contemporary technologies like the MERN stack.

MediConnect is a comprehensive platform that meets the demands of educational institutions, recruiters, doctors, and medical students. To make sure users can easily use the site and accomplish their career goals, the system provides essential features including job recommendations, CV tools, real-time notifications, and customized dashboards. Managing job applications, accessing educational programs, and enabling real-time user interactions are some of its notable features, all while improving

MediConnect's ultimate goal is to transform the healthcare hiring industry by offering a comprehensive, user-focused platform that blends cutting-edge technology with an easy, effective, and accessible experience for every user. In addition to increasing operational effectiveness, MediConnect aims to establish new benchmarks for service quality, guaranteeing a flexible and adaptable environment to satisfy the changing needs of the healthcare industry.

1.2 Problem in Brief

The healthcare recruitment process currently faces several challenges, including:

- Inefficient Job Matching:
    - Many medical professionals struggle to find jobs that match their specific skills and experience, leading to job dissatisfaction.
    - Recruiters often face difficulties in identifying the right candidates due to a lack of real-time data and comprehensive profiles.
- Fragmented Recruitment Process:
    - Medical institutions and recruiters lack a centralized platform for posting job listings, managing applications, and communicating with candidates, resulting in inefficiency and missed opportunities.
- Limited Access to Education:
    - Medical professionals and students have difficulty finding and applying for relevant higher education programs due to a lack of centralized access to educational institutions and programs.
- Poor Communication:
    - The recruiting process is delayed and stakeholders are dissatisfied when medical professionals, and educational institutions are unable to communicate in real time.

1.3 Aim and Objectives

1.3.1 Aim

The aim of MediConnect is to develop a comprehensive platform that addresses the challenges of medical recruitment and career development. By integrating job recommendations, CV management , real-time notifications, and educational program access, the platform will streamline the recruitment process, enhance communication, and facilitate professional growth for medical professionals. MediConnect seeks to improve the efficiency of the healthcare recruitment process while enhancing the overall user experience.

1.3.2 Objectives

- Streamline Job Matching and Recruitment
    - Ensure efficient and accurate job matching for medical professionals.
    - Improve recruitment processes by providing real-time data and personalized recommendations.
- Centralize Communication and Applications
    - Provide a centralized platform for recruiters to post jobs and manage applications.
    - Enable real-time communication between recruiters, medical professionals, and educational institutions.
- Enhance Access to Education:
    - Provide a platform for medical professionals and students to access relevant higher education programs.
    - Streamline the application process for educational institutions.
- Improve User Experience:
    - Develop a user-friendly interface that makes it easy for all stakeholders to navigate the platform.
    - Implement personalized dashboards for different user types (physicians, medical students, recruiters, educational institutions) to enhance engagement.

1.4 Proposed Solution

MediConnect is a web-based platform that consolidates the medical recruitment and education process into one comprehensive system. The platform is designed to facilitate job searches, application management, real-time communication, and easy access to higher education programs. MediConnect's standout feature is its personalized job recommendation system, which uses machine learning to match medical professionals with the most relevant job opportunities. In addition, the platform provides recruiters with an efficient tool to manage job postings, applications, and communications with candidates. Educational institutions can also benefit by using the platform to advertise their programs and manage student applications.

1.5 Structure of the Report

The report presents the development of a healthcare recruitment system to address inefficiencies in traditional hiring methods. It aims to enhance efficiency, optimize job matching, and improve user experience. A literature review identifies gaps in existing systems, forming the foundation for an improved solution. The proposed system's architecture, technology stack, and workflow are outlined, ensuring seamless recruitment. The implementation phase involves development, integration, and testing to measure effectiveness. The report concludes with key findings, references, and an appendix on team contributions. This structured approach ensures clarity in understanding the problem, solution, and implementation, making it a valuable resource for future improvements.

1.6 Summary

The MediConnect project aims to revolutionize healthcare recruitment and career development by providing a centralized, user-friendly platform for medical professionals, recruiters, and educational institutions. The system seeks to address challenges such as inefficient job matching, fragmented recruitment processes, and limited access to higher education programs. Through advanced features like personalized job recommendations, CV management, and real-time notifications, MediConnect promises to streamline the recruitment process and improve the professional growth of healthcare workers. The following chapter will delve into a literature review of existing solutions within the healthcare recruitment and education sectors, setting the stage for the evolution of MediConnect**.**

Chapter 2: Literature Review

2.1 Introduction

The growth of the healthcare sector has led to a surge in demand for improved recruitment processes, career development tools, and connections between medical professionals, students, recruiters, and educational institutions. In response, various platforms have emerged, each focusing on different aspects of the healthcare recruitment and professional development process. However, many of these platforms fail to provide a centralized solution that connects all stakeholders effectively.

The MediConnect project seeks to address the inefficiencies present in current healthcare recruitment and career development platforms by providing a unified platform where physicians, medical students, recruiters, and educational institutions can interact seamlessly. This chapter explores existing approaches within healthcare recruitment systems, highlighting their strengths and limitations, and outlines the need for a more integrated and efficient solution like MediConnect.

2.2 Analysis of Current Healthcare Recruitment Systems

1. **Healthcare Recruitment Platforms**
   Healthcare recruitment platforms aim to connect medical professionals with recruiters and institutions. Some platforms focus on job boards, where recruiters post job opportunities, and physicians or students apply. However, these platforms often lack integrated features such as real-time job recommendations, CV tools, and career development resources that can enhance the recruitment process.
   Example: PracticeLink
   Limitations: While PracticeLink offers job listings and job search tools, it lacks personalized recommendations for medical professionals based on their skills and preferences. Furthermore, the platform does not offer integrated career development tools such as mentorship programs or educational resources.
2. **Job Boards and Career Development Platforms**
   Some platforms, such as LinkedIn and Indeed, provide job listings, but their focus is not specifically tailored to healthcare professionals. These platforms often lack the specificity and tailored features that would benefit healthcare recruitment, such as medical-specific filters and career guidance specific to various medical fields.
   Example: LinkedIn
   Limitations: LinkedIn provides a global network for professionals but lacks specific features designed for the healthcare sector. The absence of specialized tools, such as CV builders tailored for physicians and integration with medical institutions, hinders the platform's ability to meet the needs of healthcare professionals effectively.

3. **Education-Focused Platforms for Healthcare Professionals**
   Educational platforms designed for medical students and professionals often provide resources for continuing education, certifications, and training

opportunities. These platforms tend to be isolated, focusing on educational resources rather than providing a comprehensive ecosystem that also includes recruitment and career development features.

Example: MedEdPORTAL

Limitations: MedEdPORTAL focuses on education but lacks integration with job placement or recruitment features. Medical students looking for career opportunities or recruiters seeking specific skills may find it difficult to navigate the platform for their specific needs.

4. **Integrated Healthcare Professional Platforms**

   Integrated platforms like **Doximity** attempt to bridge the gap between healthcare professionals and recruiters. They offer features like job listings, educational resources, networking, and collaboration tools. However, while these platforms serve physicians, they do not provide specialized career development tools for students or recruiters.

   Example: Doximity

   Limitations: While Doximity is widely used among healthcare professionals, it is more focused on networking and social aspects rather than providing a holistic system for recruitment and professional development. It also lacks tools for career advice or structured educational pathways.

2.3 Comparison of Approaches

Approach	Features	Limitations	Your Approach
Healthcare Recruitment Platforms (e.g., PracticeLink, LinkedIn)	Provides job listings and application tools for healthcare professionals	Lacks personalized career development tools and CV recommendations	Integrated Career Support: Offers job recommendations, CV management, and career development resources.
Education-Focused Platforms (e.g., MedEdPORTAL)	Provides educational resources, certifications, and training opportunities	Does not integrate recruitment or career development features	Career & Learning Hub: Combines education with career growth, offering training programs alongside job opportunities.
Professional Networking Platforms (e.g., Doximity)	Offers professional networking, job listings, and healthcare-specific focus	Limited career guidance tools, lacks integration with educational institutions	End-to-End Networking & Recruitment: Connects users with mentors, recruiters, and institutions in a unified space.
Open-Source & Proprietary Solutions	Customizable, secure, and scalable for data management & analytics	High cost (for proprietary) or lacks robust security (for open-source)	Scalable & Secure: Implements RBAC (Role-Based Access Control) and ensures cost-effective scalability.

2.4 Summary

This chapter explored existing platforms that address different facets of healthcare recruitment and professional development. While platforms like **PracticeLink**, **LinkedIn**, and **Doximity** offer useful features for job listings and professional networking, none provide the comprehensive, integrated solution needed to address the unique needs of healthcare professionals, students, recruiters, and educational institutions. **MediConnect** aims to bridge these gaps by offering a unified platform that integrates job recommendations, CV tools, career development resources, and real-time notifications. By bringing together these essential features, **MediConnect** will create a more efficient and user-friendly experience for all stakeholders involved in the healthcare recruitment process.

Chapter 3: Solution Approach

3.1 Introduction

In this chapter, we present the solution approach adopted for MediConnect, a web-based platform designed to bridge gaps in healthcare recruitment and career development. The chapter provides an in-depth explanation of how the platform addresses the identified inefficiencies, the key technologies utilized, and their integration to deliver a seamless user experience.

Our approach revolves around user-centric design, automation, and intelligent matching, ensuring that physicians, medical students, recruiters, and educational institutions can efficiently connect. This chapter details the users, inputs, outputs, processes, and the technology stack employed to build and deploy the system effectively.

3.2 Solution Overview

MediConnect offers a comprehensive digital ecosystem tailored to the needs of the healthcare industry. By leveraging modern web technologies, the platform streamlines job recommendations, CV generation, real-time notifications, and role-specific dashboards. The key aspects of our solution are:

1. User-Centric Experience – Role-based dashboards and tailored recommendations for different user types (physicians, students, recruiters, institutions).
2. Automated Recruitment Process – job matching, and seamless application workflows.
3. Real-time Notifications & Updates – WebSocket integration to enable real-time job alerts and application status updates.
4. Secure and Scalable Architecture – MERN stack implementation ensuring data security, role-based access control (RBAC), and efficient system scaling.

3.3 Technology Stack & Implementation

MediConnect is built using the MERN stack (MongoDB, Express.js, React.js, Node.js), ensuring a dynamic, scalable, and responsive application. The following technologies have been strategically chosen to implement the solution:

3.3.1 Frontend (React.js)

- React.js enables a dynamic and interactive user interface.
- Tailwind CSS for styling and responsiveness.
- React Router for seamless navigation.
- Redux (or Context API) for efficient state management.

3.3.2 Backend (Node.js & Express.js)

- Express.js for RESTful API development.
- JWT Authentication for secure user login and session management.
- Role-Based & Claim-Based Access Control (RBAC & CBAC) for data protection.
- WebSocket (Socket.io) for real-time communication.

3.3.3 Database (MongoDB)

- MongoDB Atlas for cloud-based storage and scalability.
- Mongoose ORM for data modeling and schema validation.

3.3.4 Additional Tools & Integrations

- Nodemailer for email notifications.
- Cloudinary for image and document uploads (CVs, certificates, etc.).
- Stripe (or other payment gateway) for transaction handling (if premium features are included).
- GitHub & CI/CD pipelines for continuous deployment and version control.

3.4 System Workflow & Process

1. User Registration & Authentication
    - Users sign up based on their roles (Physician, Medical Student, Recruiter, Institution).
    - Email verification and profile completion steps.

2. Profile & Document Management
    - Users upload CVs, certifications, and professional details.
    - CV enhancement and formatting.

3. Job & Education Matching
    - recommendation engine for job seekers and recruiters.
    - Filtering and searching based on preferences, experience, and qualifications.

4. Application & Hiring Process
    - Job application submissions with real-time status updates.
    - Recruiters review applications, schedule interviews, and send offer letters.

5. Real-time Notifications & Communication
    - Instant updates on application status and new job postings.
    - WebSocket-enabled messaging system for seamless interaction.

3.5 Conclusion

The MediConnect platform is designed to revolutionize the healthcare hiring process by leveraging modern web technologies and intelligent automation. The MERN stack provides a scalable foundation, while job matching, real-time updates, and role-based dashboards enhance user experience. By implementing a secure and efficient system, MediConnect aims to bridge the gap between healthcare professionals and recruiters, ultimately improving career opportunities and workforce efficiency.

Chapter 4: Analysis and Design

4.1 Introduction

Following the identification of the challenges faced by healthcare professionals in recruitment and career development, we initiated the requirement gathering phase through comprehensive discussions with stakeholders, including physicians, medical students, recruiters, and educational institutions. This step was crucial in understanding their needs and expectations.

After gathering requirements, we proceeded with the system design phase, utilizing UML (Unified Modeling Language) diagrams to structure and visualize the system's architecture. These diagrams played a pivotal role in defining workflows, relationships, and system functionalities.

