Software Engineering (Sessional) Final Report

Course: CSE-434

Recrutar: An Online Platform For Job Recruitment System

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Executive Summary

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Chapter 1

Introduction

1.1 Goals and Objectives of the project

The recruitment management system is a comprehensive system to manage the entire recruitment process of an organization. It facilitates the information flow of a company within HR departments. Just like performance management, payroll, and other systems, the Recruitment management system helps to contour the recruitment processes and effectively manage recruitment. The features, functions, and major benefits of the recruitment management system are explained below:

• To organize the entire recruitment process systematically and in a structured manner.

• To facilitate faster, unbiased, accurate, and reliable processing of applications from various applications.

• To reduce the time-per-hire and cost-per-hire.

• To incorporate and integrate the various links like the application system on the official website of the company, the unsolicited applications, outsourcing recruitment, the final decision making to the main recruitment process.

• To maintain an automated active database of the applicants facilitating the talent management and increasing the efficiency of the recruitment processes.

• To provide a flexible, automated, and interactive interface between the online application system, the recruitment department of the company, and the job seeker.

• To communicate and create healthy relationships with the candidates through the entire recruitment process.

1.2 Scope of the work

1.2.1 Current situation and context

Current situation

As the current business process is not automated the company needs to cope up with the following set of problems.

Performance

• Response Time: Delay in the preparation and distribution of personnel action. .

• Poor Time Management: Often paperwork is slow, which results in delays in clients' services and for the personnel processes of the company.

Information

• Redundant Information: Personnel information about employees is stored in many places.

• Data Captured Redundantly: Personnel information has to be captured again and again when activities related to a particular employee are performed.

• Data is not securely stored as the result;

• Due to a large number of manual files, data organization is difficult.

Economics

• Manual handling of data is expensive as compared to an automated system.

• Control and security is not efficient enough.

• Difficulty in keeping track of hiring costs and activities.

• Decision-making errors due to lack of credibility of reports.

Services

• The system produces inaccurate results: Once an error occurs in the input process this error can affect all levels of the division.

• The system produces inconsistent results: Inconsistency in decision-making concerning employees.

Context

Effective and consistent recruitment practices are essential to ensure that all applicants are treated fairly and with diversity and equality of opportunity and that costly

recruitment mistakes are avoided. The Company policies are listed as follows:

• Monitoring equal Opportunities: Applicants are treated equally regardless of their gender, race, religion, color, ethnicity, natural origins, color, age, and other inappropriate distinctions.

• Job Descriptions: The Company documents an employee's tasks and responsibilities, what his or her authority is and what skills and qualifications are necessary to do the job.

• Qualification Certificates: All applicants provide certificates of qualifications either in the form of original certificates which will be copied and then returned.

• Medical and Criminal Certificate: The selected candidates are medically fit and free from any criminal activity. Therefore they provide medical fit and crime-free certificates.

1.2.2 Competing products (available in market)

BDJobs.com

BDJobs is the largest jobs site in Bangladesh and offers paid job listings to employers. The site has over unique daily visitors 110,000 and 40 million monthly page views as well as 1.7 million resumes in its database.

Snaphunt

Snaphunt is a smart hiring platform that helps companies source, screen, and hire talent anywhere in the world. Employers can post their jobs for free on Snaphunt by simply signing up and getting instant access to targeted talent from a talent pool of 1 million candidates as well as 650 million profiles across the web while having their jobs distributed to over 20 jobs boards.

JobIsland

JobIsland.com is a job board that provides free job postings from employers and employment agencies with optional paid Premium Job Posting and Featured Job Advertising.

Chakri.com

Chakri.com is a job posting site for employers looking for great people in Bangladesh. The site helps to connect job seekers directly with employers by shortening the job seeker's search and lowering the employer's cost per hire .

1.3 System overview

We are looking for a system that can automate the hiring process because manual hiring is time-consuming, incompetent hiring is flawed, the company's money is wasted, or broadly speaking it is not an economic strategy. The recruitment system is the process of selecting candidates for vacancies and recruiting candidates that meet the requirements of your organization. Therefore, recruitment is a strategic function of the human resources department. Human resource management has several responsibilities. Primarily, it is the selection of potential employees that the company needs to help the system select the best applications that may help achieve its goals. Recruitment is a systematic process used to generate a pool of qualified applicants for a company's position. Selection and recruitment are important to process for a company. A skilled workforce can bring growth and stability.

1.4 Structure of the document

The document is divided into six major sections. In the first section, we will try to give an overview of the whole project and an introduction to the project will be proposed describing the purpose and scopes of the project, an overview of the project, and some critical terms. The second section will mainly focus on a project management plan, organization, life cycle used, and risk analysis of the project. Here all the required equipment will be discussed and an analysis model will be built up about the impact of the project on society. Moving to the third section we will come to know about the requirements of the project specified by some models developed from the use case scenarios. Later in the fourth section architecture alongside the model used, technology, software, and hardware specification will be done. The fifth section will be comprised of the design procedures using alignment of GUI alongside several design models. The last and final part of the project will be the testing section. Here different test cases will be evaluated according to the several models described in the initial parts of the project and it will be justified that the project returns proper outputs for each of them.

1.5 Terms, Acronyms, and Abbreviations Used

- Pycharm
- Postgresql
- Heroku

Chapter 2

Project Management Plan

2.1 Project Organization

All the elements of the project were organized properly. Service improvements must reach users. The project must be organized in a manner that enables the software team to succeed. Our project was organized by a team of three people. We designed our system determined the process of our future steps.

2.1.1 Individual Contribution to the project

Member name	Requirement Specification	Planning	Designing	Model Implementation	User Interface	Testing	Deployment
Rajon Chowdhury	✓	✓	✓	✓	✓		
Nishan Paul	✓	✓	✓		✓		✓
Sijanur Rahman	✓	✓				✓	

Figure 2.1: Individual Contribution To The Project

2.2 Process Model Used

In this project, we used the Agile model as a process model. Using this process model, we have divided our project into several sequential phases. The phases are:

1) Brainstorm

2) Design

3) Development

4)Quality Assurance

5)Deployment.

We completed every phase and finally reached our goal.

