DECLARATION SHEET

The Intelligent Job Connector SDD presented here is the work of the group members whose names are listed below, without any external help, under the supervision of Dr. Abdulgany K. All sources used in this document are cited in the text and in the reference section. We understand and agreed that not following the guideline will lead us for a denial of passing to next phase.

GROUP MEMBERS				
#	**Name**	**ID**	**Signature**	**Date**
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Table 1 Group Members

☐ I witnessed that this document was done according to the guidelines under my supervision. This final document incorporates my comments.

☐ I have seen partially

☐ I did not see at all

Remark _____

Dr. Abdulgany K. _____ _____

Advisor Name **Signature** **Date**

Abbreviation and Acronyms

1	SDD	Software Design Document
2	IJC	Intelligent Job Connector
3	HTML	Hyper Text Markup Language
4	CSS	Cascading Style Sheet
5	CV	Curriculum vitae
6	UML	Unified Modeling Language
7	API	Application Development Interface
8	AWS	Amazon Web Service
9	JWT	Json Web Token
10	SSL	Secure Socket Layer
11	TLS	Transport Layer Security
12	CI/CD	Continuous Integration / Continuous Deployment

CHAPTER ONE

INTRODUCTION

Introduction

This document aims to provide you with a comprehensive understanding of the design and architecture of the system.
It serves as a valuable reference for the development team, stakeholders, and future maintenance efforts.
In this SDD, we will cover various aspects of the Job Connector System, including its architectural design, modules, components, interfaces, data design, user interface design, and requirement matrix.
By providing detailed descriptions and explanations, we aim to give you a clear picture of how the system is designed and how its different components interact.

The architectural design section will provide you with insights into the system's overall structure, including its subsystem decomposition and the 4+1 Architecture View Model. This will help you understand the system's organization and the interaction between different subsystems.

We will also delve into the data design of the Job Connector System, which encompasses the logical data model, physical data management, and a comprehensive data dictionary.
Understanding the data design is crucial for grasping how the system handles and stores information.

The user interface design section will focus on the user interface aspects of the system.
It will provide an overview of the interface, along with screen images and detailed descriptions of the various user interface components.
This will give you a visual understanding of how users will interact with the system and what the interface will look like.

To ensure that the system meets the specified requirements, we have included a requirement matrix that maps the system requirements to the design components.
This matrix will help you understand how the system's design aligns with the desired functionality and features.

Throughout the document, we have followed standard conventions to enhance clarity and consistency.
We have also included references and an appendix section for additional supporting information and resources.

By going through this SDD, you will gain a comprehensive understanding of the Job Connector System's design and architecture.
It will enable effective communication, collaboration, and decision-making for the development team, stakeholders, and future maintenance efforts.

1.1. Document Scope

The scope of this SDD is to provide a comprehensive overview and detailed description of the Job Connector System. The document outlines the architectural design, modules, components, interfaces, data design, user interface design, and requirement matrix of the system. It serves as a reference for the development team, stakeholders, and future maintenance and enhancement efforts

This document (SDD) is organized into five chapters, each focusing on a specific aspect of the Job Connector System's design. Chapter One provides an introduction to the document, including the scope, purpose, conventions, and intended audience. Chapter Two delves into the system's architectural design, covering the system overview, design goals, subsystem decomposition, and the 4+1 Architecture View Model. Chapter Three focuses on data design, presenting the logical data model, physical data management, and a comprehensive data dictionary. Chapter Four explores the user interface design, offering an overview, screen images, and detailed descriptions of the user interface. Finally, Chapter Five presents the requirement matrix, mapping system requirements to the design components. The document also includes references and an appendix for additional supporting information.

Based on the type of the reader, here is a suggested sequence for reading the document, starting from the introductory section and proceeding through the sections most appropriate to each reader type.

Readers of all types can start with the Introduction section to gain a general understanding of the document's purpose and scope.

Technical stakeholders, such as software architects and developers, can proceed to the System Architectural Design section to understand the overall architecture, design goals, subsystem decomposition, and various views of the system.

Database administrators and developers can focus on the Data Design section to comprehend the logical data model, physical data management, and the data dictionary of the system.

Designers and front-end developers can refer to the user interface design section to explore the overview, screen images, and descriptions of the user interface components.

All stakeholders can review the Requirement Matrix section to understand the mapping of requirements to the system design.

After going through the above sections, readers can refer to the References section for any external sources used in the document.

The Appendix contains additional supporting information, diagrams, or reference materials.

1.2. Document Purpose

The main objective of this SDD is to provide a comprehensive and detailed description of the design and architecture of the Job Connector System. The SDD serves as a critical reference for the development team, stakeholders, and future maintenance efforts, ensuring that the system is designed and implemented effectively.

The Document Purpose section of the SDD serves several key objectives:

- **Scope Definition**: The purpose is to clearly define the scope of the document. It outlines the boundaries and limitations of the Job Connector System's design and functionality, ensuring that all stakeholders have a clear understanding of what aspects of the system are covered in the document.
- **Objective Clarification**: the purpose describes the main objectives of the SDD in the context of the project. It establishes the goals and intentions of the document, ensuring that all parties involved are aligned on the intended outcomes and deliverables.
- **Conventions and Standards**: The purpose section specifies the document conventions to be followed throughout the SDD. It defines the formatting guidelines, terminology, notation, and any other conventions that enhance understanding and facilitate effective communication among the development team and stakeholders.

- **Intended Audience Identification**: The purpose section identifies the intended audience of the SDD. It specifies the various stakeholders and roles within the audience, such as developers, project managers, system architects, and quality assurance personnel when we are thinking as the system has a future. But, for our final year project this SDD‘s intended audiences are us (as developer), the advisor (as project manager) and examiners (as testers). This identification ensures that the document is tailored to meet the specific needs and requirements of each group.

By achieving these objectives, the SDD document provides a clear and comprehensive understanding of the Job Connector System's design and architecture. It serves as a guide for the development team, ensuring that the system is implemented according to established standards and best practices. Additionally, it facilitates effective communication among stakeholders (advisor,developer and examiners) and supports future maintenance efforts, enabling the system to be modified, enhanced, and maintained efficiently over time specially advisor.

1.3. Document Conventions

This section outlines the document conventions and standards that will be followed throughout the SDD to enhance understanding and ensure consistency in communication. The conventions specified here apply to terminology, formatting guidelines, notation, and other aspects of the document.

Terminology: Standardized terminology will be used to ensure clarity and consistency in communication.
Key terms and their definitions will be provided in a glossary for easy reference.

Formatting Guidelines: The SDD will adhere to a consistent formatting style to enhance readability and organization. Headings, subheadings, and numbering schemes will be used to structure the document hierarchy. Font styles, sizes, and colors will be selected to ensure legibility.

Notation: The SDD will utilize a consistent notation system to represent different elements and concepts. Commonly used notations, such as UML diagrams, flowcharts will be employed to illustrate system design and processes.

References: Any external sources, frameworks, or tools referenced in the SDD will be properly cited using standard citation styles to give credit and enable further exploration by readers.

Version Control: The document will be maintained using a version control system to track changes, revisions, and updates. This ensures that the most up-to-date version is accessible to all stakeholders and helps manage the document's evolution.

Collaboration and Review: The SDD will be subject to collaboration and review processes to gather feedback and validate the design. A designated review mechanism, such as revision tracking or comment annotations, will be used to facilitate effective collaboration among team members.

Documentation Templates: Standard templates and formats will be utilized for consistency across different sections of the SDD. These templates will provide a predefined structure and layout, minimizing inconsistencies and ensuring uniformity in documentation.

By following these document conventions, the SDD aims to enhance readability, improve comprehension, and enable efficient collaboration among stakeholders. Consistent use of terminology, formatting guidelines, notation, and documentation templates contributes to a well-structured and coherent SDD, facilitating effective communication and understanding of the Job Connector System's design and architecture.

1.4. Intended Audience

The SDD is primarily intended for three specific types of readers in our case:

1. **Developers**: Developers are a crucial audience for the SDD. The document provides with detailed information about the design and architecture of the Job Connector System. It outlines the system's components, interfaces, data structures, and algorithms, enabling to understand the technical requirements and implement the system effectively.
   The SDD serves as a guide for us to translate the design specifications into functional code.

2. **Project Manager**: Our advisor, who also plays the role of project manager, will rely on the SSD to oversee the development process and ensure its alignment with project goals. The document provides our advisor with an overview of the system's design and architecture, enabling him to assess progress, evaluate deliverables, and provide guidance and feedback throughout the development cycle. The SDD helps our advisor make informed decisions regarding resource allocation, project timelines, and risk management.

3. **Testers**: Examiners, who act as testers in this context, will use the SDD to evaluate the functionality and quality of the Job Connector System. They will refer to the document to

gain a comprehensive understanding of the system's design, features, and expected behavior. The SDD enables examiners to develop test plans, execute test cases, and verify that the system functions as intended. They will assess the system against the design specifications outlined in the SDD.

While the primary focus is on developers, project managers (advisor), and examiners (testers), other stakeholders, such as documentation writers, marketing staff, and end-users, may also benefit from the SDD.

Documentation writers can utilize the SDD to gather relevant technical information for creating user manuals and technical guides.

Marketing staff may use the document to gain insights into the system's capabilities and features for promotional purposes.