The system design incorporates several UML diagrams such as Activity, Class, and Sequence diagrams, ensuring a well-structured and efficient architecture for MediConnect. These diagrams serve as a blueprint for the subsequent development phases, providing a clear roadmap for implementation.

4.2 Analysis

4.2.1 Software Requirement Specification (SRS)

To ensure that MediConnect aligns with user needs, we categorized requirements into functional and non-functional aspects. The SRS document serves as a reference for defining and validating these requirements.

Functional Requirements

- User authentication (registration, login, and role-based access control)
- Profile management for physicians, students, recruiters, and institutions
- Job recommendation system based on user profile and preferences
- CV upload and document management tools

- Real-time notifications for job alerts, application status, and messaging
- Role-specific dashboards with customized functionalities
- Search and filtering options for job postings and institutions
- Secure messaging system for communication between users
- Integration with external APIs for job listings and credential verification

Non-Functional Requirements

- Scalability to accommodate a growing number of users and job postings
- High availability with minimal downtime
- Data security and encryption for user information
- Responsive design for accessibility on multiple devices
- Efficient database performance for quick data retrieval

4.3 Design

The design phase of MediConnect focuses on defining the system architecture, user interactions, and database structure. Various UML diagrams are employed to illustrate these aspects visually.

4.3.1 Use Case Diagram

The use case diagram outlines key interactions between users and the system, ensuring that all functional requirements are covered.

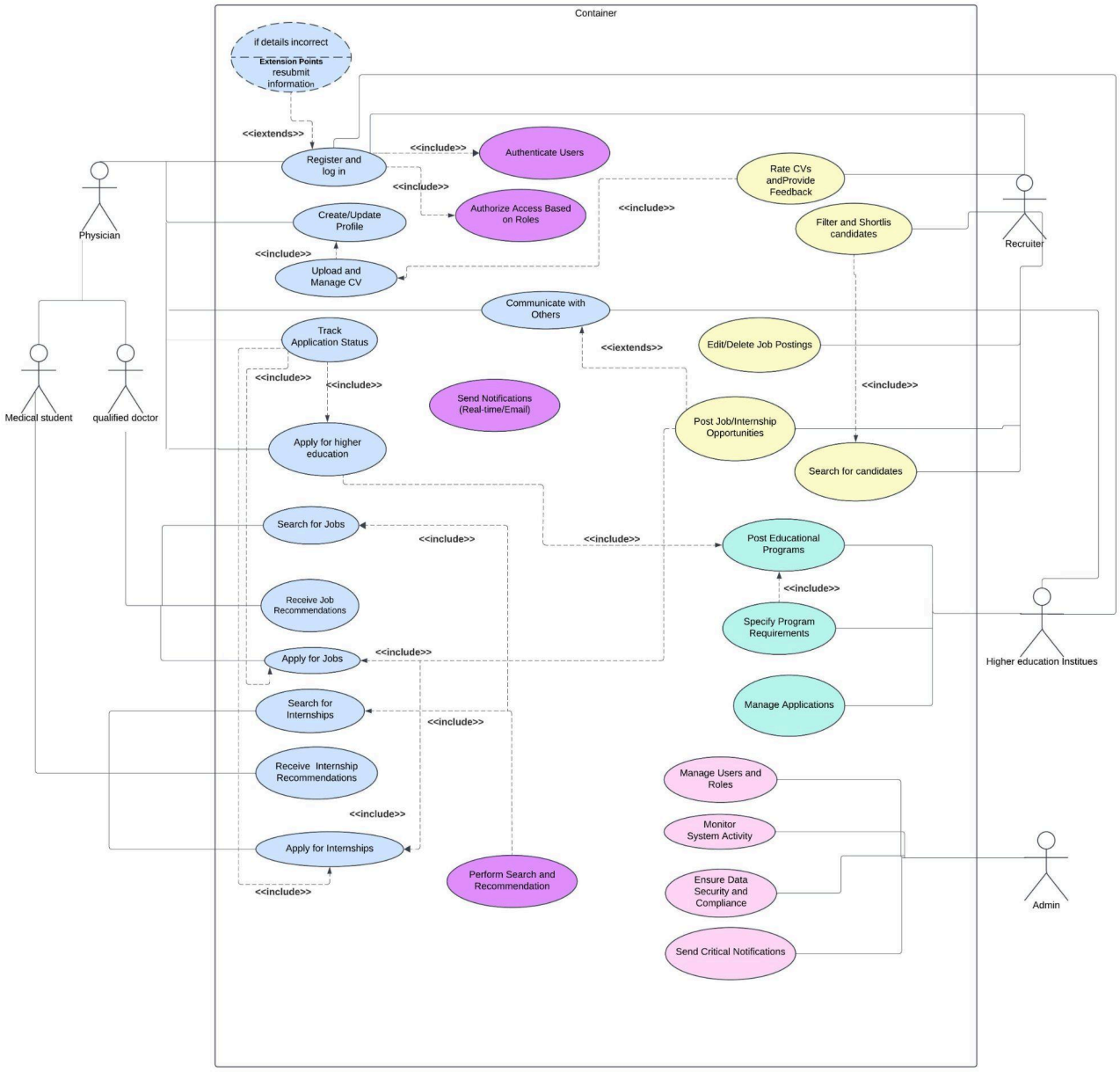

Figure 4.1: Use Case Diagram of MediConnect

4.3.2 Activity Diagram

Activity diagrams illustrate workflows for critical processes such as job applications, recruiter actions and messaging.