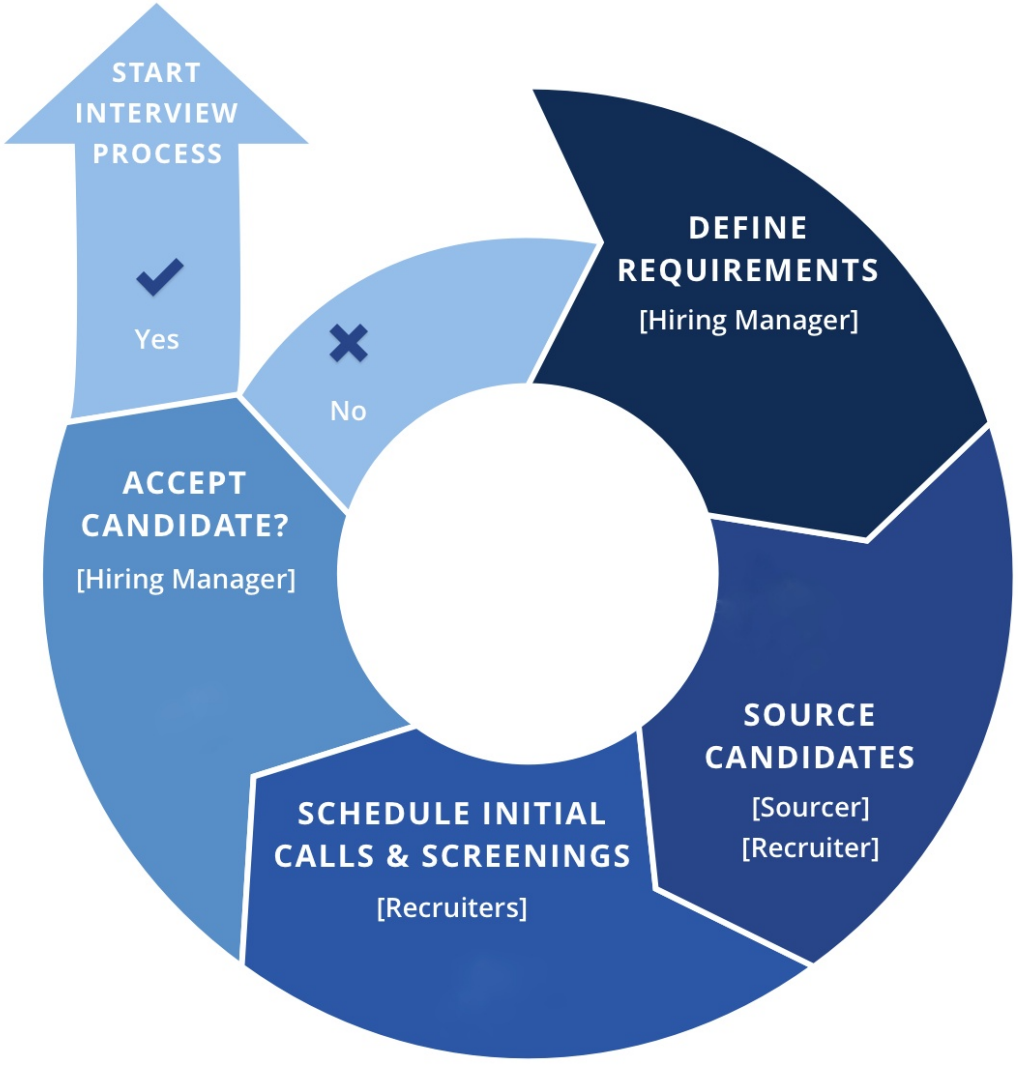

Figure 2.2: Agile Model

2.2.1 Rationale for choosing your life cycle model

Agile today stands as one of the most popular approaches to project management because of its flexibility and evolutionary nature. It started in 2001 with the Agile manifesto and was originally made for software development. Over time, agile project management evolved and became a popular choice for many project managers, irrespective of the industry.

Agile, in a nutshell, is an iterative and incremental approach to project management that helps teams keep up with the demands of the modern workplace. It consists of different methodologies and all of them are based on the concepts of flexibility, transparency, quality, and continuous improvement.

The benefits of Agile make the managers' job easier and allow them to have greater control over their projects. What makes Agile project management truly unique is the fact that it focuses on both, delivering quality and value to the customer, and completing the project within the given project constraints.

2.3 Risk Analysis

Risks in internet recruitment

Hayes and Hubbard (2006) define risk as simply future issues that can be avoided or mitigated, rather than present problems that must be immediately addressed. The general perception is that whenever there is the use of the internet they are bound to be any form of risks involved, for instance, fraud risks in online shopping and interest risks in e-banking, privacy risks of using Twitter, and Facebook. However, unlike the aforementioned services and risks, internet recruitment is also vulnerable to certain risks associated with the practice. Some of the most common risks associated with internet recruitment are analyzed Further.

Tactical risks

This is a type of risk that emanates from adverse business decisions and improper implementation of business decisions (Casselman, 2002). Casselman, further argues that some senior managers do not fully understand the strategic and technical aspects of internet recruitment. Stimulated by competitive and peer pressures, business organizations may seek to introduce or expand online recruitment services without carrying out an adequate cost-benefit analysis, with a poor organizational structure and inefficient resources with the skills to manage internet recruitment systems (Wainner and Braun, 1999; Price, 2007).

Privacy risk

These are the risks associated with the inability to comply with privacy legislation, protection of individual information, and to match privacy agreements with systems that may need to be re-designed (Jackson and Mathis, 2009). According to Schweyer (2001), online recruitment is characterized by a great deal amount of personal information relating to applicants, and that this impacts majorly organizations that do not protect and regularly update their privacy policies.

Information reliability risk

These are the risks that emanate from the applicant's ability to forge and manipulate documents, files, and information (Jackson and Mathis, 2009). That is, not all the information found on the internet is reliable. Schweyer (2001) in his research found out that statistics show that most people have computer twins' in terms of their names and even a similar date of birth. These may be anecdotes of false postings created under another person's name- a form of cyber identity theft.

Performance risk

Internet recruitment requires a great deal of commitment, especially from the people who use it. How people embrace change within their work operations is quite different, simply because of their different cultural sects or background (Bodgan, 1998). The major problem affecting the efficiency and effectiveness in the use of internet recruitment processes is the inability of practitioners to accept change (Walton, 2007). Perhaps more significantly, internet recruitment is about cultural or behavioral change within the human resources departments (Brake and Lawrence, 2000). Price (2007) asserts that it is about developing the capability of human resources departments to facilitate the system and to view the staffing process as an end to end process, similar to that of a supply chain.

2.4 Constraints to project implementation

Schedule Constraint: Since the project includes several implementations, front and back end user interface designing is expected to take some time during preparation. However, since it must be installed in a suitable location, hardware setup and configuration in a particular location can take longer. These factors can cause software development and deployment to fall behind schedule.

Budget Constraint: We faced some budget constraints for efficient software processing because our system needs a high-configured computer to identify several situational problems and work on appropriate solutions.

Hardware Constraint: When several users try to access the same database at a time that is not supported by the capacity of a cloud server, the server can't respond

in expected and anticipated time. This will result in more response time. To solve this overloading problem, we may face a scarcity of needed hardware.

2.5 Hardware and Software Resource (Tools/Language) Requirements

The web development schedule gives us the requirement of some resources. Here, we can make a list of the resources that are needed for the project.

• The main hardware resource needed for the system that is to be dedicated for the system is a distributed system development that can create the server.