End-users can gain an understanding of the system's functionality and usage through the SDD.

The SDD facilitates clear, cooperative, and informed interactions among developers, project managers (advisor), and examiners, who have different requirements and perspectives in creating and assessing the Job Connector System.

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CHAPTER TWO

2.1. SYSTEM OVERVIEW

2.1.1 Objective

General objective

The primary objective of the Job Connector System is to develop a web-based platform utilizing machine learning algorithms to intelligently recommend suitable jobs to candidates. The system

aims to revolutionize the job search and recruitment processes by enhancing the matching accuracy between job seekers and employers.

Specific Objectives:

1. Facilitate effortless job search
2. Empower job seekers with comprehensive profiles
3. Streamline job posting and management for employers
4. Foster transparent communication
5. Optimize the matching process
6. Ensure data security and privacy
7. Enhance user experience and accessibility
8. Enable efficient application management for employers
9. Monitor and analyze platform performance
10. Expand geographic reach
11. Support scalability and reliability
12. Promote user engagement and retention

2.1.2 Problem Statement

The current job market faces challenges such as inefficiency, lack of centralization, geographical limitations, uncertain relevance of skills, a fragmented job market, and inefficient job matching, data relevance.

Traditional systems are time-consuming, lack networking opportunities, and pose privacy concerns. The Intelligent Job Connector seeks to address these issues by providing a comprehensive and efficient solution.

2.1.3 Scope

The scope of the project includes the development, deployment, and maintenance of a web-based application with features like a recommendation engine, user authentication, user profiles, job listings, search functionality, application submission, messaging system, and analytics. The

system aims to enhance accessibility, mobile responsiveness, real-time messaging, and overall visual appeal.

2.1.4 Significance

The Intelligent Job Connector is significant for reducing unemployment, improving job matching quality, increasing access to opportunities, enhancing skills development, and increasing overall efficiency in the job market. It addresses issues of geographical barriers, inefficient job matching, and lack of holistic solutions.

2.1.5 Technologies and Tools:

1. Backend Development: Python, Django, MySQL.
2. Machine Learning and Recommendation Engine: scikit-learn, Panda.
3. Frontend Development: HTML, CSS, JavaScript (React.js), tailwind css, Bootstrap.
4. Documentation and Version Control: Git, Google Docs.
5. Security and Authentication: JWT, OAuth, SSL/TLS, bcrypt.
6. Deployment and Infrastructure: Virtual Machine in our Local Computers, Jenkins or GitLab CI/CD,Terraform and Ansible.
7. Containerization and orchestration: Docker, Kubernetes
8. Web Server Software tools: NGINX/Apache.

2.1.6 Overall Workflow:

The system's workflow involves users (job seekers, employers, admins) interacting with the web-based platform. Job seekers create detailed profiles, search for jobs, and receive recommendations. Employers post job listings, manage applications, and communicate with potential hires. The recommendation engine uses machine learning algorithms to optimize job matches. The system emphasizes security, accessibility, and real-time communication, providing a comprehensive solution for job seekers and employers. The high-level context diagram illustrates the major activities within the system, showcasing the interactions between users, the recommendation engine, and the various features of the platform.

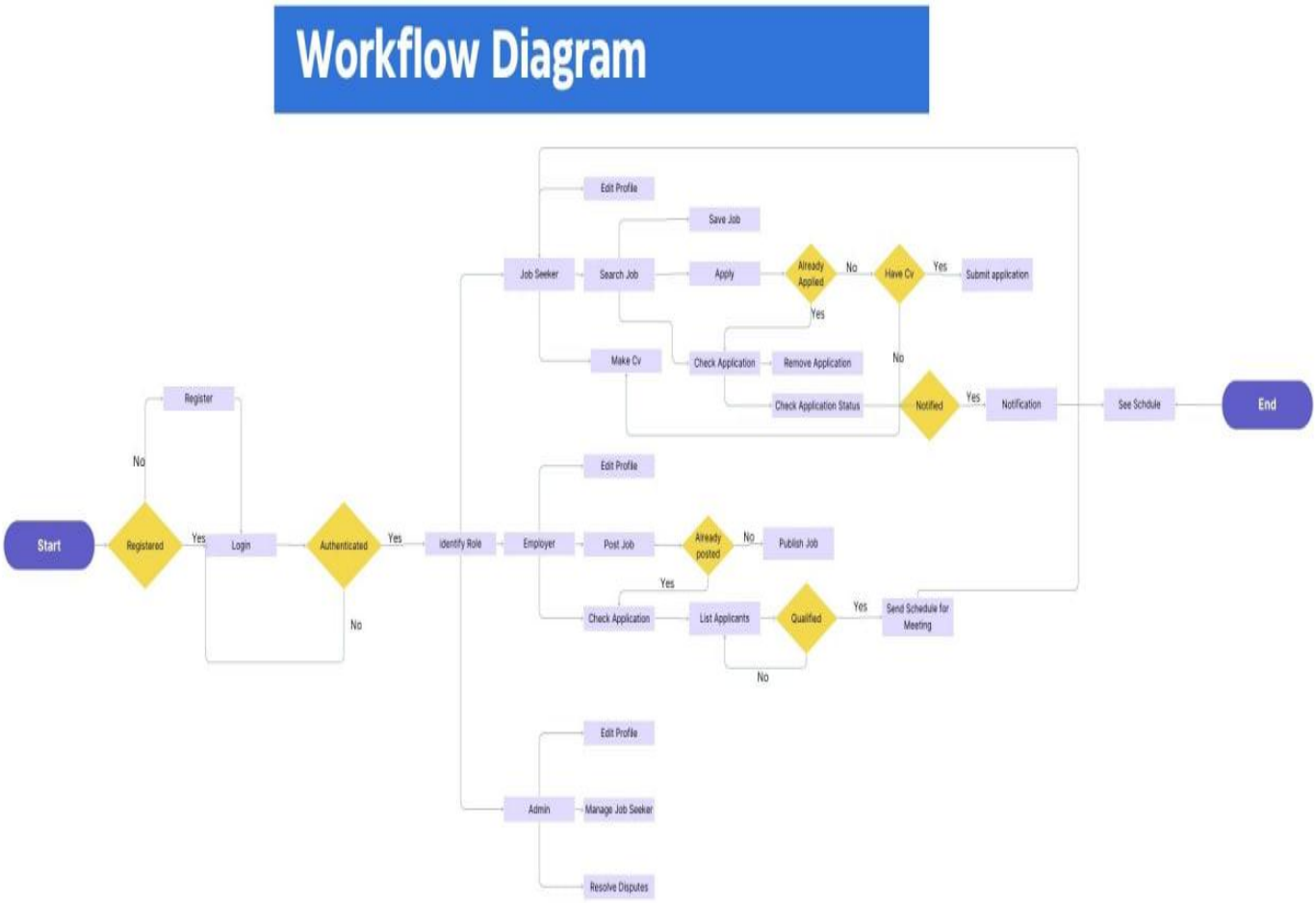

Figure 1 workflow diagram

2.2 DESIGN GOALS

In the development of the Job Connector system, ensuring optimal performance and user satisfaction relies on carefully addressing non-functional requirements, particularly in the areas of performance and usability.

2.2.1 Performance Requirements:

2.2.1.1 Response Time:

To enhance user experience, the system must swiftly generate personalized job recommendations within a few seconds. Efficient search functionality is paramount, allowing users to find relevant jobs promptly. Furthermore, the application submission process should be seamless, ensuring quick processing and real-time status updates for submitted job applications.

2.2.1.2 Scalability:

The system's architecture must support a large user base and job database without compromising performance. Horizontal scalability is imperative to accommodate increasing demands. This ensures that the system continues to serve users smoothly as it grows, without any degradation in performance.

2.2.1.3 Accuracy:

To provide valuable recommendations, the system must accurately match jobs to the user's skills, experience, and preferences. Continuous learning mechanisms should be in place to adapt to user behavior over time, improving the precision and relevance of job recommendations.

2.2.1.4 Availability:

Maintaining 24/7 availability is critical for user accessibility. Redundancy and disaster recovery measures are essential components to guarantee uninterrupted service, ensuring the system remains operational even during unexpected events.

2.2.1.5 Security:

Safeguarding user data is a top priority. The system must implement robust security measures to protect sensitive information such as resumes, applications, and personal details. Preventing unauthorized access and potential data breaches is paramount to establishing user trust and complying with privacy standards.

2.2.2 Usability Requirements:

2.2.2.1 User Interface:

The user interface of the Intelligent Job Connector system should embody simplicity and cleanliness, presenting information in a clear visual hierarchy. Navigating the system should be intuitive, with easily accessible menus and navigation buttons facilitating a seamless user experience. Responsive design is essential, ensuring that the interface adapts gracefully to various screen sizes and devices, promoting accessibility across a range of platforms.

By meticulously addressing these non-functional requirements, the Intelligent Job Connector system will not only deliver high-performance functionality but also provide users with an intuitive and user-friendly platform, enhancing their overall experience in job discovery and application processes.

2.3 SUBSYSTEM DECOMPOSITION

To decompose the Intelligent Job Connector System into subsystems and illustrate their relationships using a package diagram, we can identify several key components or modules within the system. Each subsystem represents a coherent and functionally related set of classes, associations, operations, events, and constraints. Below is a conceptual breakdown of the subsystems and their relationships:

1. User Management Subsystem

User Management is a subsystem that deals with the management and administration of user-related functionality within the Job Connector system. It is responsible for handling user registration, authentication, authorization, and user profile management.