4.3.2.1 Create Account

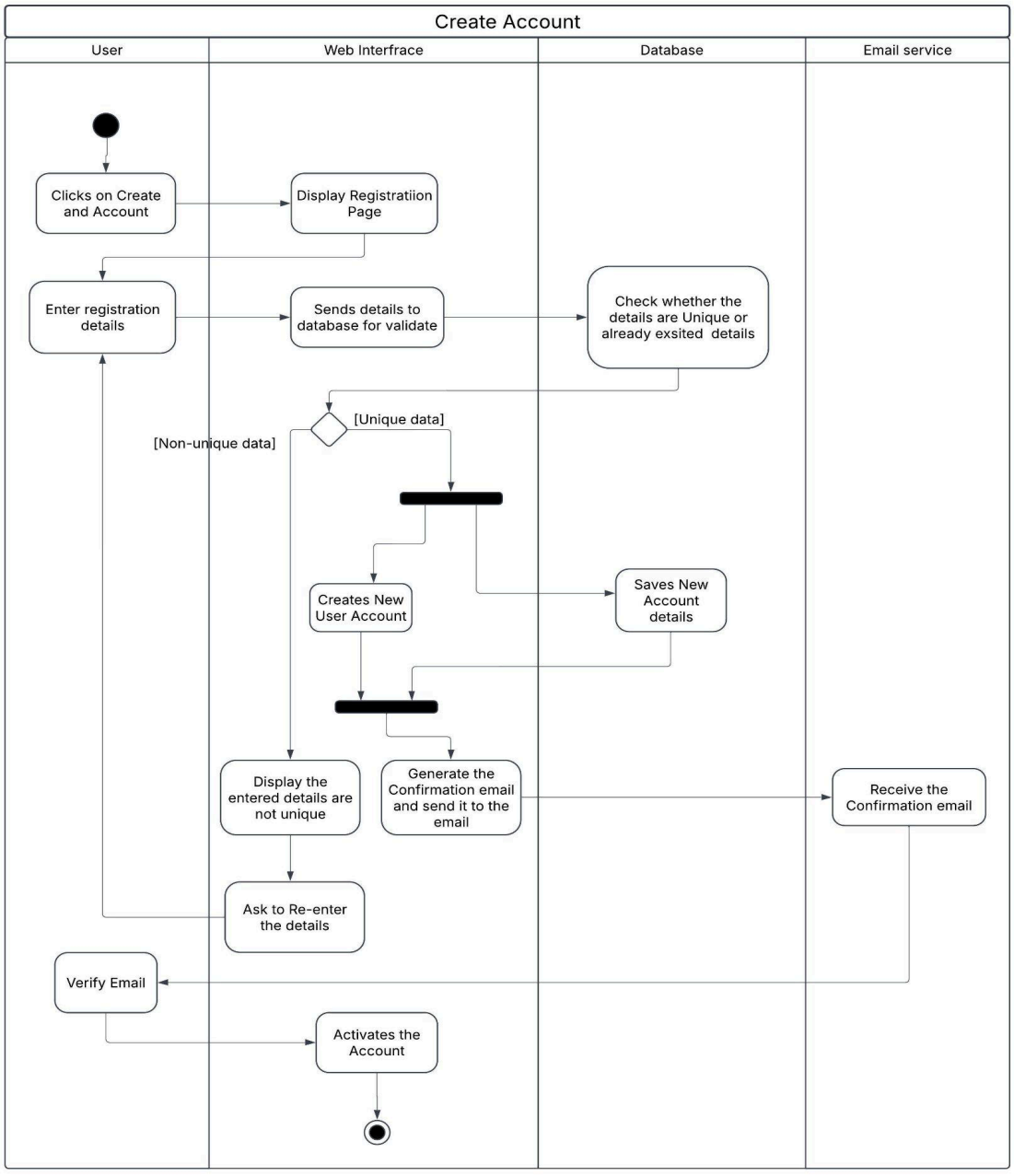

Figure : Activity Diagram for User Registration

4.3.2.2 Login

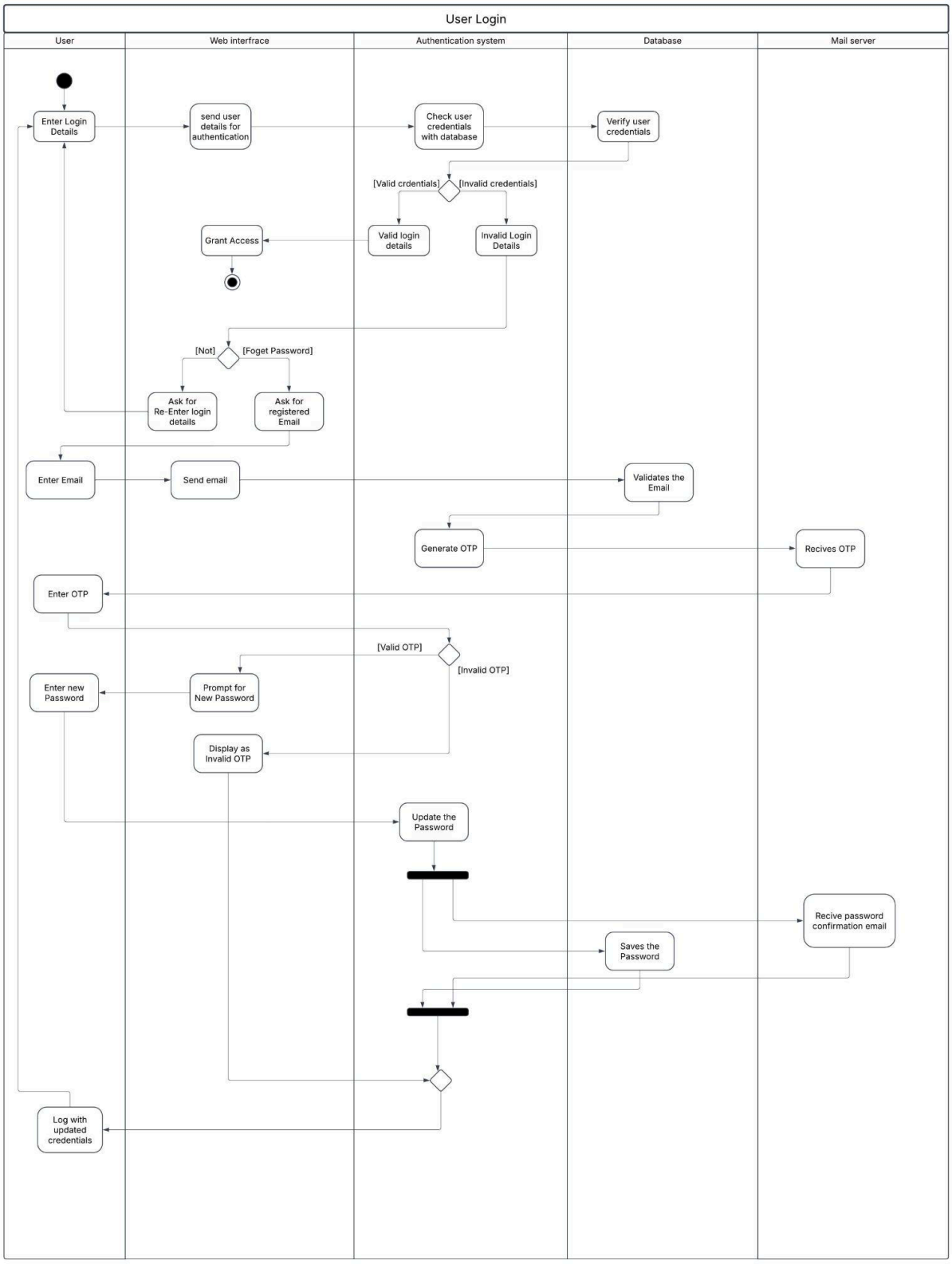

Figure : Activity Diagram for User Login

4.3.2.3 Update Account Details

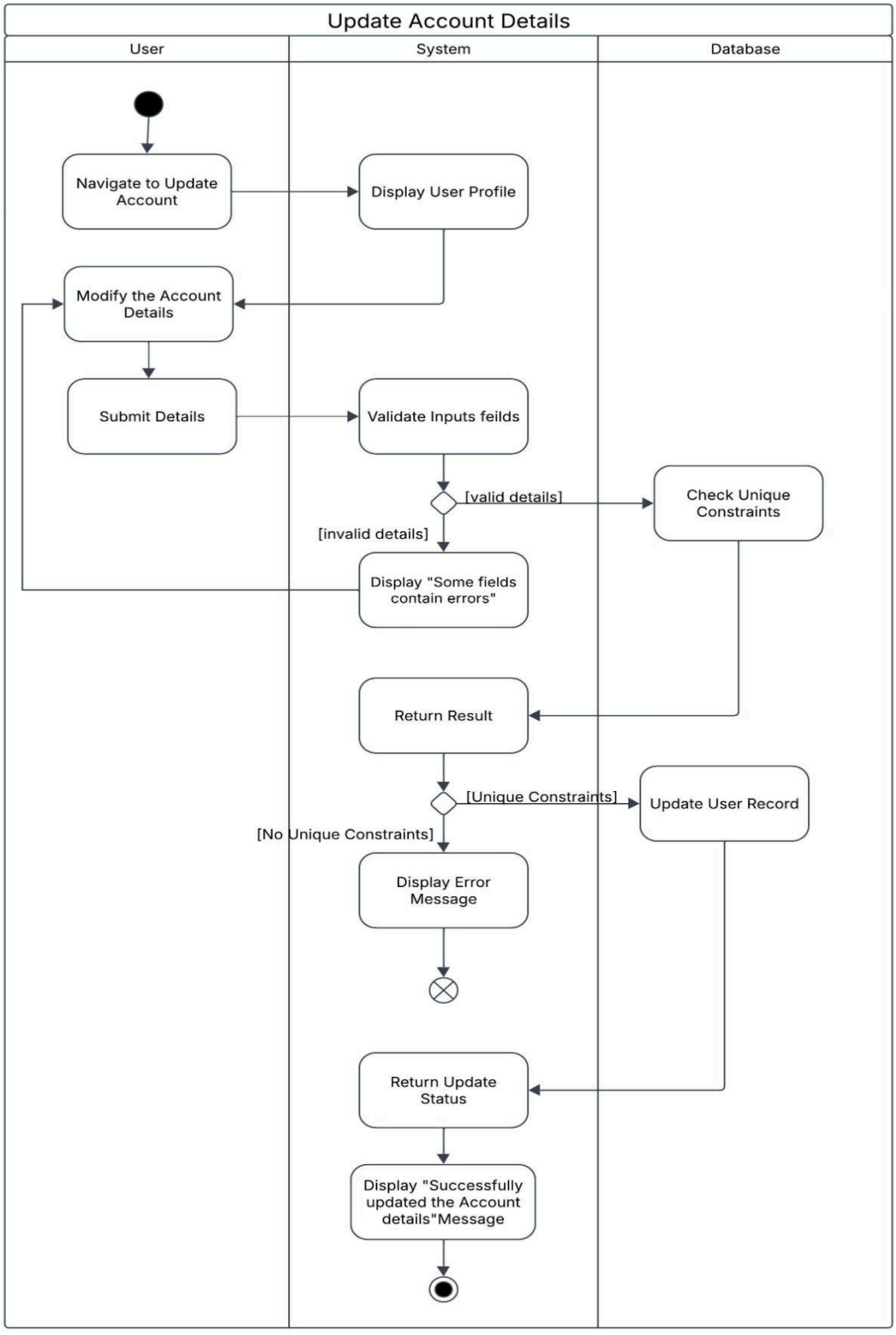

Figure : Activity Diagram for Update Account Details

4.3.2.4 Delete Account

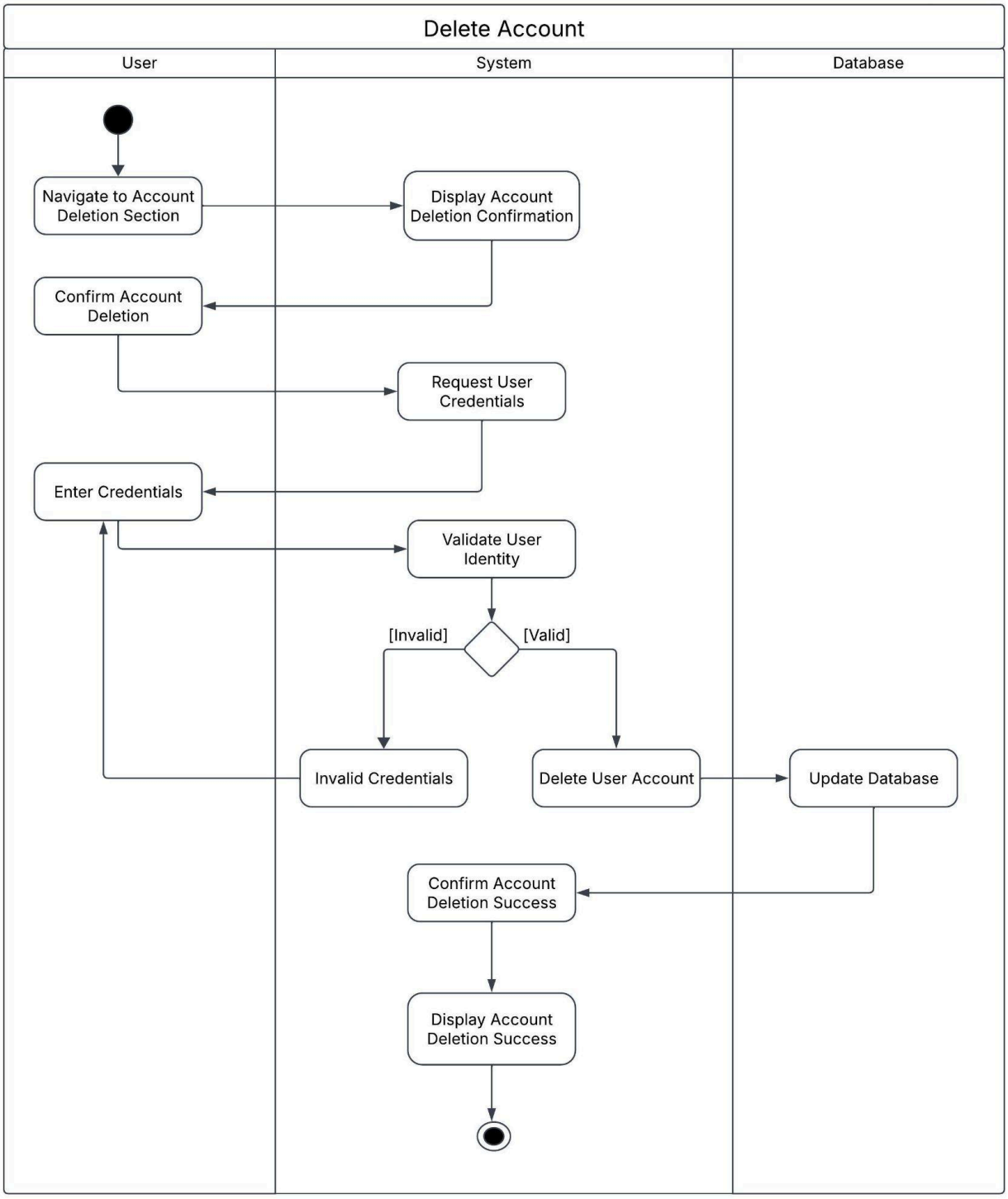

Figure : Activity Diagram for Delete Account