• In the software section, our main achievement will be learning a new programming language like python and different frameworks of python. We also will use software like Pycharm, Postgresql, Heroku.

2.6 Project Timeline and Schedule

• Specifying requirements: 1 weeks

• Planning: 1 week

• Modeling: 1 week

• Code generation and testing: 2 weeks

2.7 Estimated Budget

2.8 Social/Cultural/Environmental impact of the project

Employees' work ethics and attitudes are heavily influenced by their religious and cultural views. In order to organize the recruiting process, it is necessary to first understand the motivations of society. As the economy matures and evolves, recruiters must also consider changes in the cultural and social attitudes of those seeking employment. Recent millennials, for example, favor organizations with more flexible employment structures. Adults are more likely to marry later in life, have fewer children, and retire early. All of these are examples of changes in societal preferences that are taking place on a worldwide scale.

Hosting	Tk. 3,000/=
Server	Tk. 5,000/=
Miscellaneous	Tk. 7,000/=
total	Tk. 15,000/=

Figure 2.3: Estimated Budget

Chapter 3

Requirement Specifications

3.1 Stakeholders for the system

Stakeholders are anyone who benefits from or is interested in the system. It can be directly or indirectly affected. The stakeholders involved in this system and their roles are as follows:

Administrators: The individuals responsible for managing the whole online-based platform. They supervise and control the whole system.

Recruitment Unit: The main task of the recruiting department is to attract talented candidates who meet the requirements of the organization while providing equal opportunities for all. Create job descriptions and staff descriptions, publish jobs, select applicants, design and implement a selection process, conduct interviews, and guide you to your HR manager.

Job Applicants: Job seekers applying for specific vacant seats

3.2 Use case diagram with Graphical and Textual Description

A use case diagram is the simplest representation of a system that shows how users interact with the system.

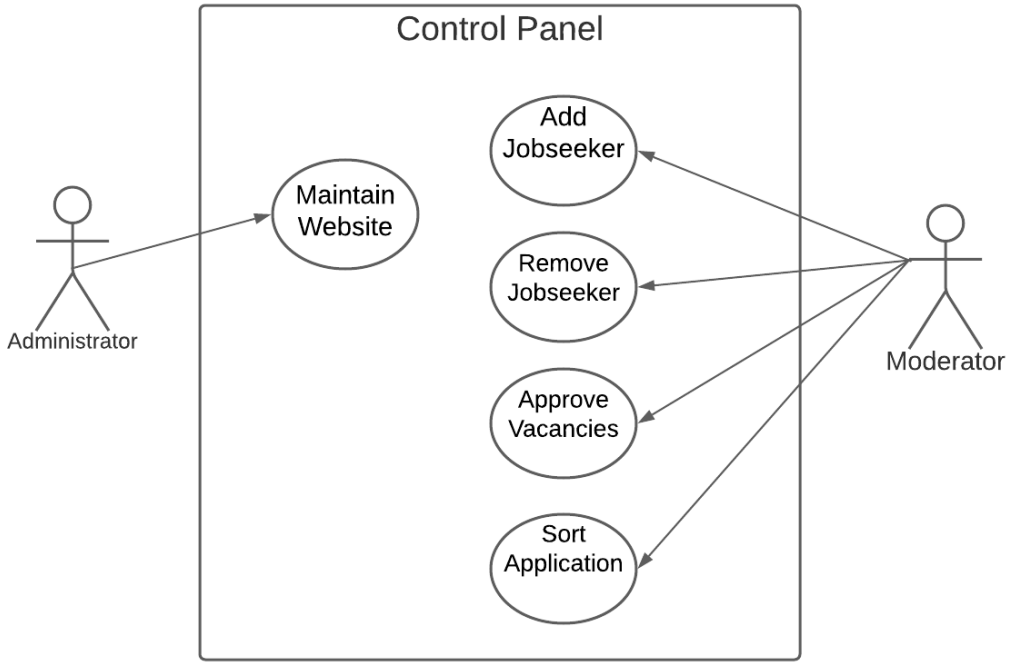

Figure 3.1: use case for control panel

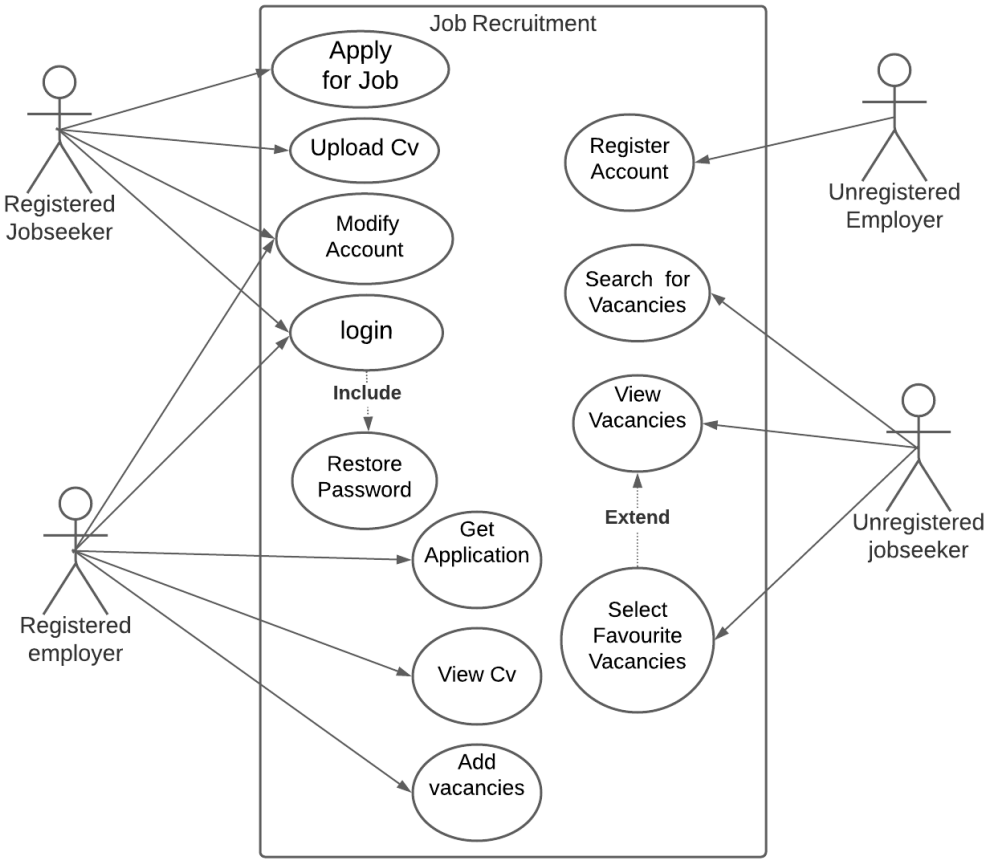

Figure 3.2: Use case for functionality

3.3 Activity Diagram

The activity diagram shows the dynamic behavior of a system or part of a system through the flow of control between actions that the system performs.