The User Management subsystem typically includes the following key features:

User Registration: It allows individuals to create new user accounts within the Job Connector system. This may involve capturing user information, such as name, email address, username, and password.

Authentication: It ensures that users provide valid credentials to access the system. This can involve verifying the username and password combination or implementing more advanced authentication mechanisms like multi-factor authentication.

Authorization: It manages user access rights and permissions within the system. This includes defining user roles, assigning appropriate permissions, and controlling access to specific features or data based on user roles.

User Profile Management: It provides functionality for users to update their profile information, such as contact details, preferences, and personal information. It may also include features like profile picture management and account settings.

User Administration: It enables system administrators to manage user accounts, such as activating or deactivating accounts, resetting passwords, and assigning roles or permissions.

The User Management subsystem plays a crucial role in ensuring secure access to the Job Connector system, maintaining user data integrity, and providing a personalized experience for users.

Relationships:

The User Management subsystem interacts with the Recommendation subsystem to access user profiles and preferences. User profiles and preferences are essential inputs for generating personalized job recommendations.

It collaborates with the Communication subsystem to facilitate user-to-user communication. For example, when job seekers and employers communicate regarding job opportunities or application-related matters.

The User Management subsystem also interacts with the Post and Application Management subsystem to manage user roles and permissions. It ensures that users have the appropriate access rights and permissions when interacting with job postings and applications.

2. The Recommendation Subsystem

The Recommendation Subsystem is a component within the Job Connector system that provides personalized recommendations to job seekers and employers based on their preferences, interests, and historical data. Its primary goal is to enhance the matching process between job seekers and job opportunities, thereby improving the overall user experience.

The Recommendation Subsystem typically includes the following features:

User Profiling: It collects and analyzes data related to job seekers and employers, including their preferences, skills, qualifications, past job history, and other relevant information. This data is used to create user profiles that serve as the basis for generating tailored recommendations.

Recommendation Generation: It employs algorithms and machine learning techniques to process user profiles and job-related data. Based on this analysis, the system generates personalized recommendations for job seekers, suggesting relevant job opportunities that match their skills, interests, and career goals. Similarly, it provides employers with recommendations of potential candidates who align with their job requirements.

Content-based Filtering: It leverages content-based filtering methods to recommend jobs or candidates based on their attributes and characteristics. For example, job seekers may receive recommendations based on their skills, experience, location, and industry preferences, while employers may receive recommendations based on their job requirements and organizational needs.

Real-time Updates: The subsystem continuously updates and refines recommendations based on user actions and changes in the system. This ensures that the recommendations remain relevant and up to date as job seekers and employers interact with the platform.

Relationships:

The Recommendation subsystem relies on the User Management subsystem to access user profiles and preferences. User profiles serve as the foundation for generating tailored recommendations.

It interacts with the Post and Application Management subsystem to gather data on job posts and applications. This data is used to generate recommendations that align with job seekers' skills and employers' requirements.

The Recommendation subsystem also collaborates with the Communication subsystem to deliver notifications about relevant job opportunities to users.

The Recommendation Subsystem plays a crucial role in enhancing the efficiency and effectiveness of job matching within the Job Connector system. By providing personalized recommendations, it assists job seekers in finding relevant job opportunities and helps employers in identifying suitable candidates. This subsystem ultimately aims to optimize the job search and recruitment process, leading to increased satisfaction for both job seekers and employers.

3. Communication Subsystem

The Communication subsystem, also known as the Messaging subsystem, is a component within the Job Connector system that facilitates communication and messaging functionality between various entities such as job seekers, employers, and administrators. Its primary purpose is to enable efficient and effective communication within the system.

The Communication subsystem typically includes the following features:

Messaging Interface: It provides a user-friendly interface that allows users to compose, send, and receive messages within the Job Connector system. This interface may include features such as message composition, attachments, formatting options, and message organization.

Inbox and Notifications: It manages the incoming messages for users and provides them with notifications when new messages are received. Users can access their inbox to view, reply to, or manage their messages. Notifications may be delivered through various channels, such as email notifications or system alerts.

Conversation Management: It organizes messages into conversations or threads, allowing users to have ongoing discussions. This feature helps users to easily track and follow the progression of their conversations with other system participants.

User-to-User Communication: It enables direct communication between users within the Job Connector system. Job seekers can communicate with employers, and vice versa, facilitating discussions related to job opportunities, applications, interviews, and other relevant topics.

System Notifications: It allows the system to send automated notifications to users based on certain events or triggers. These notifications can include updates on job postings, application statuses, interview invitations, or any other important system-related information.

Relationships:

The Communication subsystem interacts with the User Management subsystem to access user profiles and contact information. This allows users to communicate with each other and receive notifications about important system-related information.

It collaborates with the Recommendation subsystem by sending notifications to users regarding recommended job opportunities or candidate matches.

The Communication subsystem also interacts with the Post and Application Management subsystem to enable communication between job seekers and employers regarding job postings, applications, and interviews.

The Communication subsystem plays a vital role in enhancing collaboration, facilitating timely communication, and streamlining interactions between job seekers, employers, and administrators within the Job Connector system.

4. Post and Application Management Subsystem

The Post and Application Management subsystem is a crucial component within the Job Connector system that handles the management and processing of job posts and job applications. It provides functionality for employers to create and manage job postings, as well as for job seekers to search and apply for job opportunities.

Our Post and Application Management subsystem typically includes the following features:

Job Post Creation: It allows employers to create new job posts by providing relevant details such as job title, description, requirements, location, and other pertinent information. This feature enables employers to effectively communicate the job opportunities available within the system.

Job Post Management: It provides the ability for employers to edit, update, and delete their job postings. This feature ensures that job information remains accurate and up to date throughout the hiring process.

Job Search and Filtering: It enables job seekers to search for relevant job opportunities based on specific criteria such as job title, location, industry, and keywords. Filtering options help job seekers narrow down their search and find the most suitable job postings.

Application Submission: It allows job seekers to submit their applications for specific job posts. This feature typically involves providing personal information, uploading a resume or CV, and potentially answering additional application-related questions.

Application Tracking: It provides job seekers with the ability to track and monitor the status of their applications. This feature allows applicants to stay informed about the progress of their applications, such as whether they have been shortlisted, scheduled for an interview, or received a job offer.

Application Management for Employers: It provides employers with tools to manage incoming job applications efficiently. This includes features such as reviewing and sorting applications, shortlisting candidates, conducting interviews, and making hiring decisions.

Notifications and Communication: The subsystem may include features to send automated notifications to both employers and job seekers, keeping them informed about application status updates, interview invitations, and other relevant communications.

Relationships:

The Post and Application Management subsystem interacts with the User Management subsystem to manage user roles and permissions. It ensures that employers and job seekers have the necessary access rights to create job posts or submit applications, respectively.

It collaborates with the Recommendation subsystem to provide personalized recommendations to job seekers based on their skills and interests.

The Communication subsystem interacts with the Post and Application Management subsystem to facilitate communication between job seekers and employers regarding job postings and applications. It enables notifications about application statuses and interview invitations.

The Post and Application Management subsystem is vital for streamlining the job posting and application process within the Job Connector system. It facilitates effective communication between employers and job seekers, simplifies the application tracking process, and helps in efficient management of job posts and applications.