4.3.2.5 Search and apply for jobs/internships

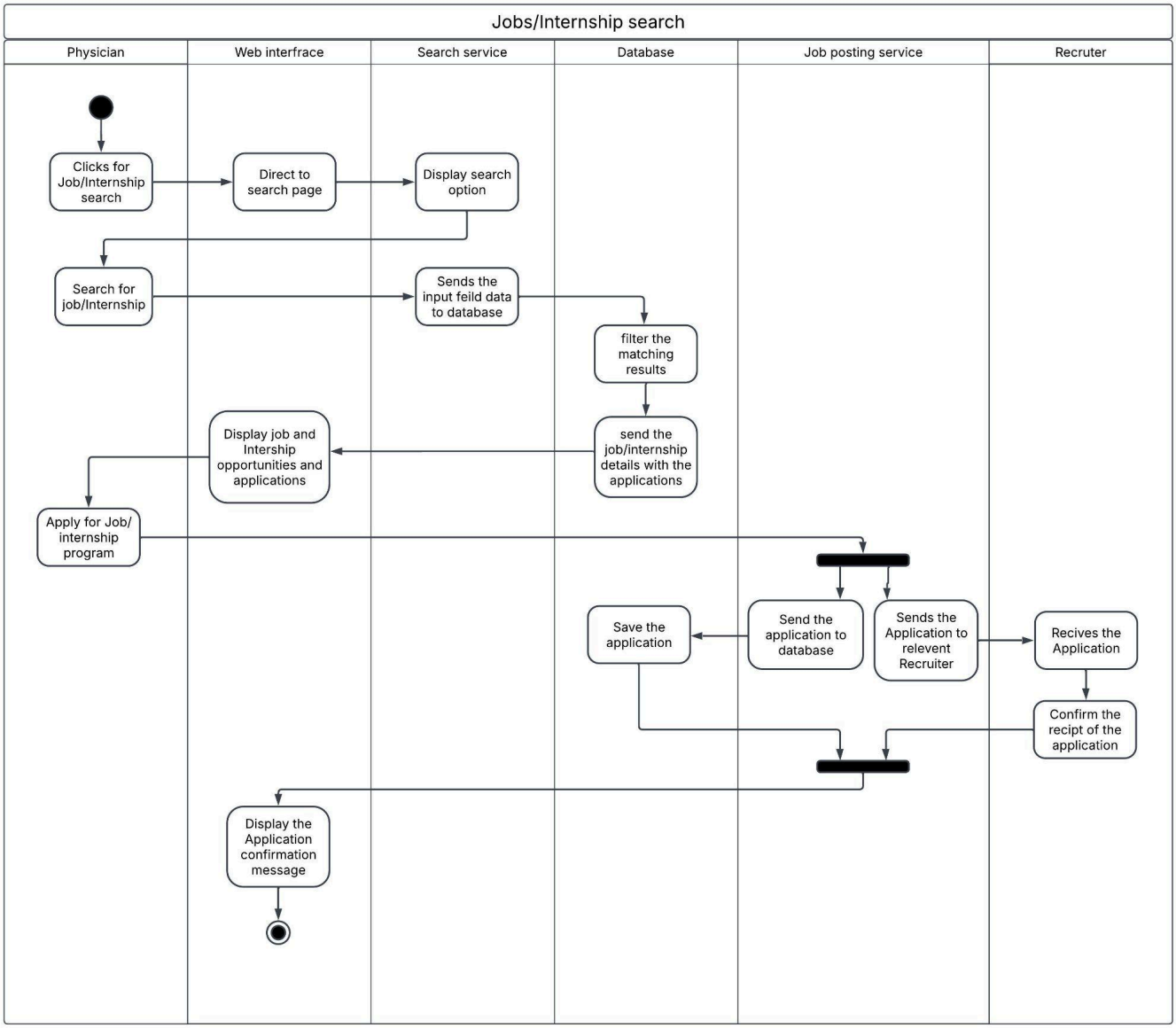

Figure : Activity Diagram for Search and apply for jobs/internships

4.3.2.6 Search and apply for degree programs

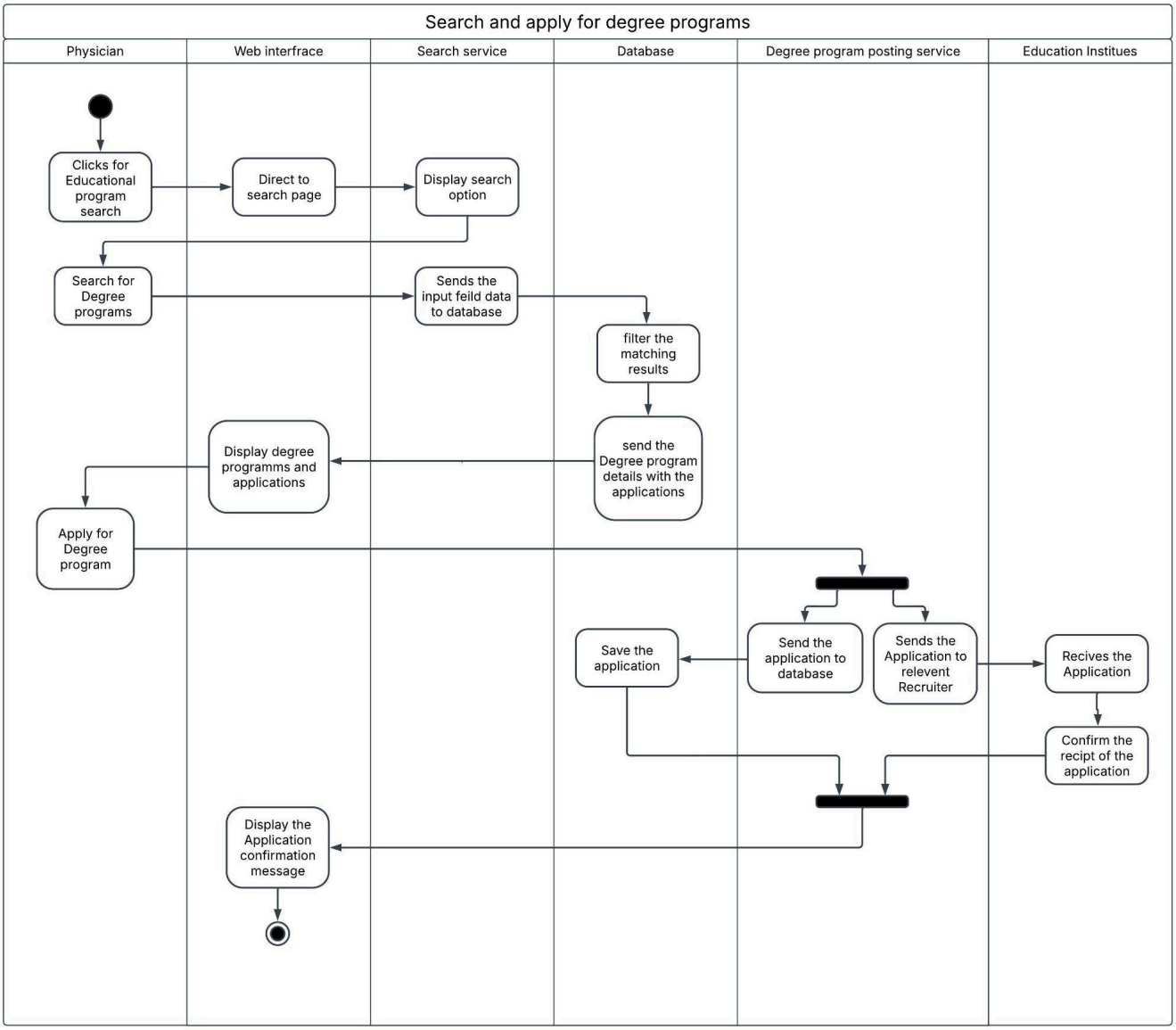

Figure : Activity Diagram for Search and apply for jobs/internships

4.3.2.7 CV Uploading

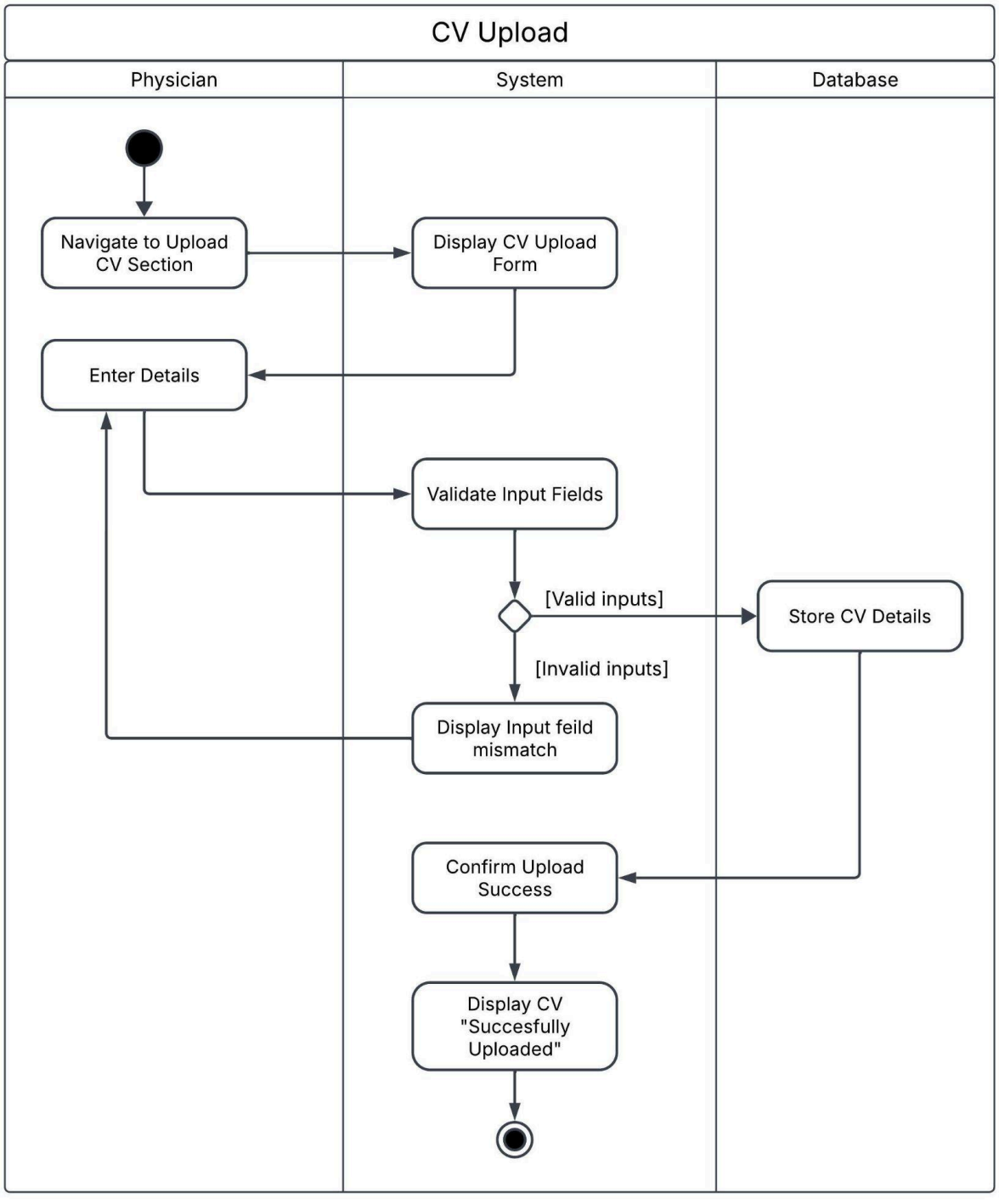

Figure : Activity Diagram for CV Uploading

4.3.2.8 Job Posting