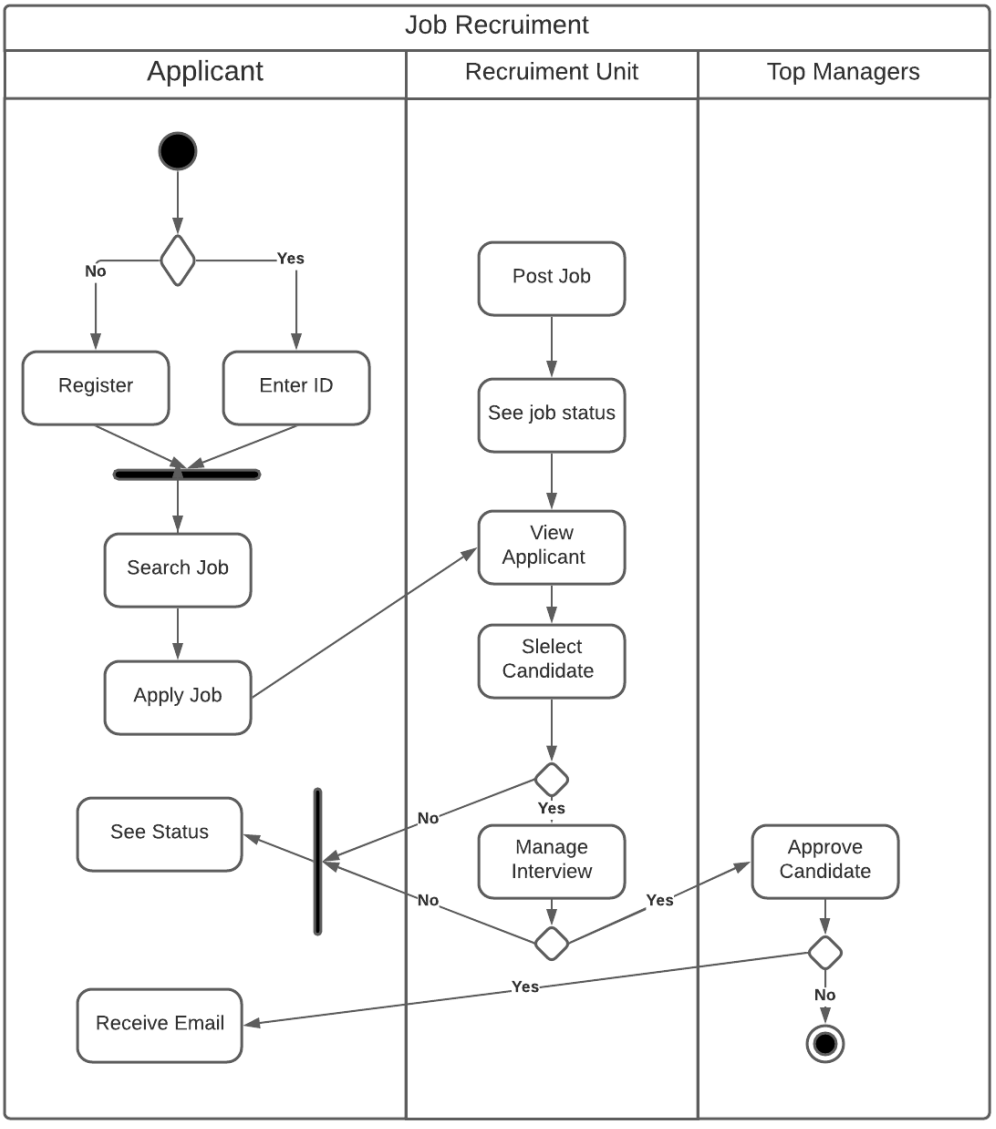

Figure 3.3: Activity Diagram

3.4 Static model – class diagram

A class diagram provides a structural view of the system. The class diagram is the main building block of object-oriented modeling. It is used for general conceptual modeling of the structure of the application, and for detailed modeling, translating the models into programming code. Class diagrams can also be used for data modeling.

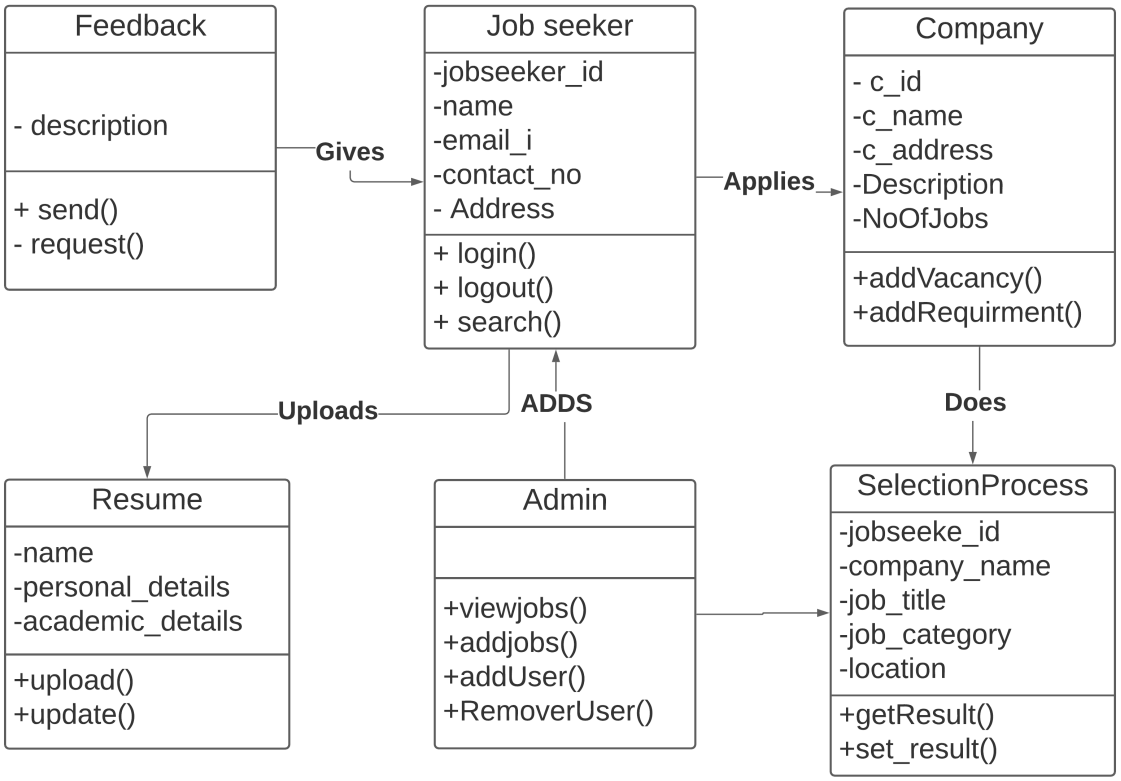

Figure 3.4: Class Diagram

3.5 Dynamic model – sequence diagram

A sequence diagram is used to show the dynamic communication between objects during the execution of a task. This is a type of interaction diagram because it describes how and in what order a group of objects works together.