2.4 4+1 ARCHITECTURE VIEW MODEL

2.4.1 Logical View

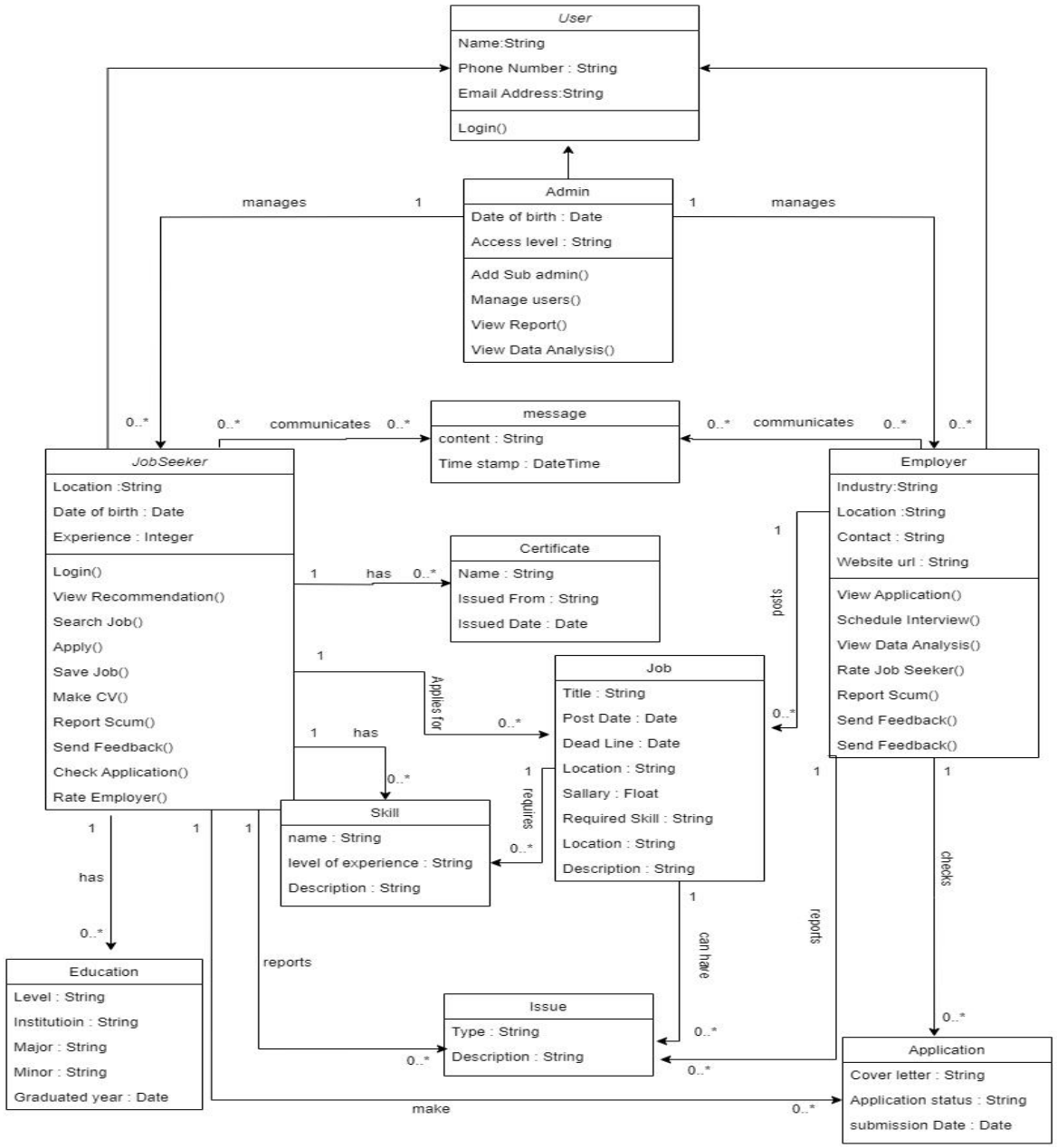

Figure 2 class diagram

2.4.2. Process View:

2.4.2.1 Activity Diagram

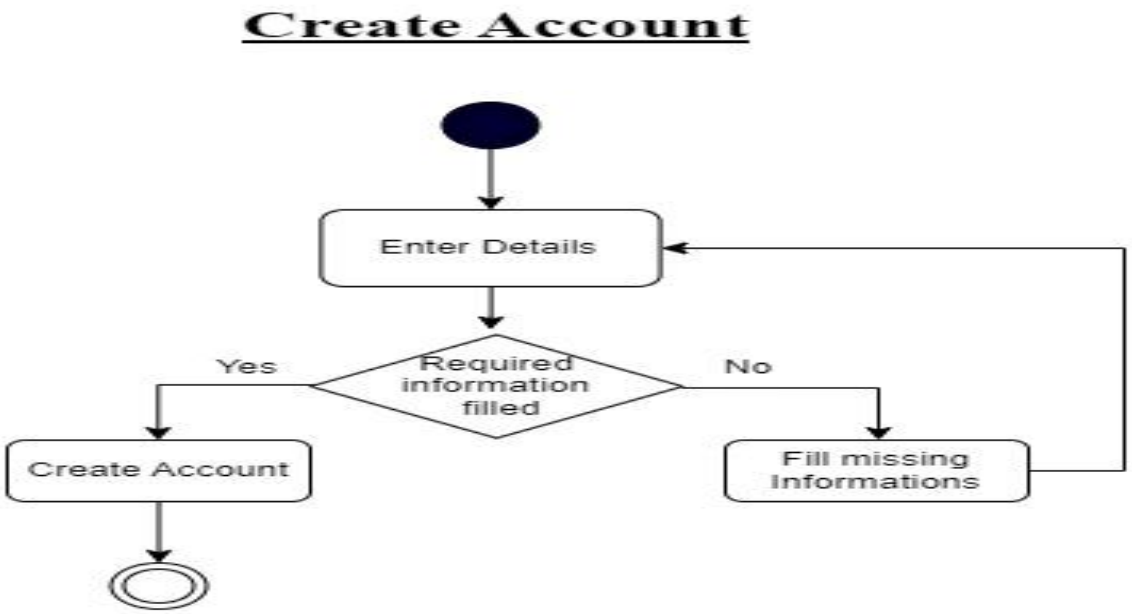

Figure 3 activity diagram for creating account (job seeker and Employer)