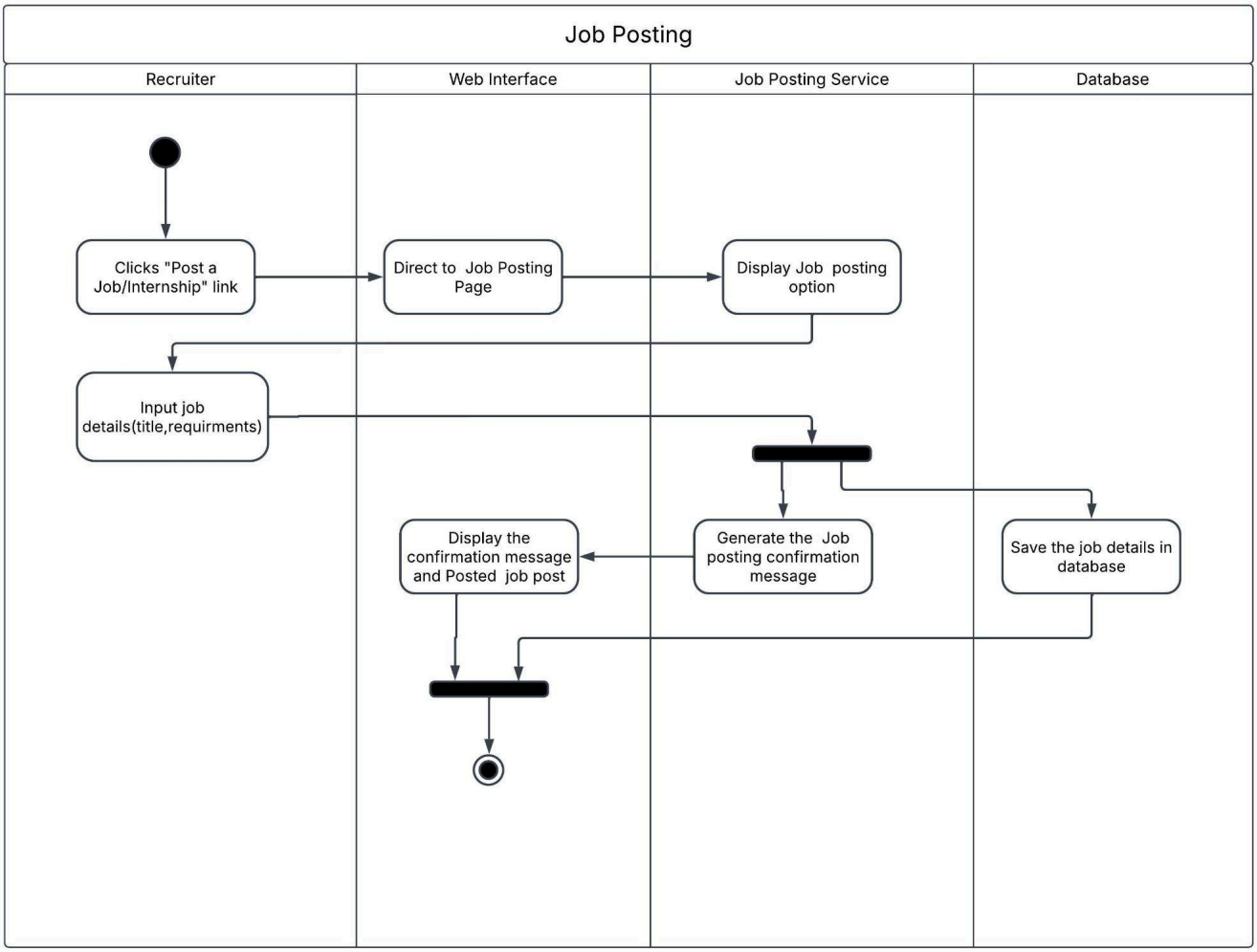

Figure : Activity Diagram for Job Posting

4.3.2.9 Degree Posting

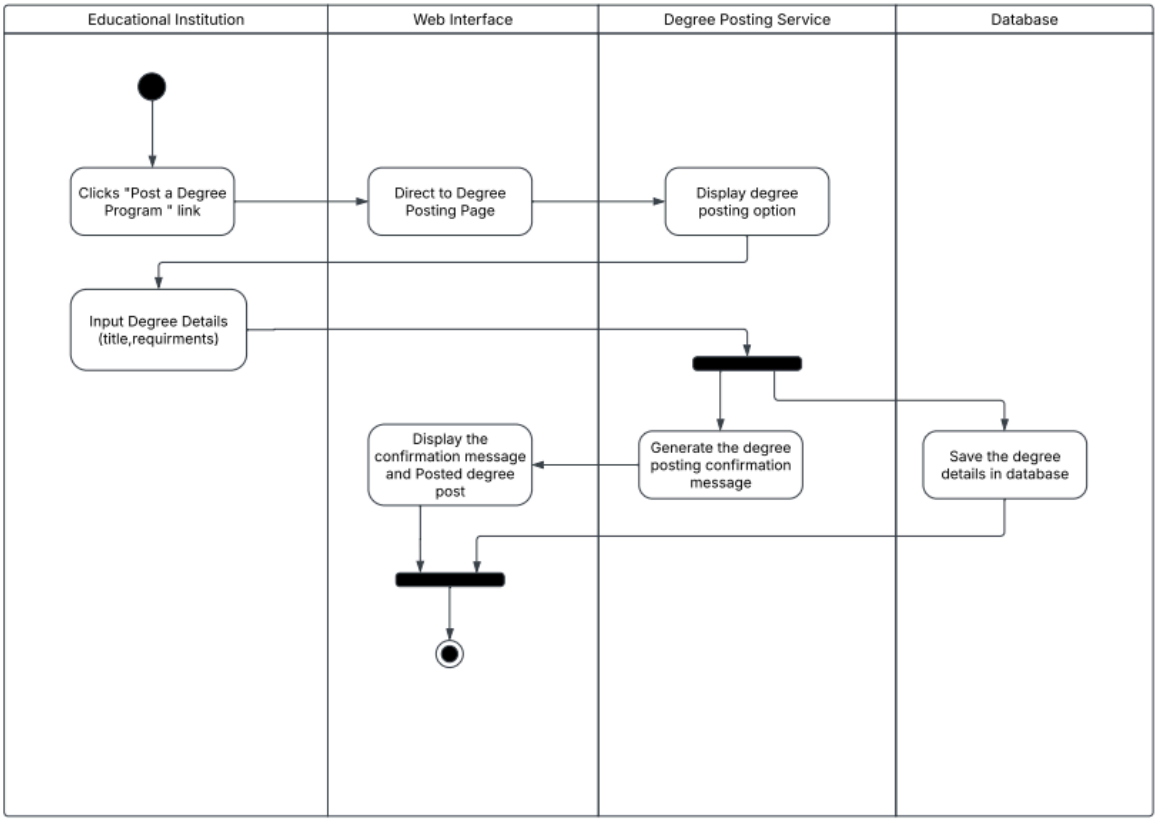

Figure : Activity Diagram for Degree Posting

4.3.2.10 Post Feedbacks

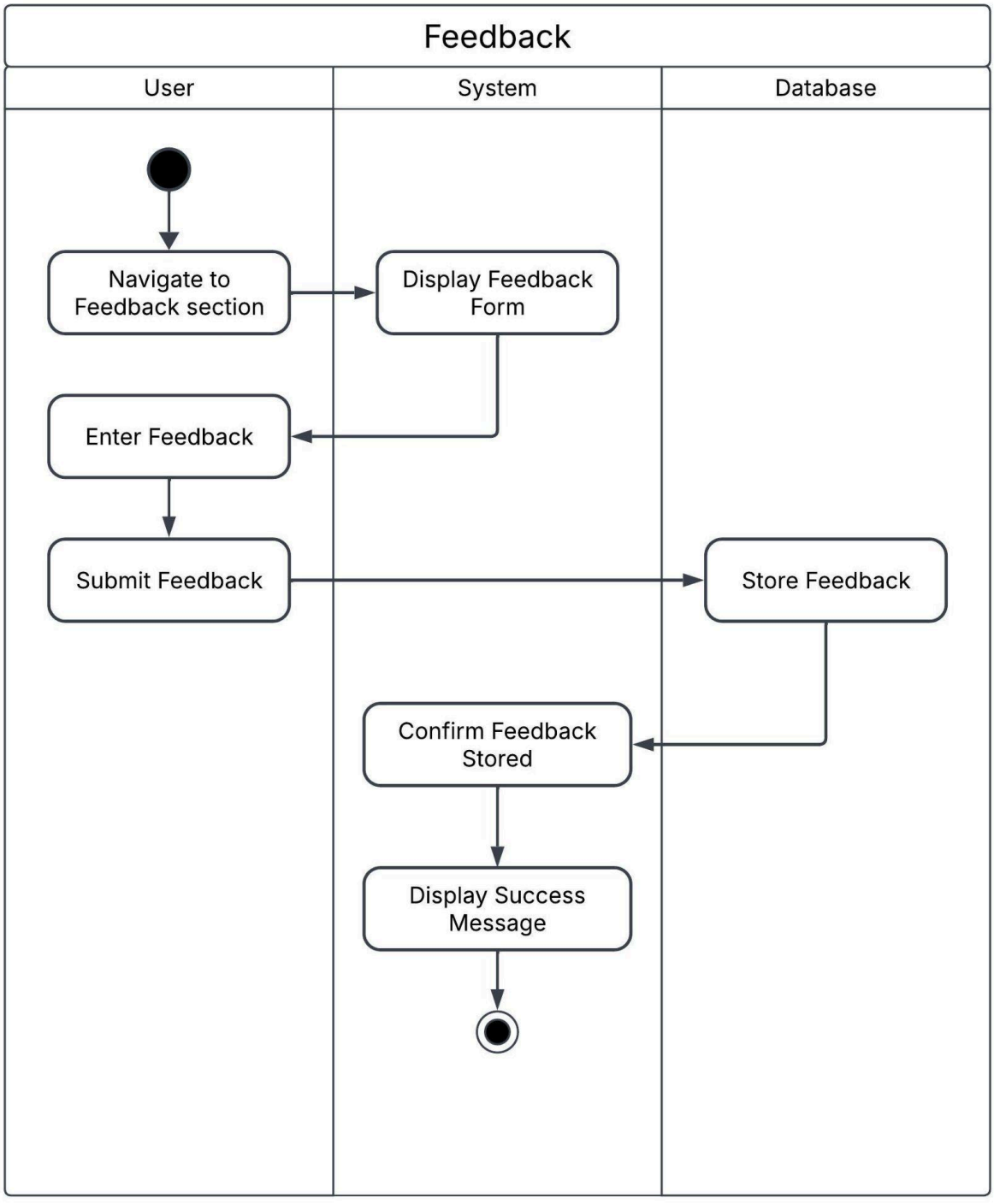

Figure : Activity Diagram for Post Feedbacks

4.3.3 Sequence Diagram

Sequence diagrams detail interactions between system components, showing how user requests are processed.