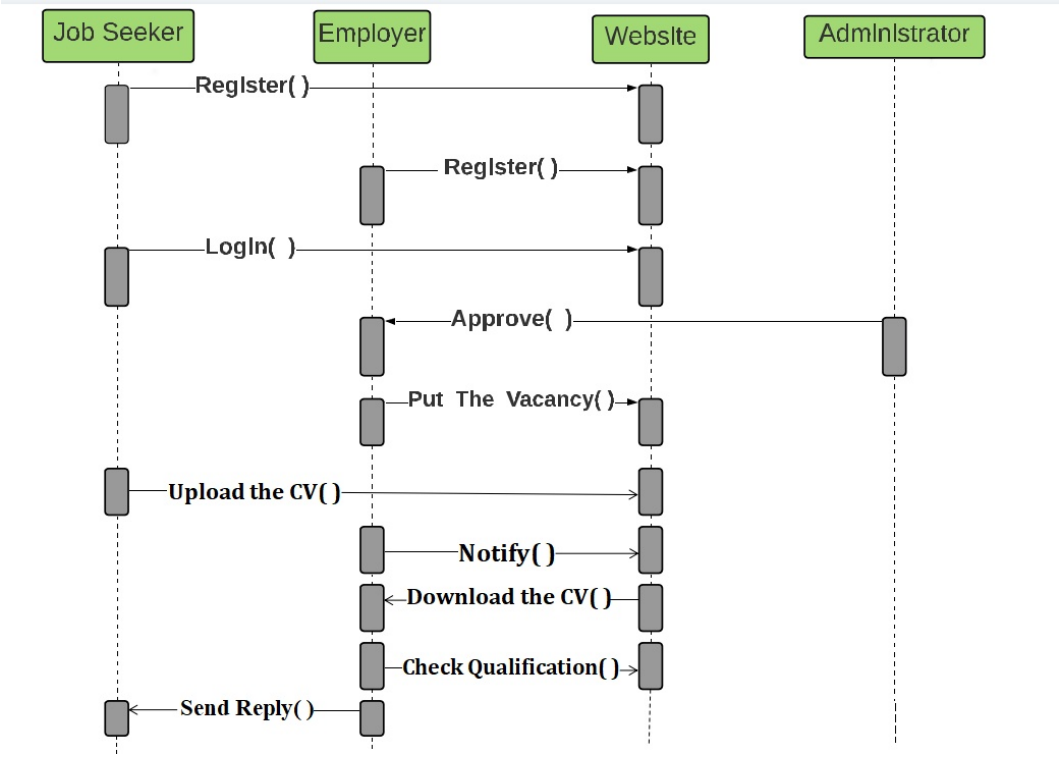

Figure 3.5: Sequence Diagram

3.6 Safety and Security requirements

3.6.1 Access Requirements

Users must first register to access our project. The services can then be accessed by the registered user. A user's data can only be accessed by the user's approved users. A user can't see the data of another user. Unauthorized users can't access anything from the database. Authorized Admin can edit and see various data.

3.6.2 Integrity Requirements

The Three Key Requirements to Achieve Data Integrity for our project will be-

• Completeness: All the data records shall be complete to satisfy the needs of all its users.

• Accuracy: Wrong or misleading data helps no one.

• Consistency: This is one of the harder data integrity issues to resolve. We shall try our level best to ensure this.

3.6.3 Privacy Requirements

Users must accept our terms and conditions before using our service. Users provide data by accepting these terms and conditions. We are also obliged to follow all applicable data protection regulations.

Chapter 4

Architecture

4.1 Architectural model/style used

The architectural design represents the arrangement of data and software components required to construct a computer-based system. It considers the architectural style of the system, the arrangement and properties of the system's components, and the interrelationships between all of the system's architectural components. In our web-based job recruitment system, we used a data-centered architectural design. As seen in the figure:

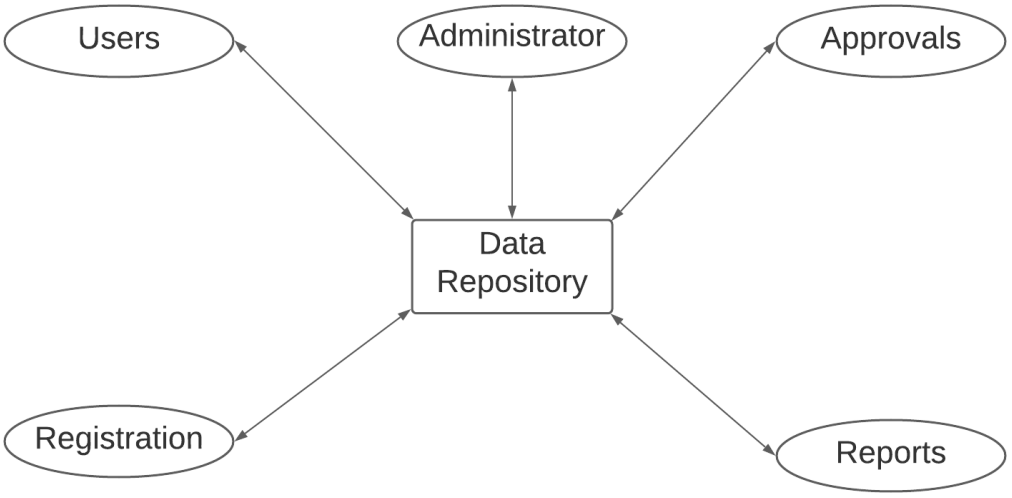

Figure 4.1: Architectural style of an online platform for job recruitment system

4.1.1 Rationale for choosing your architectural model/style

The user's information is stored in a central database. The reasons behind this are-

• The data integrity is maximized as the whole database is stored at a single physical location. This means that it is easier to coordinate the data and it is as accurate and consistent as possible.

• The data redundancy is minimal in the centralized database. All the data is stored together and not scattered across different locations. So, it is easier to make sure there is no redundant data available.

• Since all the data is in one place, there can be stronger security measures around it. So, the centralized database is much more secure.

• Data is easily portable because it is stored in the same place.

• The centralized database is cheaper than other types of databases as it requires less power and maintenance.

• All the information in the centralized database can be easily accessed from the same location and at the same time.

4.2 Technology, software, and hardware used

• Programming Language: Python

Python is an interpreted high-level general-purpose programming language. Its design philosophy emphasizes code readability with its use of significant indentation. Its language constructs as well as its object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects.