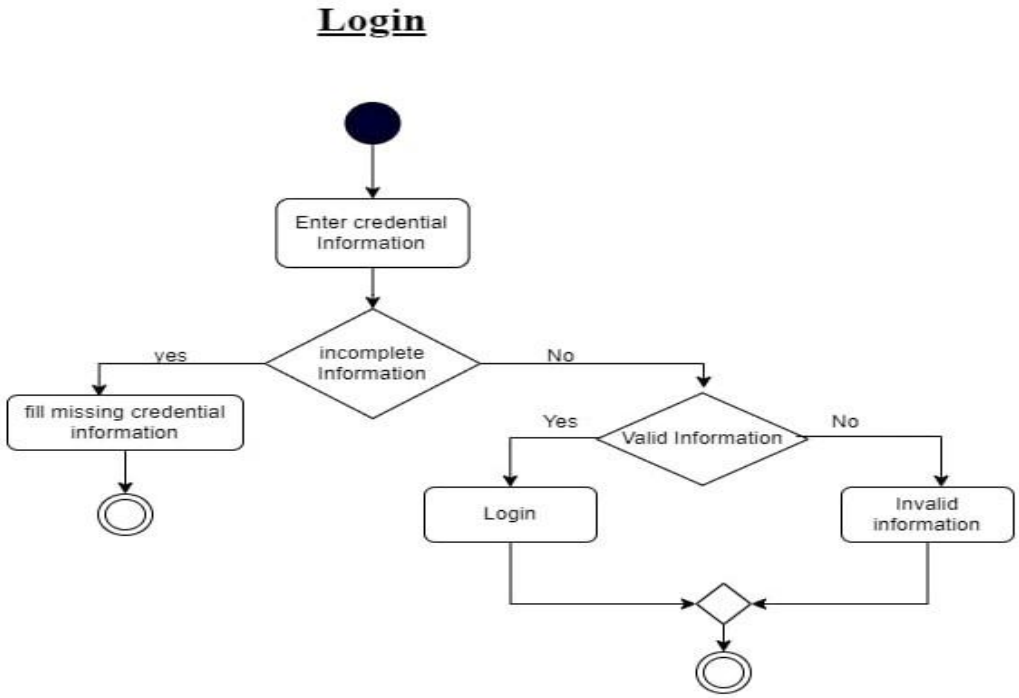

Figure 4 login activity diagram

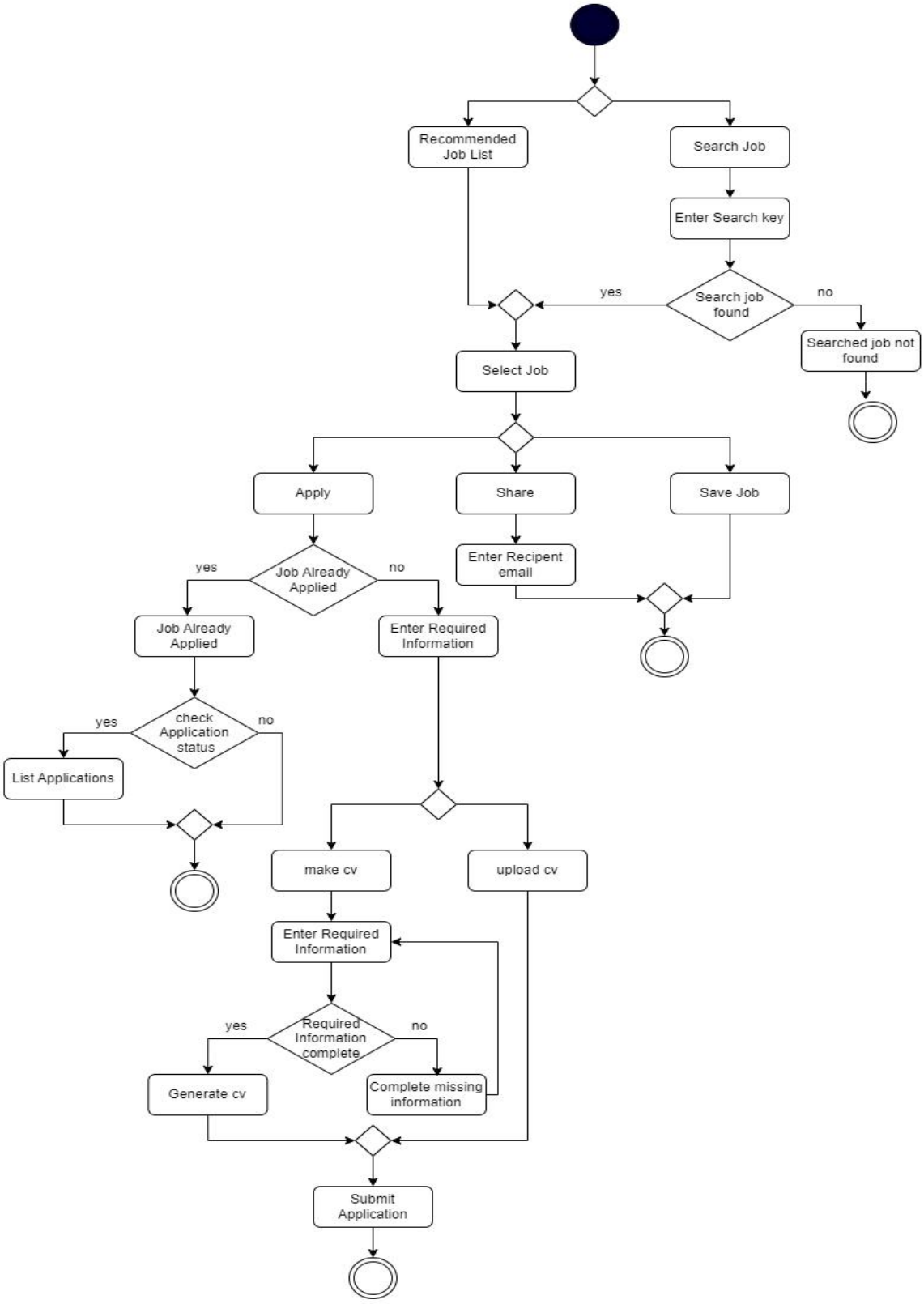

Figure 5 activity diagram for applying, sharing and saving job , checking application status

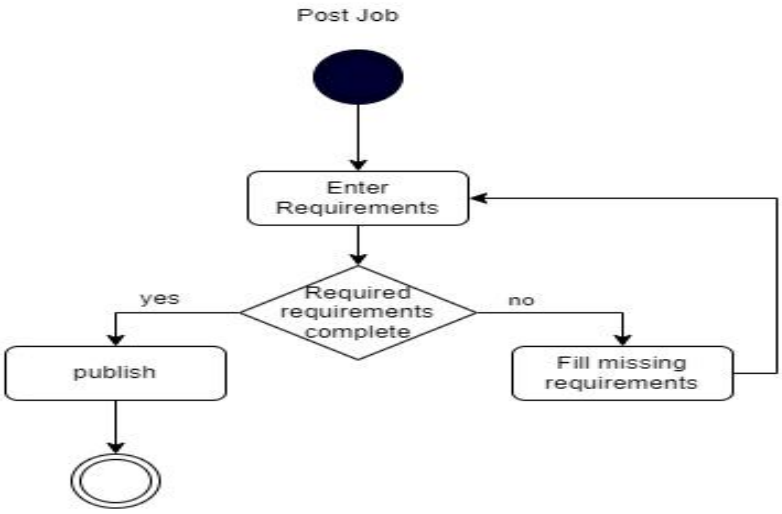

Figure 6 activity diagram for employer to post job

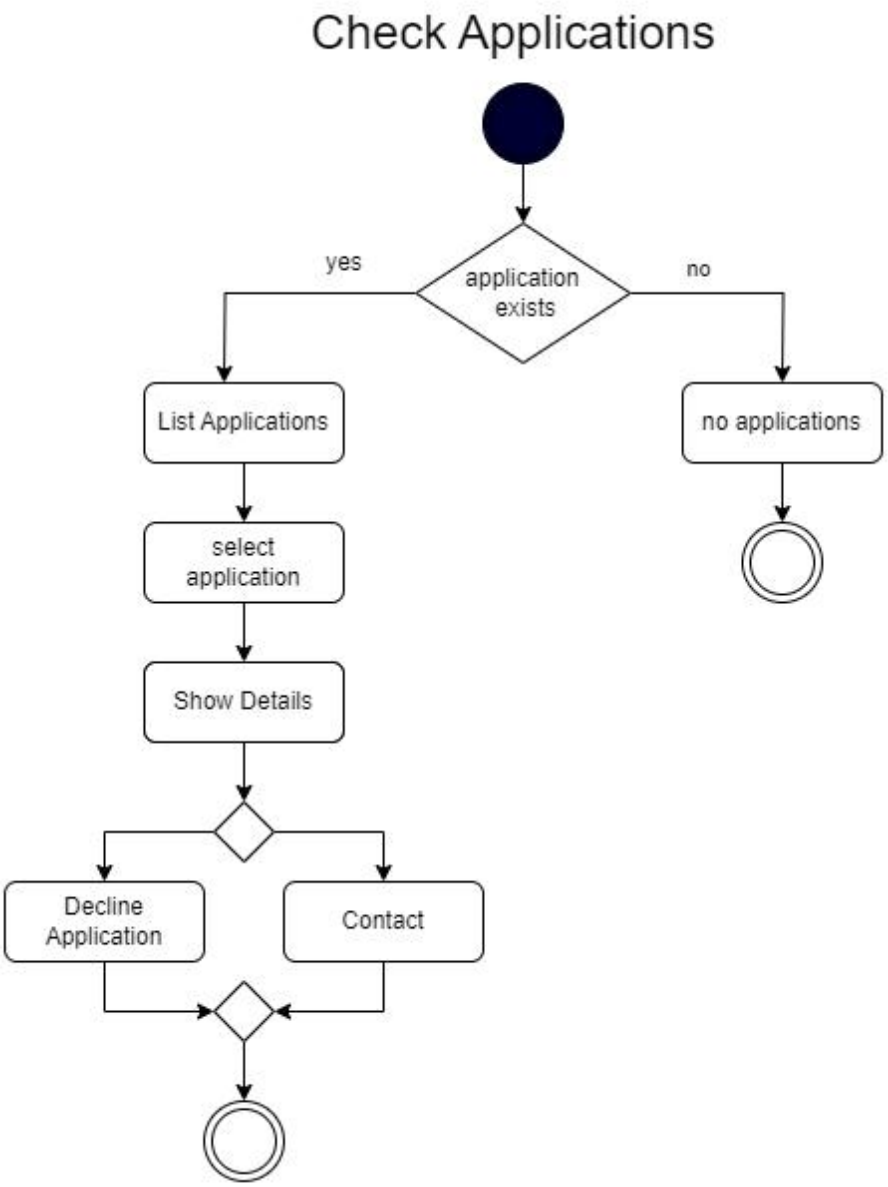

Figure 7 activity diagram for checking applicants information

2.4.2.2 Sequence diagram

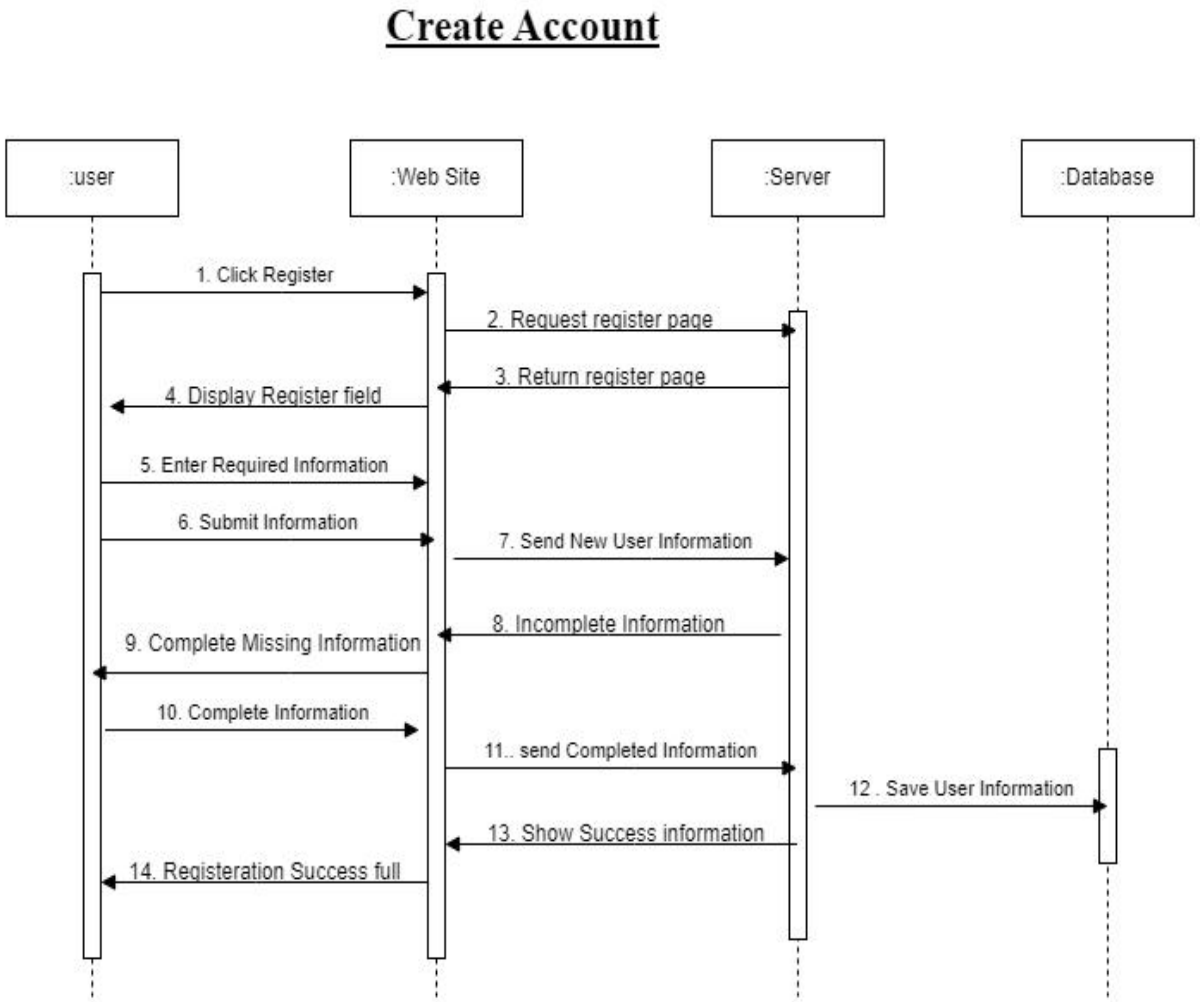

Figure 8 sequence diagram for creating account (Employer and job seeker)