4.3.3.1 User Register

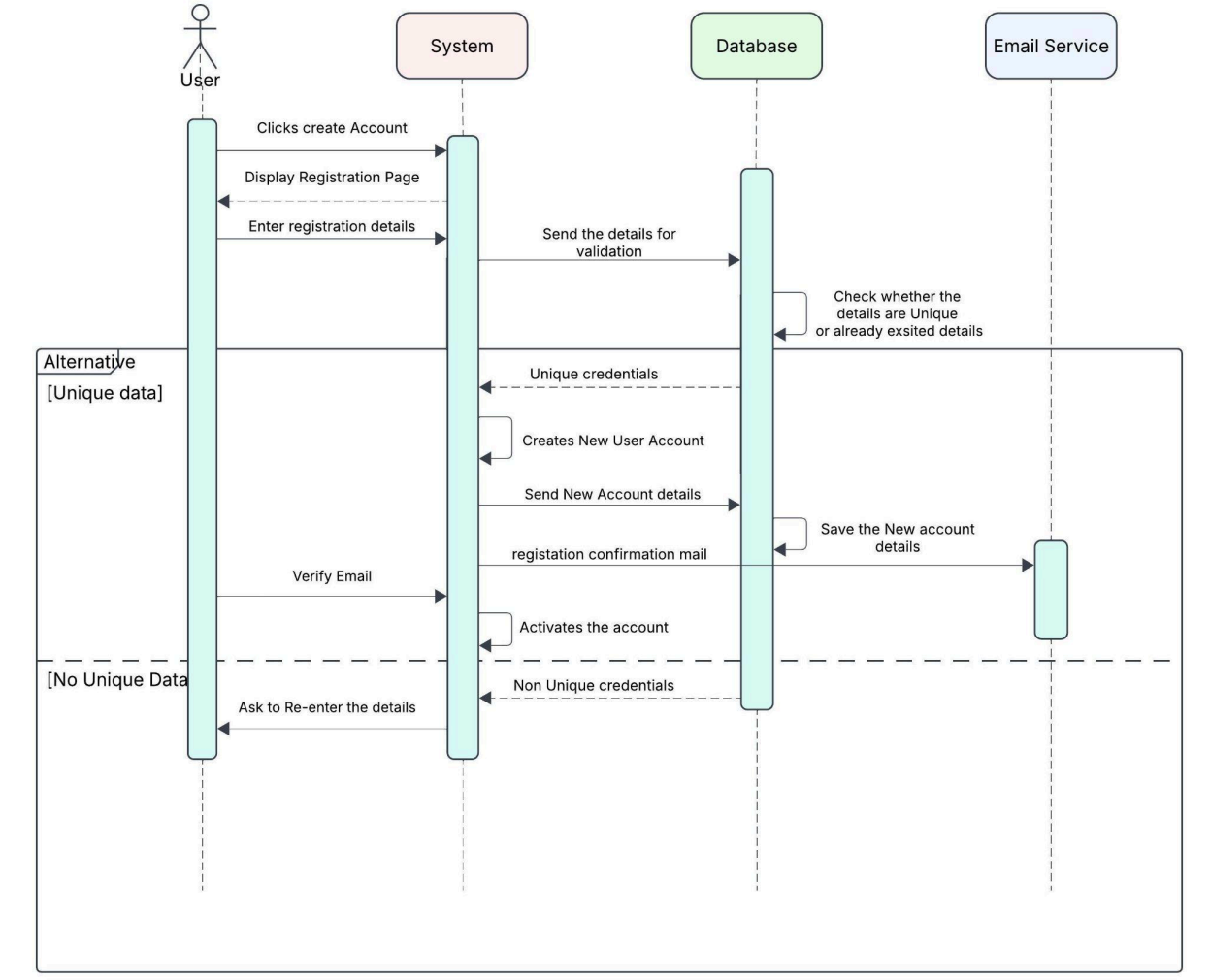

Figure 4.3: Sequence Diagram for User Register

4.3.3.2 User Login

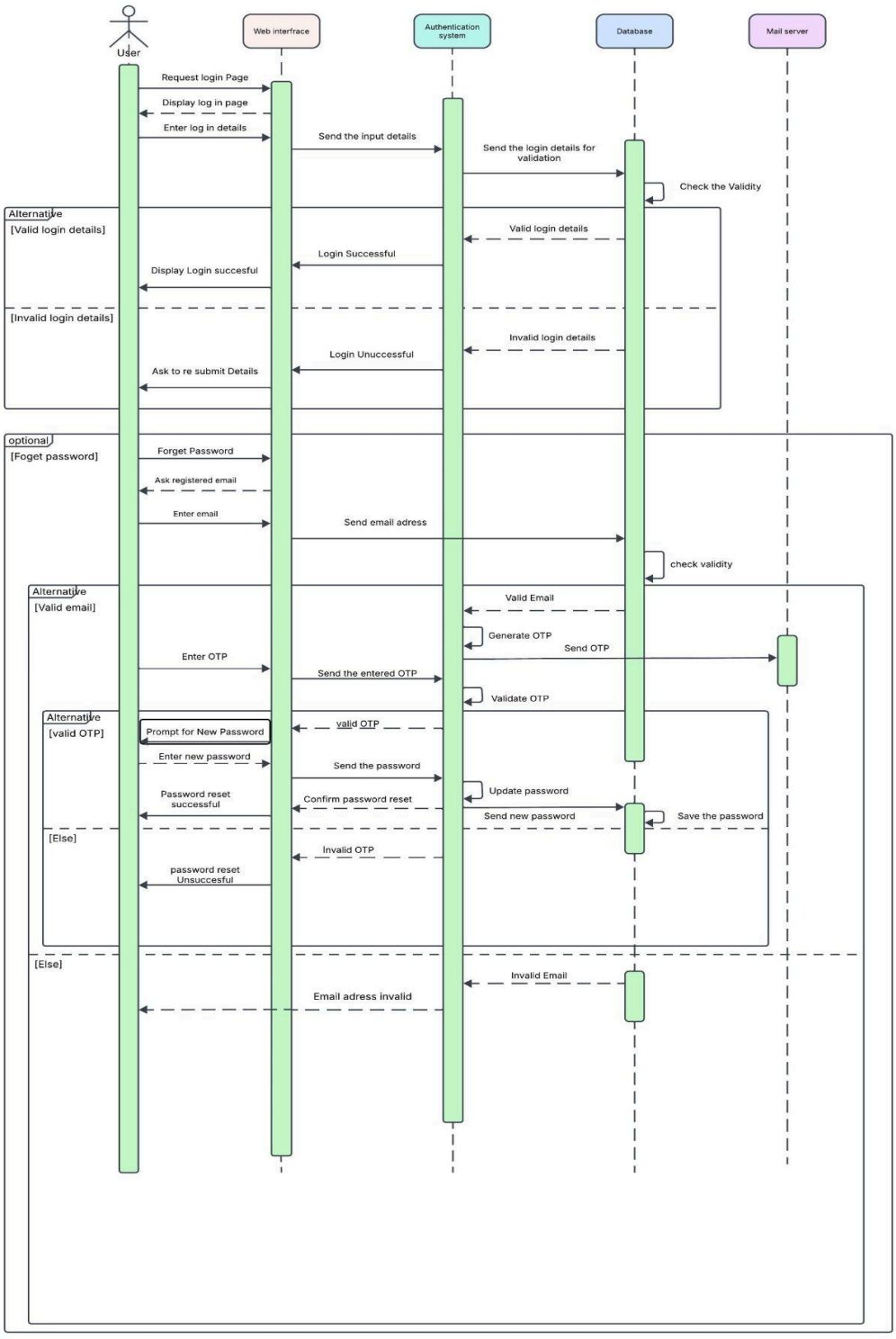

Figure 4.3: Sequence Diagram for User Login

4.3.3.3 Delete Account

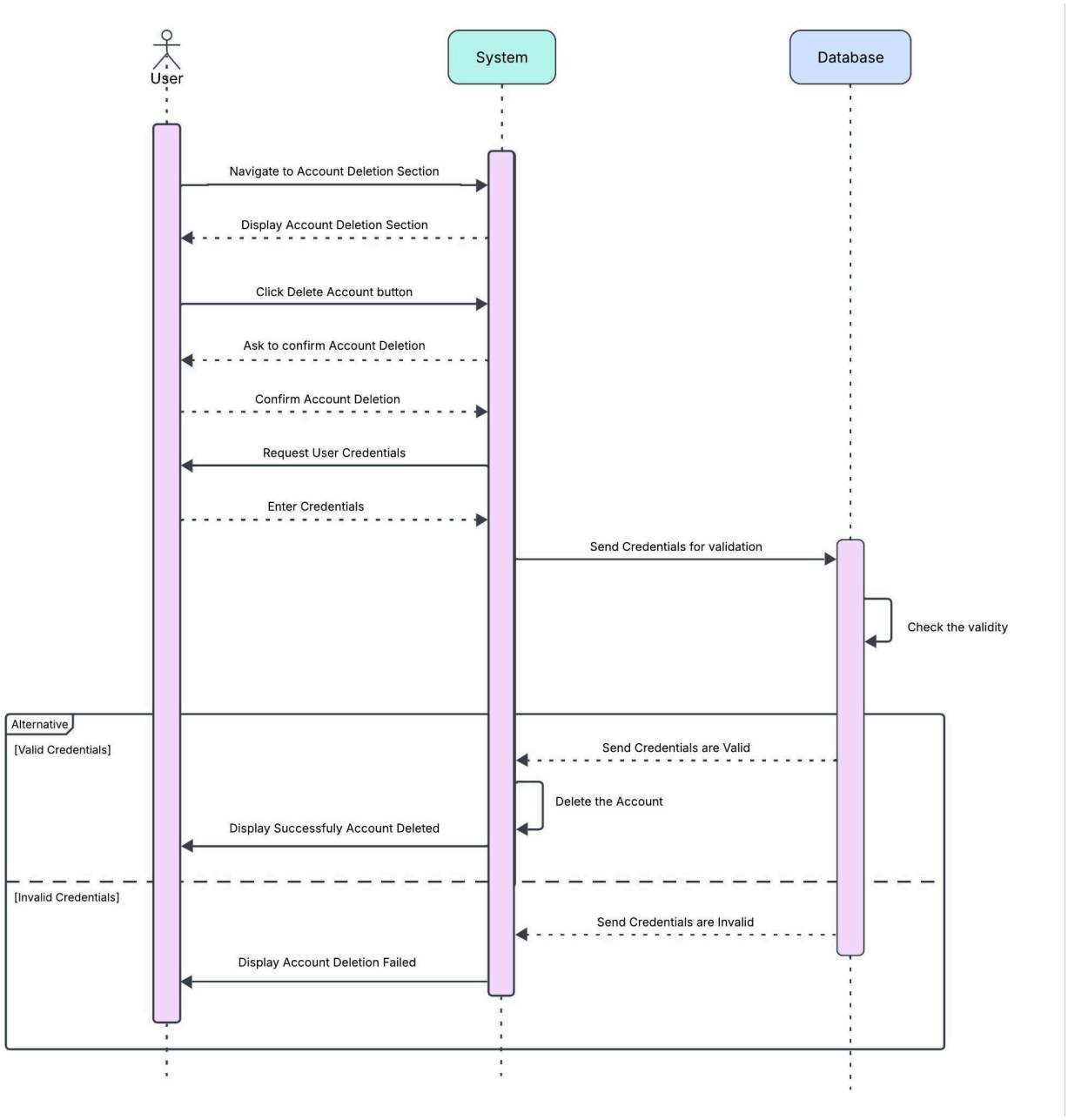

Figure 4.3: Sequence Diagram for Delete Account

4.3.3.4 Update Account

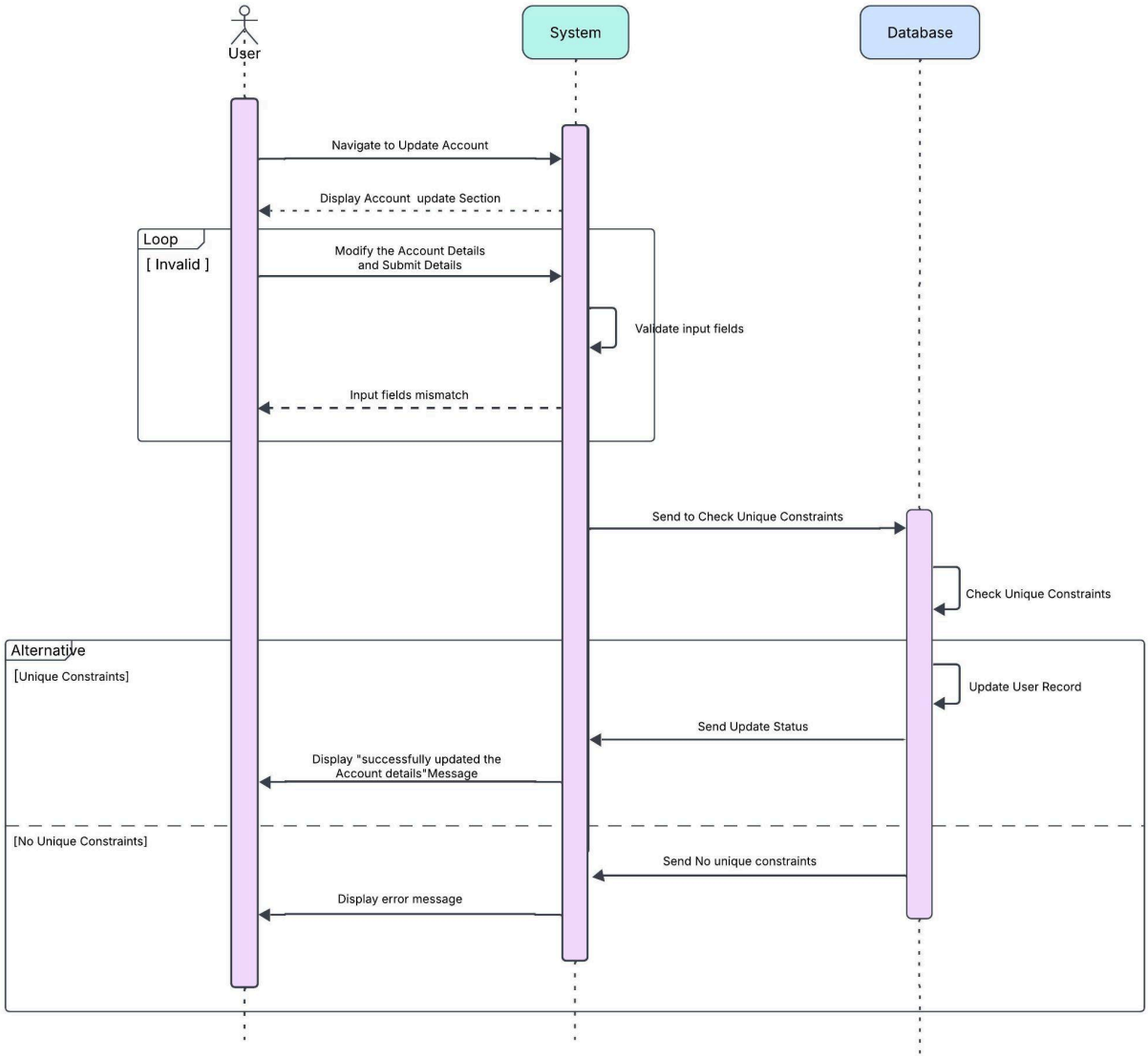

Figure 4.3: Sequence Diagram for Update Account

4.3.3.5 Search and apply for jobs/internships

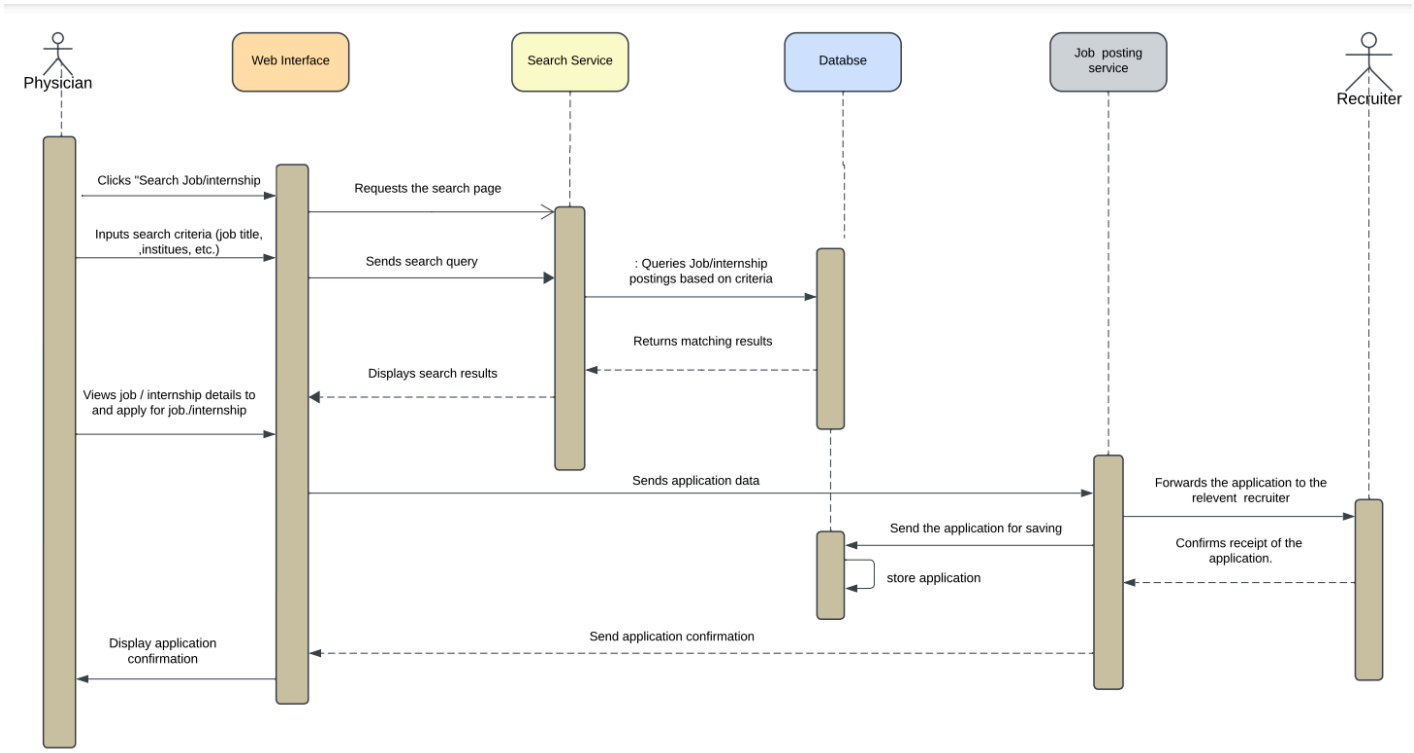

Figure 4.3: Sequence Diagram for Search and apply for jobs/internships

4.3.3.6 Search and apply for degree programs

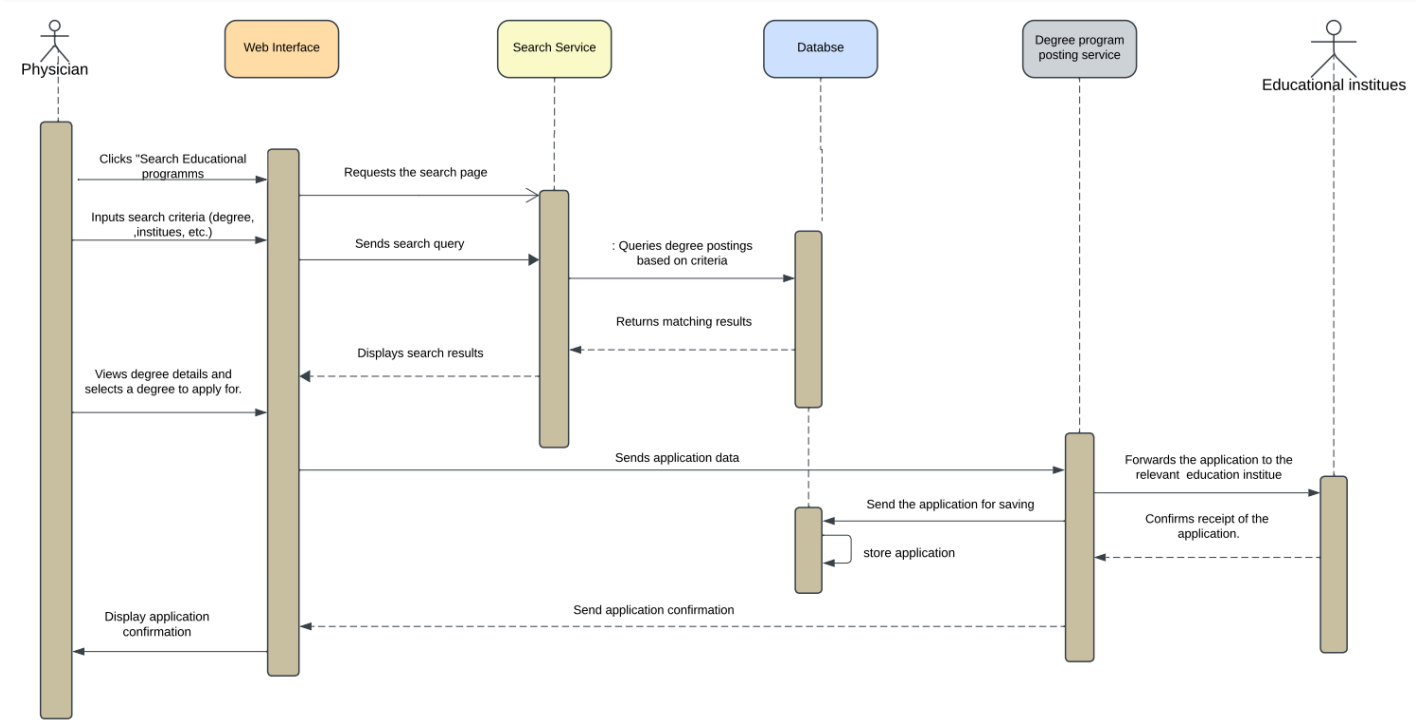

Figure 4.3: Sequence Diagram for Degree Programs

4.3.2.7 Job Posting

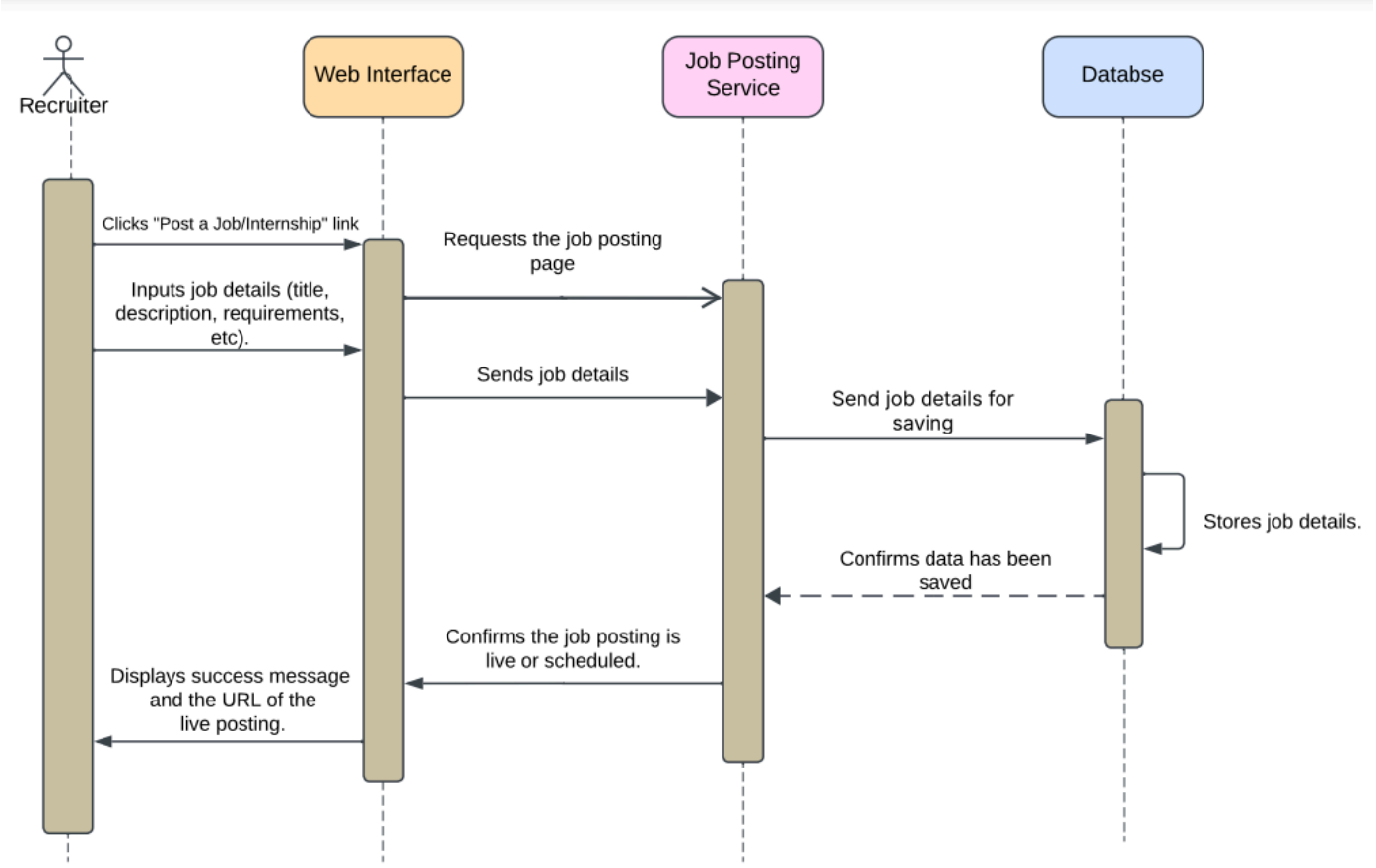

Figure 4.3: Sequence Diagram for Job Posting

4.3.2.8 Degree Posting

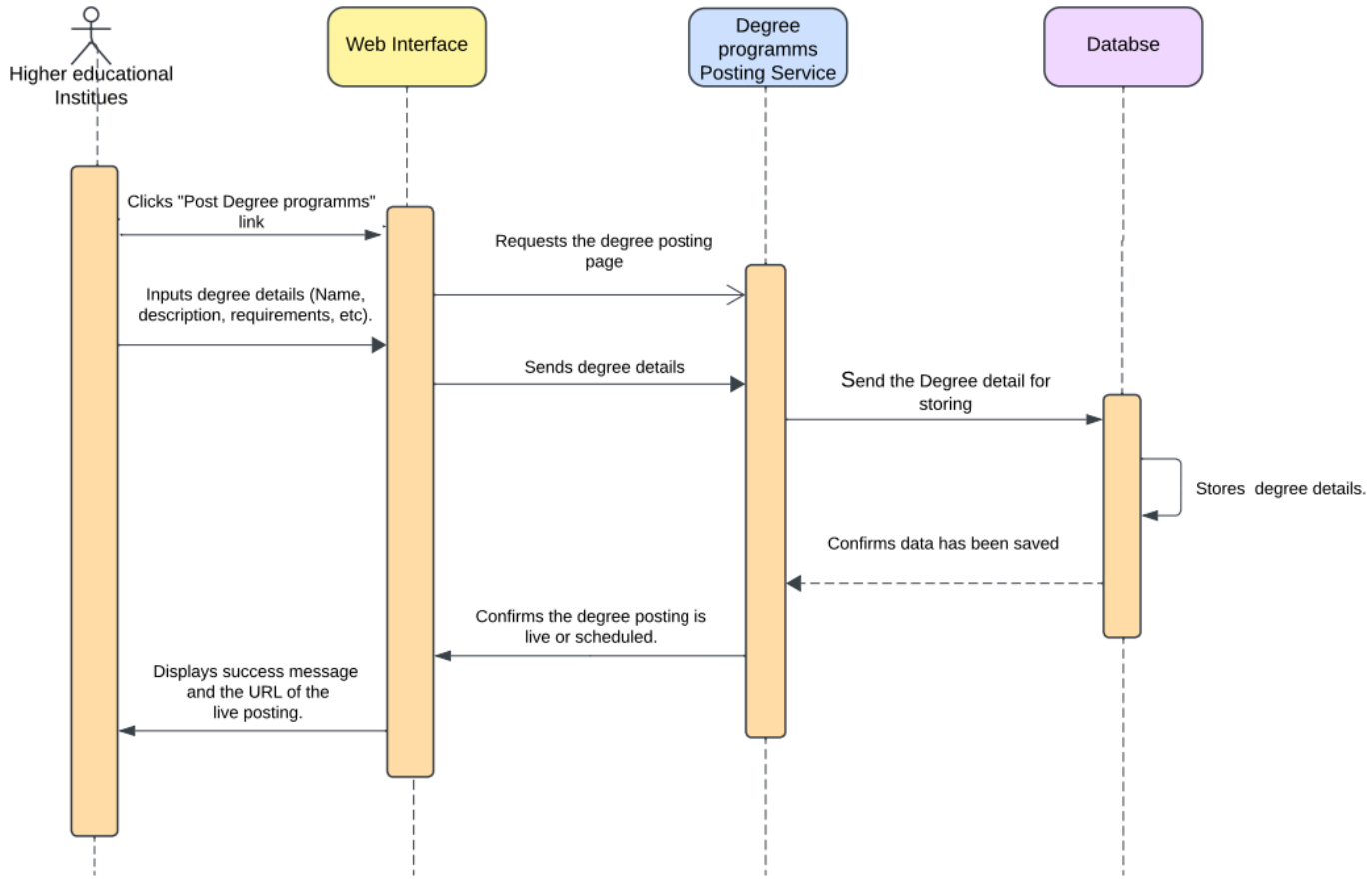

Figure 4.3: Sequence Diagram for Degree Posting

4.3.2.9 CV Uploading