• Framework: Django

Django is a high-level Python web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of web development, so we can focus on writing our app without needing to reinvent the wheel. It's free and open source.

• Database: PostgreSQL

PostgreSQL is a powerful, open-source object-relational database system with over 30 years of active development that has earned it a strong reputation for reliability, feature robustness, and performance.

• IDE: Pycharm

PyCharm is a dedicated Python Integrated Development Environment (IDE) providing a wide range of essential tools for Python developers, tightly integrated to create a convenient environment for productive Python, web, and data science development.

• Hosting and Server: Heroku

Heroku is a container-based cloud Platform as a Service (PaaS). Developers use Heroku to deploy, manage, and scale modern apps. Heroku is fully managed, giving developers the freedom to focus on their core product without the distraction of maintaining servers, hardware, or infrastructure.

Chapter 5

Design

5.1 Component level design following pattern

The component is a well-defined set of modular, portable, replaceable, and reusable functionality that encapsulates and exports its implementation as a higher-level interface. A component is a software object that encapsulates a single function or a set of functions and is intended to interface with other components. It has a well-defined interface and follows a set of rules that should be followed by all components in an architecture. Only a composting unit with a legally established name can be defined as a software component. It is self-contained and subject to third-party composition. Component-based architecture's main purpose is to ensure that components can be reused. A component is a binary item that is reusable and self-deployable that encapsulates functionality and the characteristics of a software feature.

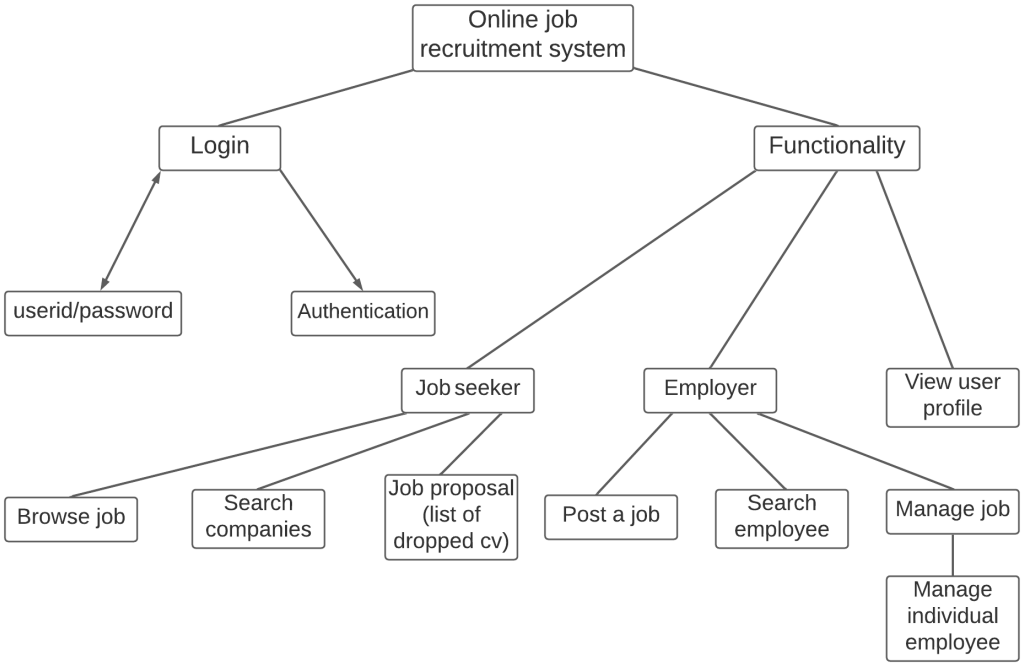

Figure 5.1: : Structure of online job recruitment system

Naming conventions should be developed for components that are defined as part of the architectural model and then revised and elaborated as part of the component-level model. Architectural component names should be generated from the issue domain and make sense to all stakeholders viewing the architectural model.

For components that are defined as part of the architectural model and then refined and elaborated as part of the component-level model, naming conventions should be developed. The names of architectural components should be derived from the problem domain and should make sense to all stakeholders viewing the architectural model.

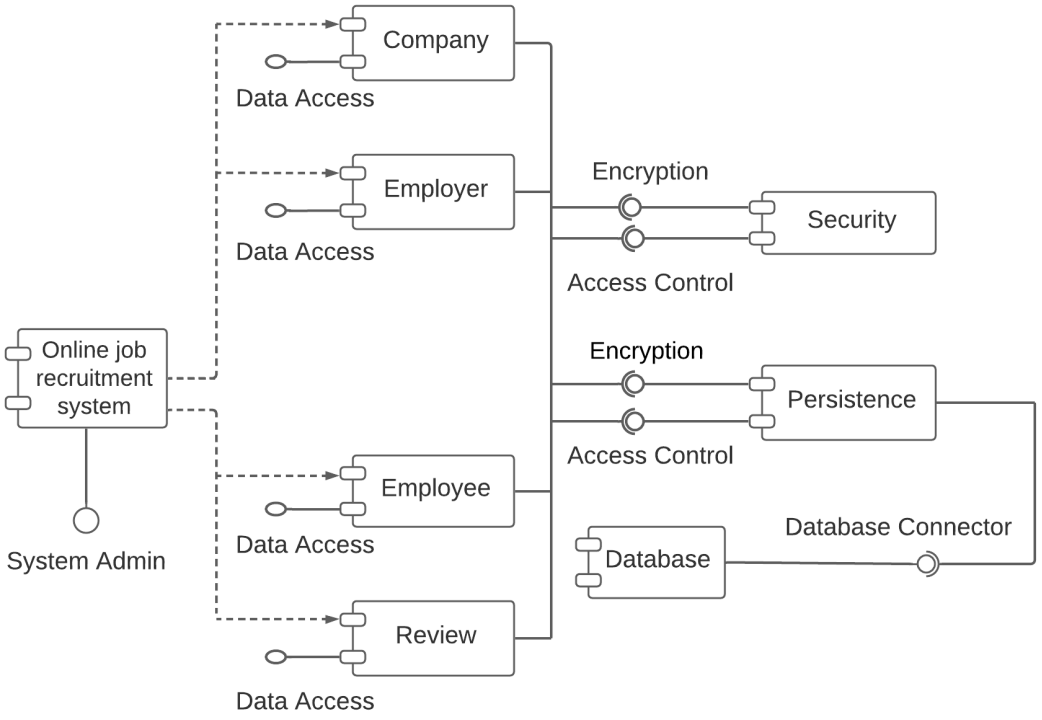

Figure 5.2: : Design components of Online Job recruitment System

5.2 GUI (Graphical User Interface) design

A graphical user interface (GUI) is a way for users to communicate with a computer device. So for the convenience of the user, we also have designed GUI using HTML, CSS.