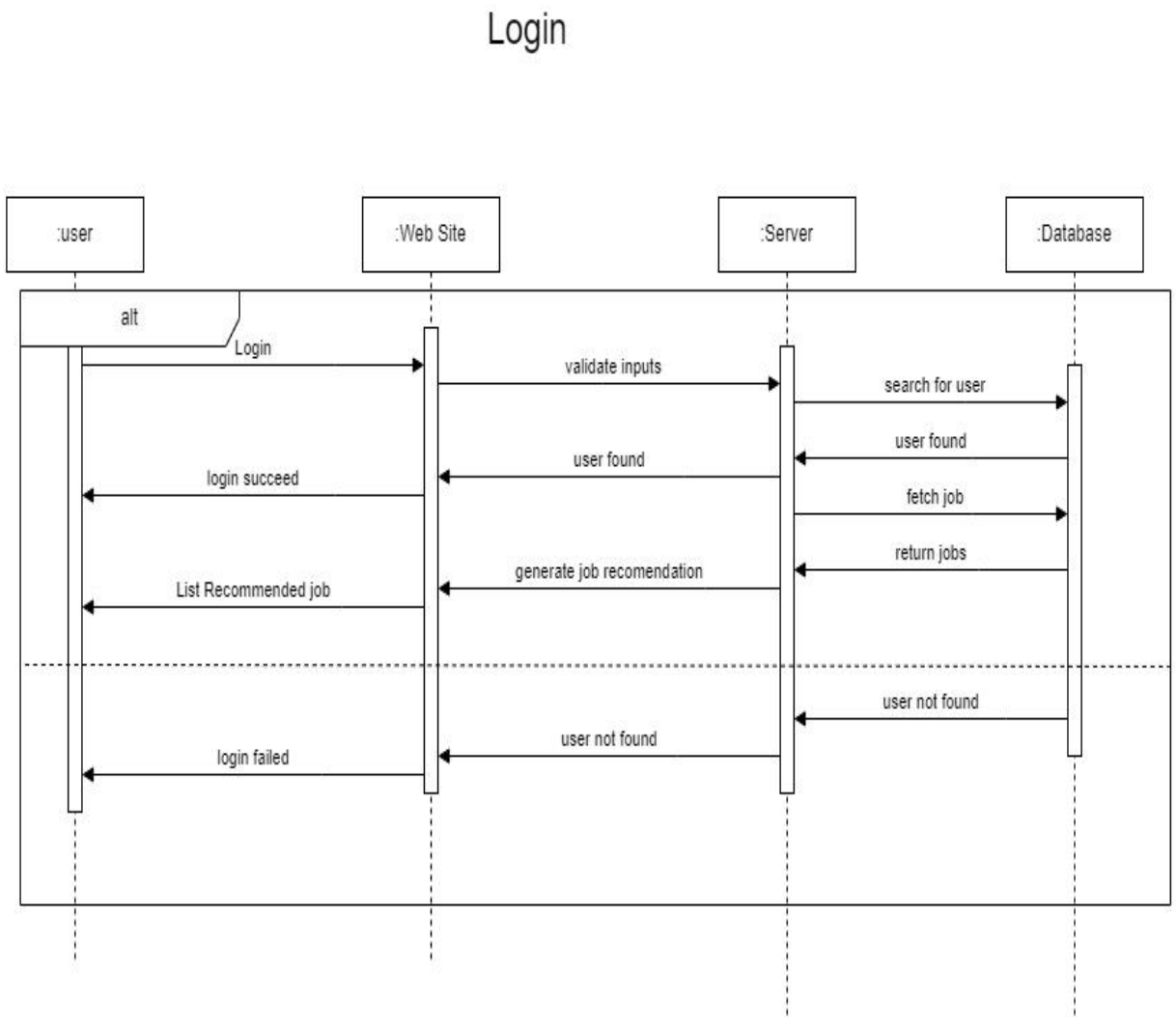

Figure 9 sequence diagram for login

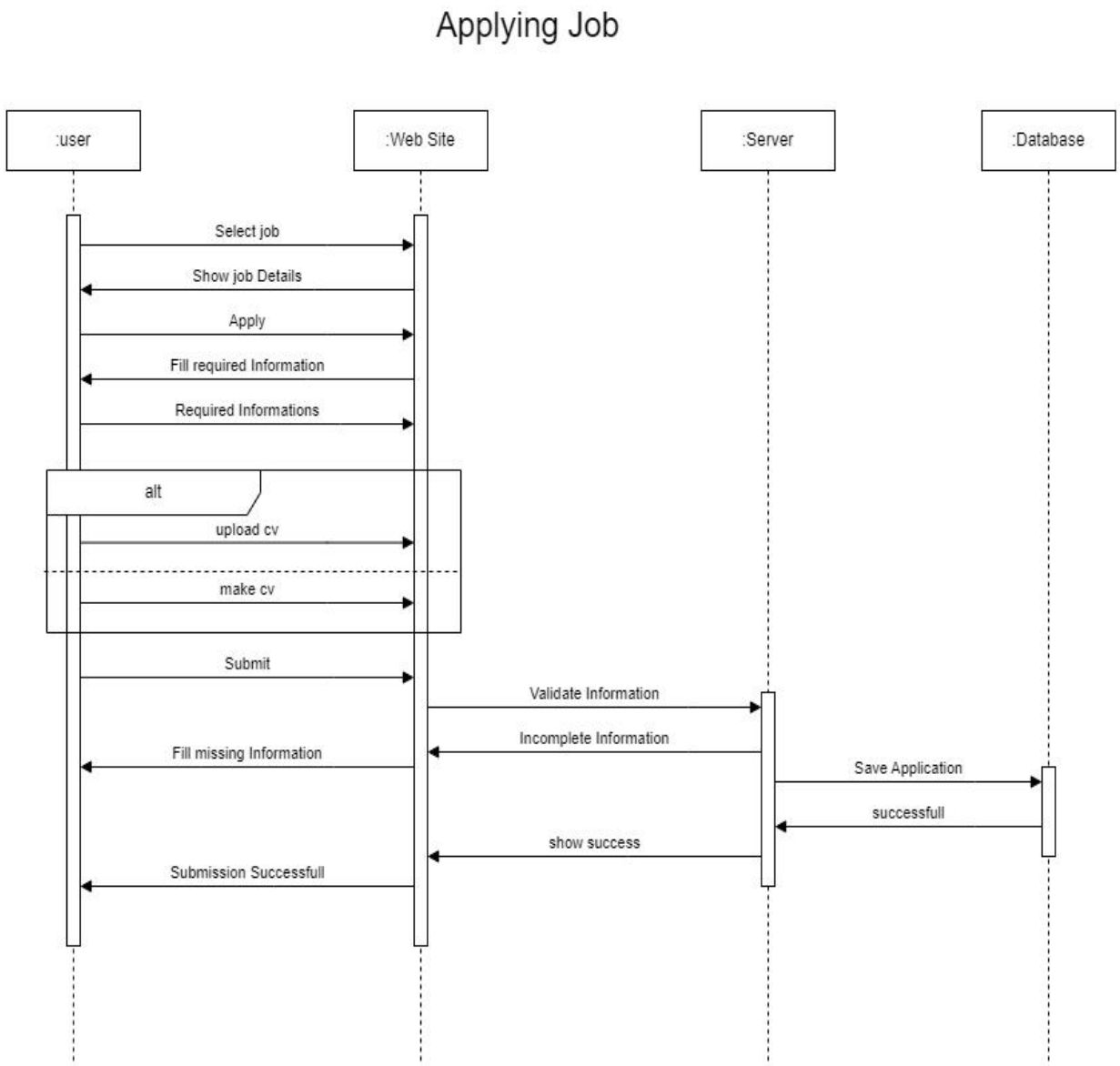

Figure 10 sequence diagram for applying to job

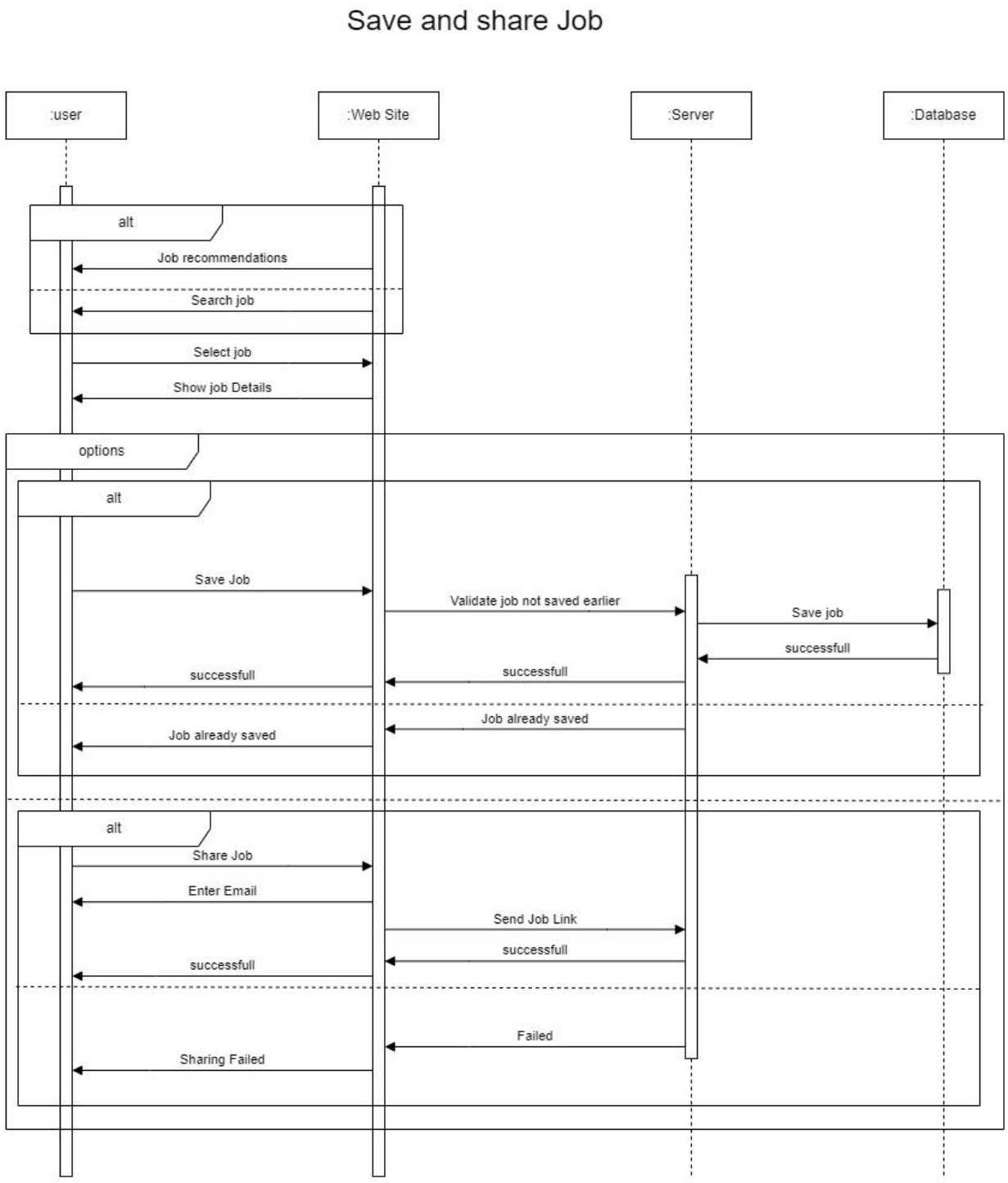

Figure 11 sequence diagram for sharing and saving job

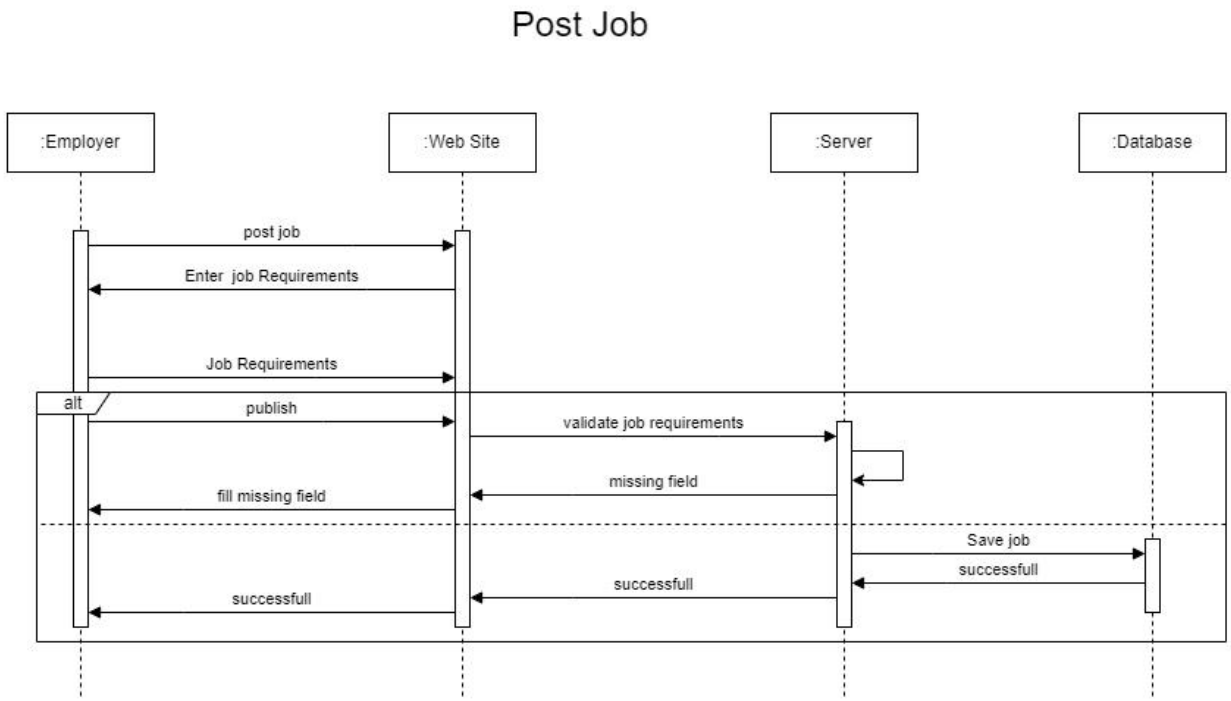

Figure 12 sequence diagram for posting job

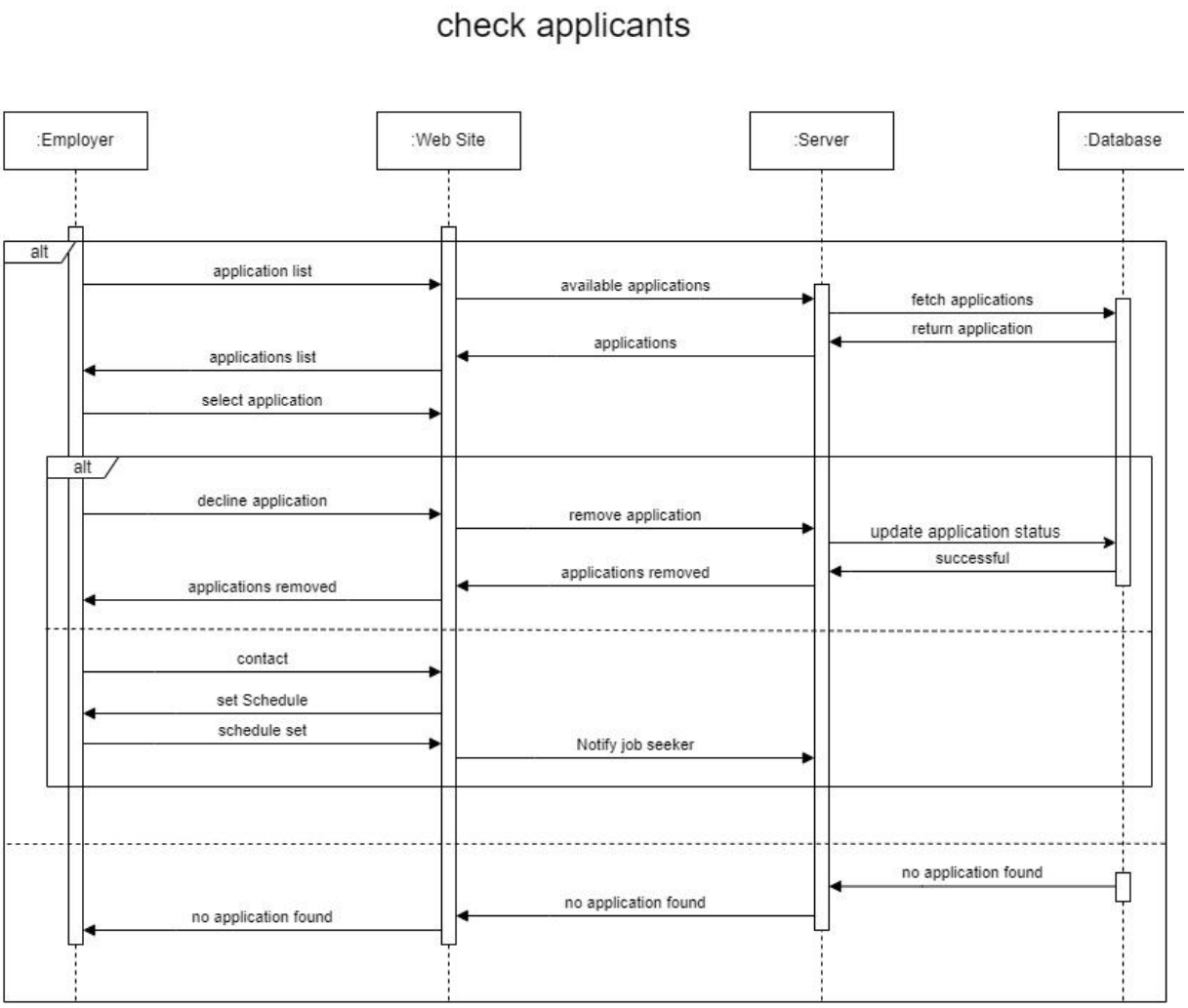

Figure 13 sequence diagram for checking applicants