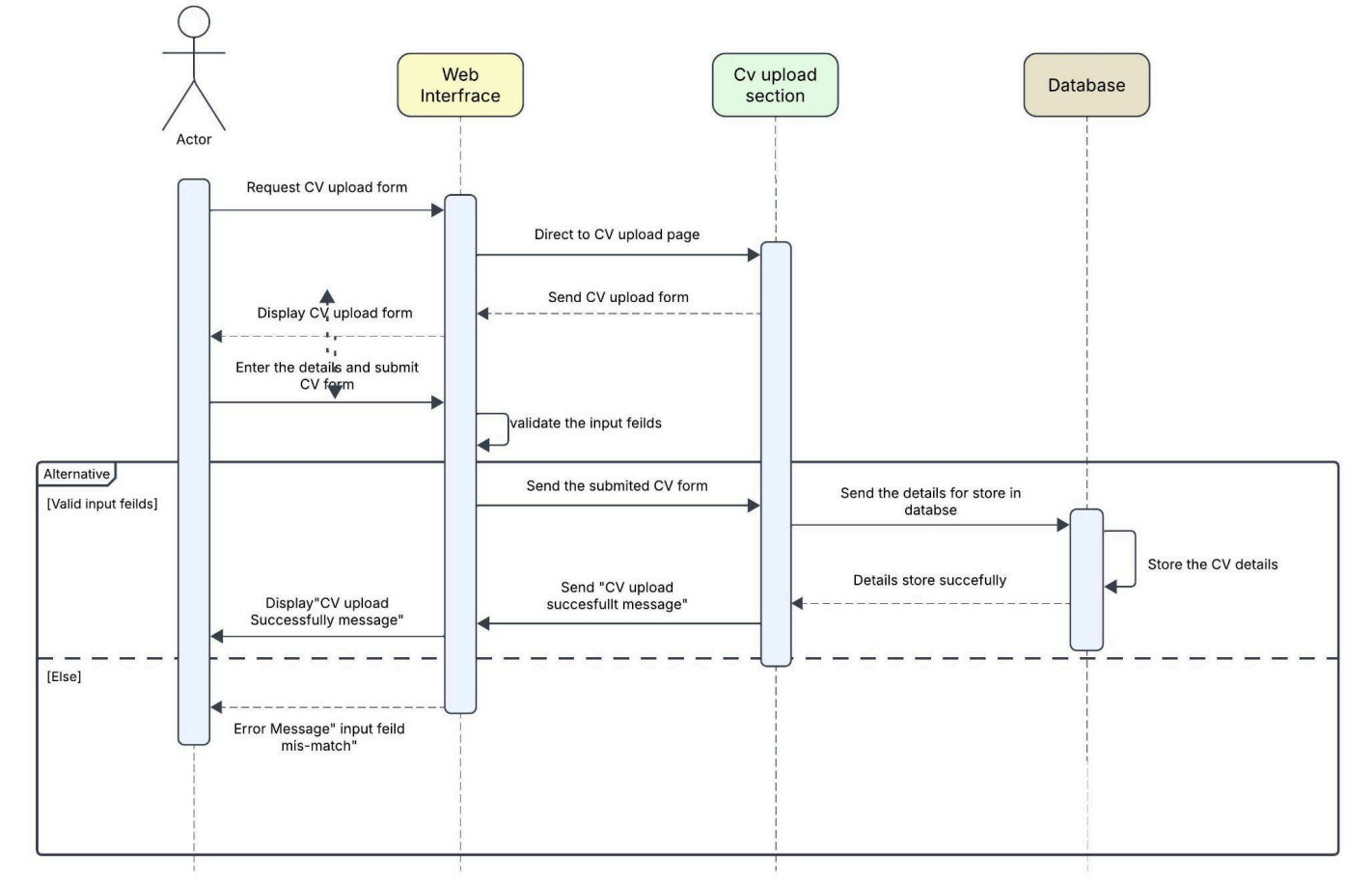

Figure 4.3: Sequence Diagram for CV Uploading

4.3.2.10 Post Feedbacks

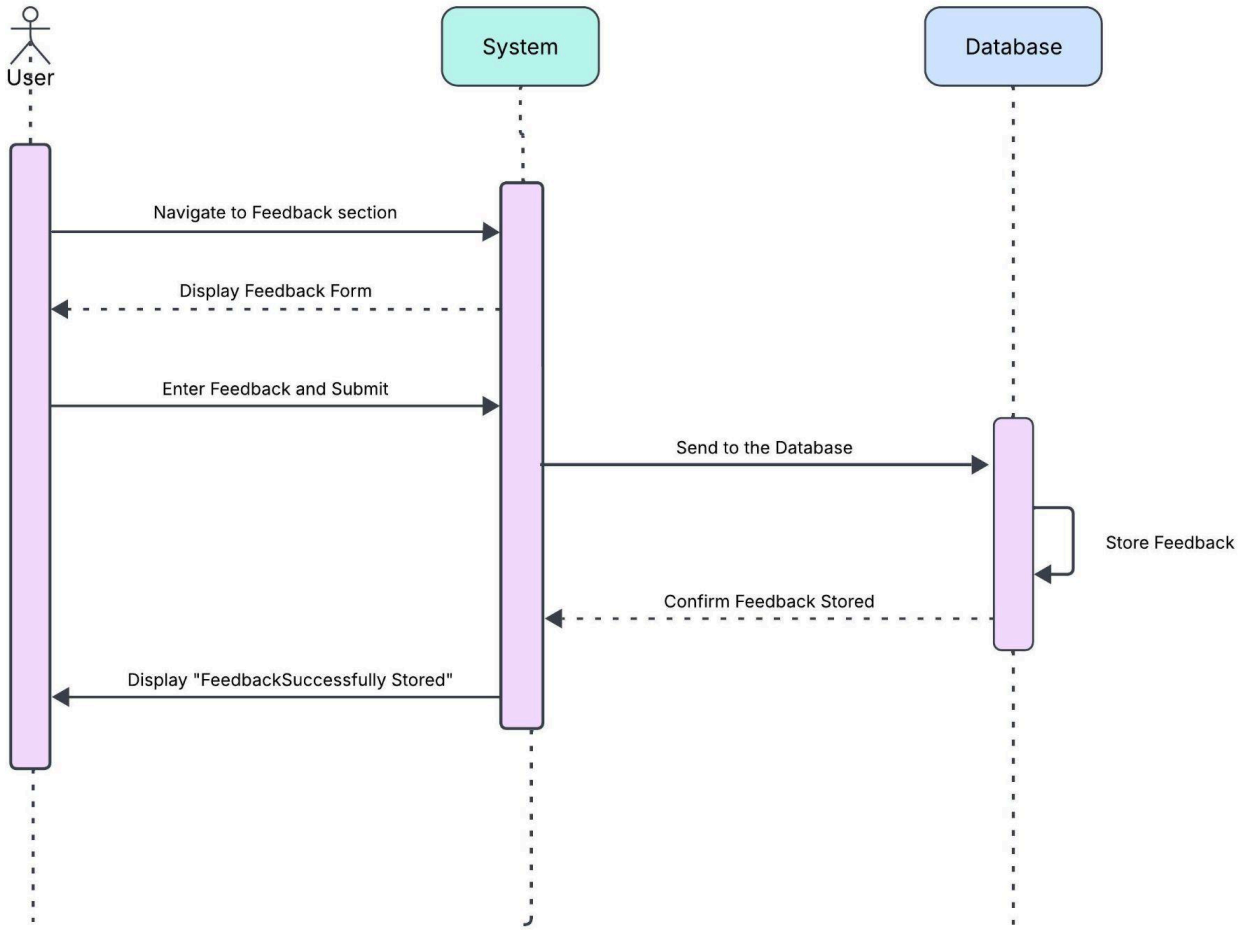

Figure 4.3: Sequence Diagram for Posting Feedbacks

4.3.4 Class Diagram

The class diagram represents the structure of the MediConnect system, including key entities and their relationships.

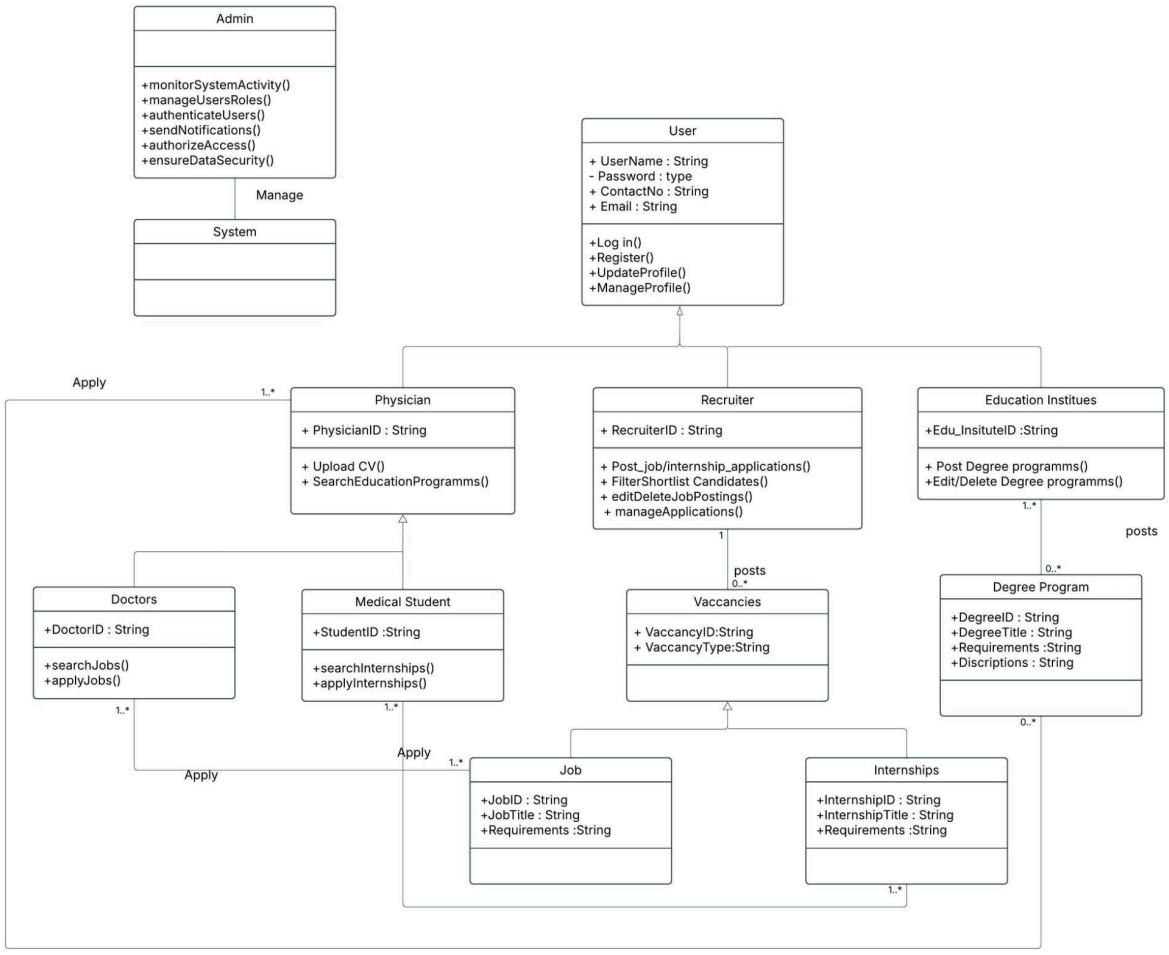

Figure 4.4: Class Diagram of MediConnect

4.3.5 Entity-Relationship (ER) Diagram

The ER diagram visualizes database relationships and data flow within the system.

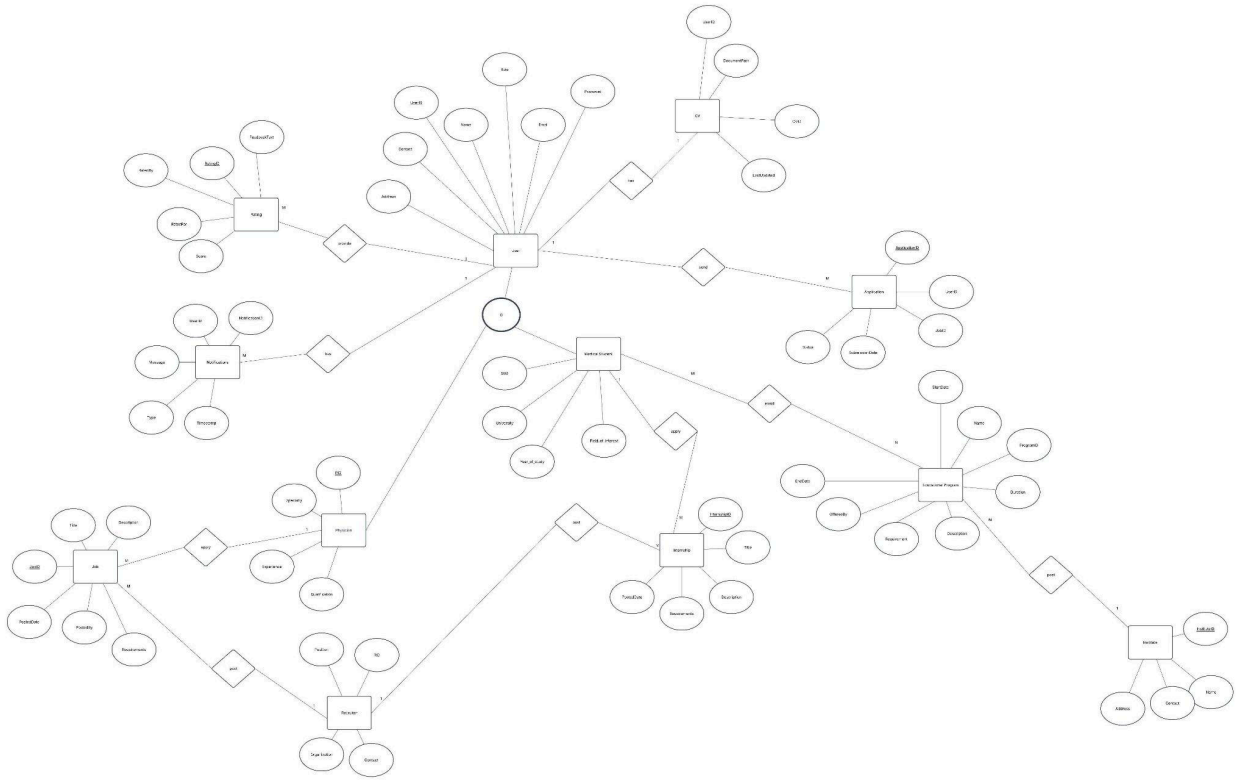

Figure 4.5: ER Diagram for MediConnect Database (View on this link)

Chapter 5: Implementation

5.1 Introduction

This chapter outlines the implementation of MediConnect, developed using the Incremental Development Model and MVC architecture. The system integrates backend development, authentication, and a responsive frontend to provide a seamless user experience**.**

5.2 Triggers of Implementation

To ensure efficient development and deployment, we utilized the following technologies:

- Frontend: React.js (Next.js 13.3), Tailwind CSS
- Backend: Node.js (Express.js), MongoDB (Mongoose ORM)
- Authentication: JWT, OAuth 2.0 for secure access
- Hosting: AWS EC2 for backend, Vercel for frontend
- Hardware: Intel Core i7, 16GB RAM, 512GB SSD, high-speed internet

The implementation was driven by the need for a scalable, secure, and real-time healthcare networking platform that efficiently connects physicians, medical students, recruiters, and institutions.

5.3 Summary

MediConnect has been implemented using the MERN stack, focusing on security, scalability, and real-time interactions. Key features include user authentication, job recommendations, real-time messaging, and structured database management. The next phase will involve rigorous testing and optimization to enhance performance and user experience.

References

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