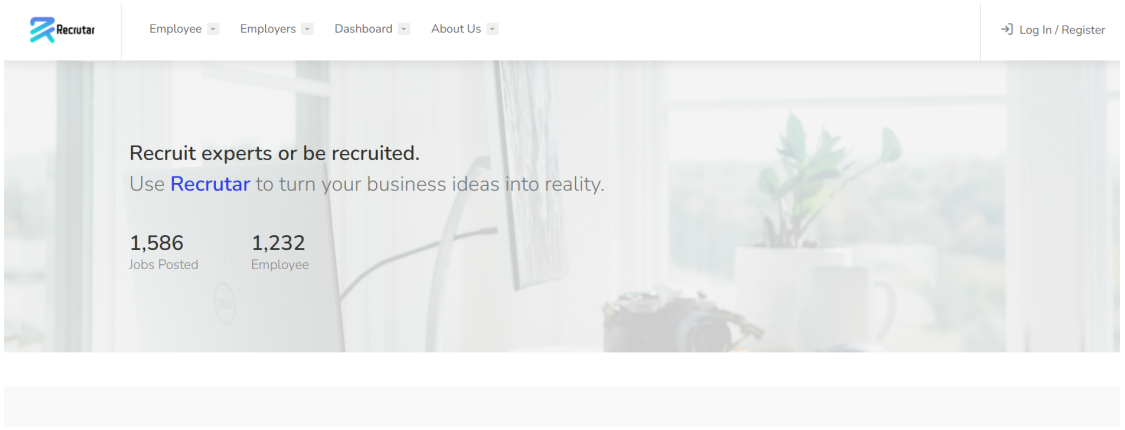

Figure 5.3: : Home

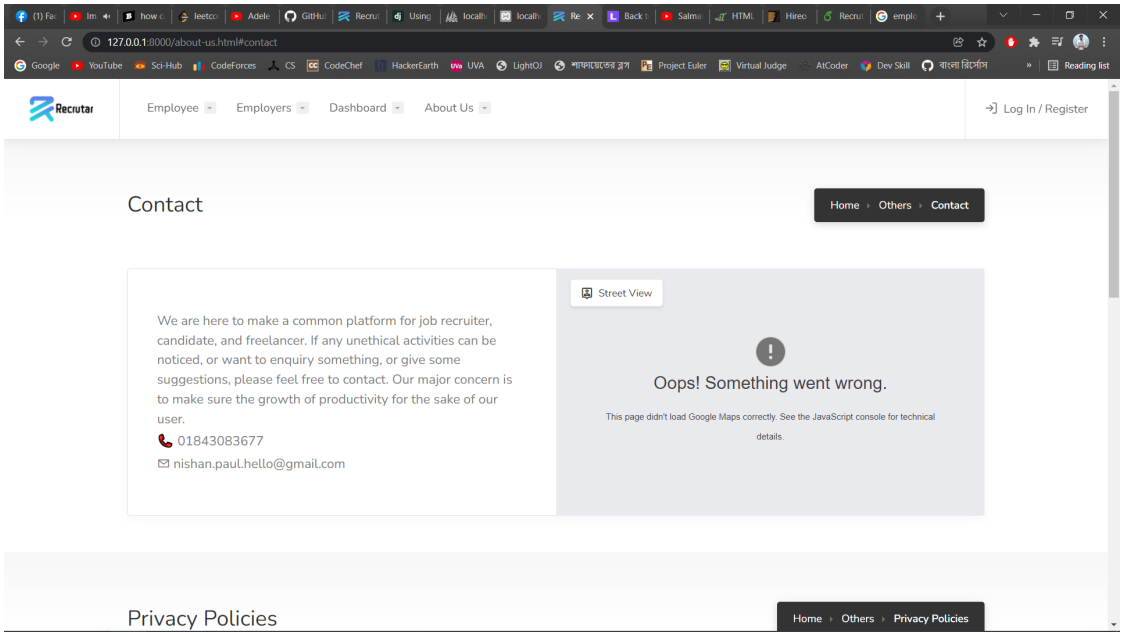

Figure 5.4: : About Us

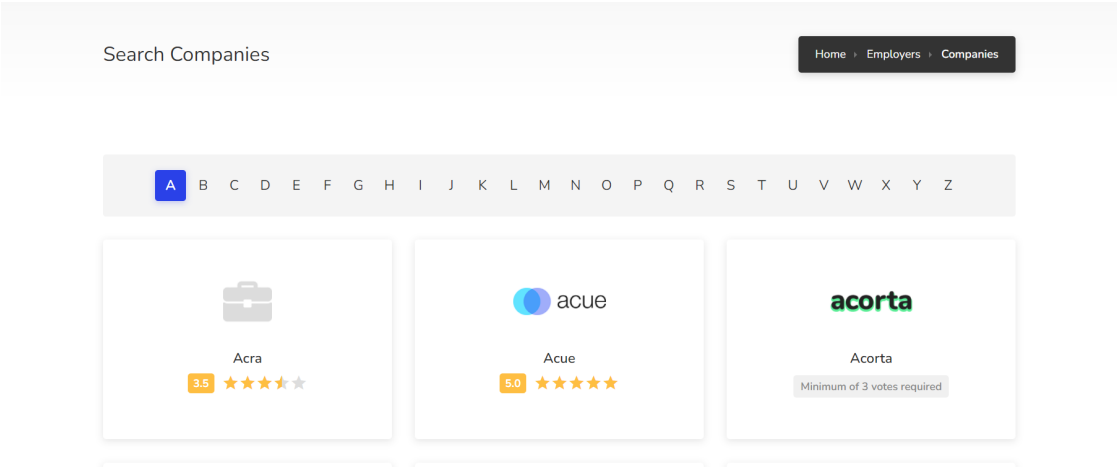

Figure 5.5: : Search Companies

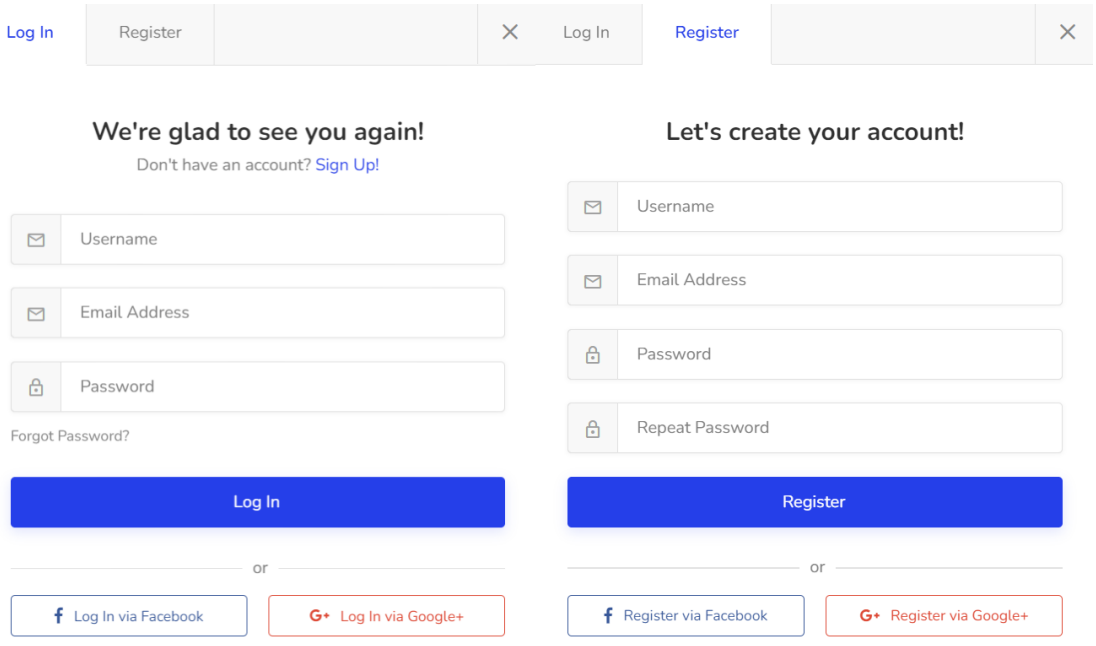

Figure 5.6: : Authentication

5.3 Architectural design

Architectural design is the process of determining the subsystems that make up a system, as well as the framework for subsystem control and communication. A description of the software architecture is the result of this design process. It entails determining the primary system components and their interconnections.

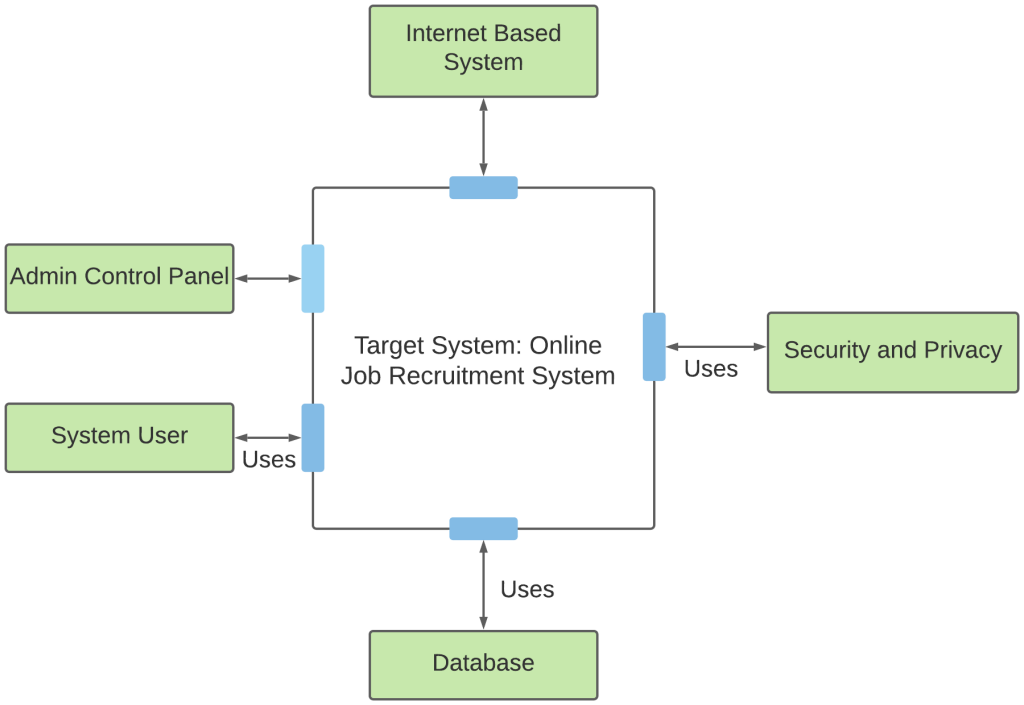

Figure 5.7: :Architectural Design of Online Job recruitment System

5.4 Data/Class Design

A class diagram shows how a system's classifiers are organized. The UML diagrams that follow use it as a starting point. Developers and other team members will benefit as well. Business analysts can use class diagrams to model systems. from a strategic point of view A UML class diagram is divided into two sections:

•A set of classes

•A series of relationships between classes.

Class diagrams' main purpose is to offer a static representation of an application. It represents the many different objects that may be discovered in the system, as well

as the different types of things that can be found in the system as well as the ties that bind them together. It illustrates the capabilities of the software system. To provide an overview of properties, classes, functions, and relationships It distinguishes between classes. To facilitate software development, names, attributes, and procedures are provided.