2.4.3. Development View

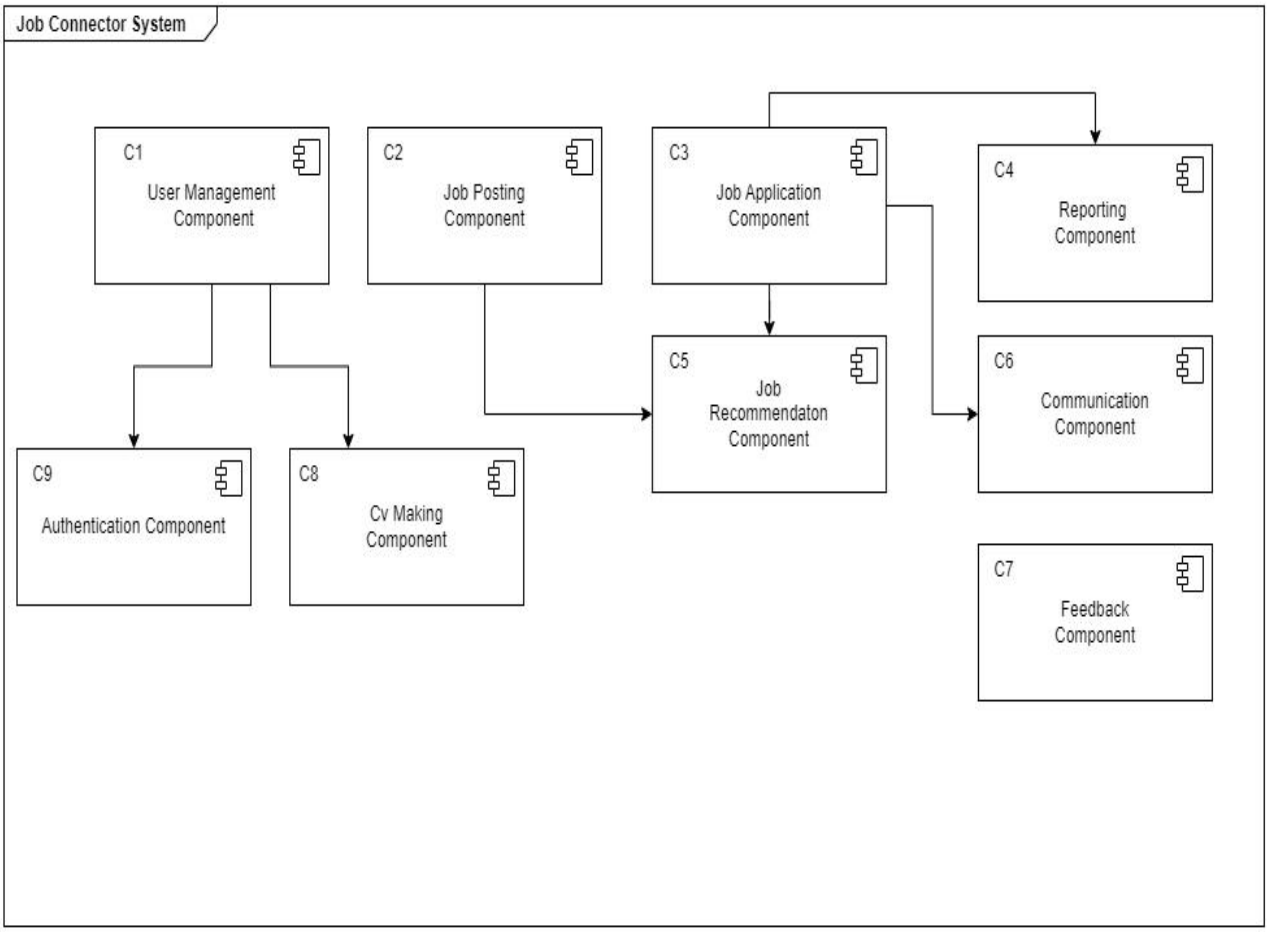

Figure 14 Development view

2.4.4. Physical View

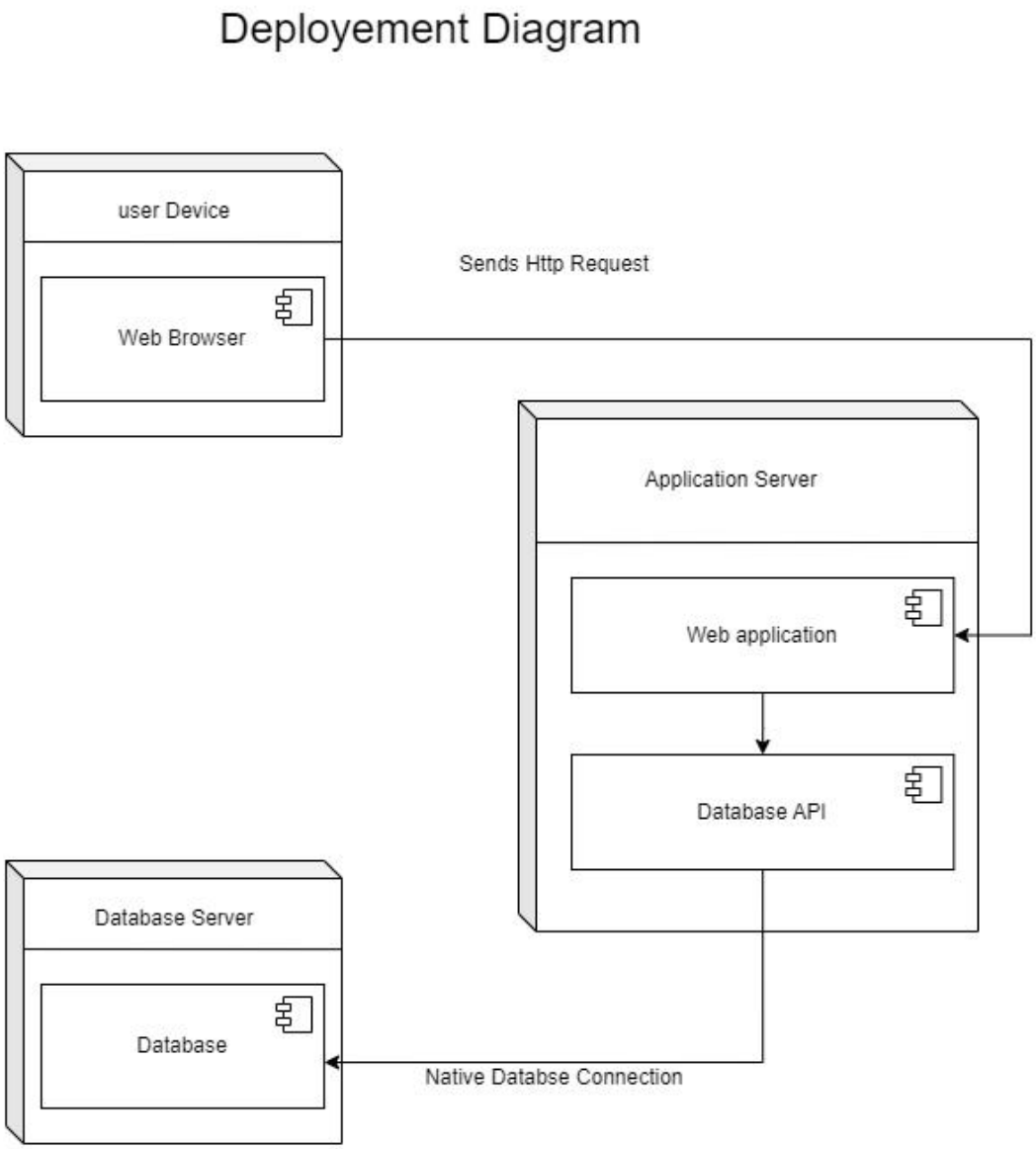

Figure 15 Deployment view

5.1 REQUIREMENT MATRIX

Tabular format can be used to show the relationship between system components and the functional requirements specified in the Software Requirements Specification (SRS). Column two in the table can represent a functional requirement, and column three can represent a system component. Each row in the cells of the table signifies which components are responsible for satisfying which requirements.

#	User Requirement	Component
1	User Management	C1, C6, C4
2	Job Posting and Management	C2, C3, C4, C9
3	Matching and Recommendation	C5
4	Data Management	C8
5	Additional Requirements	C7

Table 1 Requirement matrix