Because it's made up of classes, interfaces, affiliations, collaborations, and other components, it's called a structural diagram. A class diagram is a diagram that is used to illustrate, explain, and record several different sections. of a system, as well as to write software code that may be executed. The following are some of the benefits of class diagrams: -

•It might represent the object model of a complex system.

•It reduces maintenance time by providing a visual depiction of how an item works.

•To facilitate comprehension, it displays a general diagram of an application.

•It shows a detailed diagram by stressing the code that has to be written.

•Both stakeholders and developers benefit from it.

5.5 Test Case Design

5.5.1 Test Scenarios for SignUp and Login Section

• Check that administrators and users have access to the system using the information they have provided.
• Ensure that no one can access the database without first signing up and logging in..
• Ensure that no one other than the account holder can change any signin-related data..

5.5.2 Test Scenarios for Admin Section

Attempt To Authentication:

Successful Authentication:

Failed Authentication:

• Verify that the administrator has access to the central database as well as the appropriate modification rights.
• Verify that the administrator has complete control over the recruiting firms.
• Admin has access to monitor how well the employers are carrying out their responsibilities.

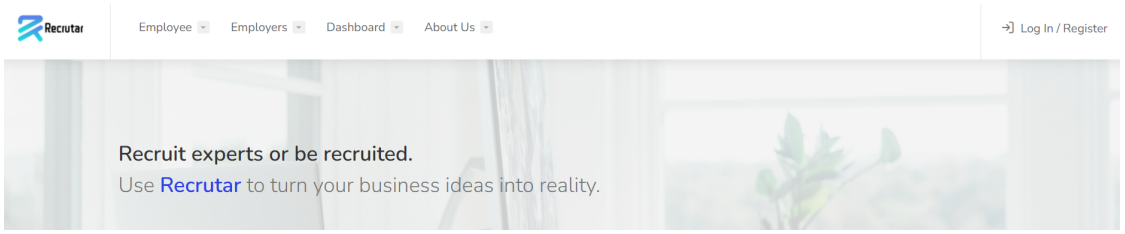

Figure 5.8: : Authentication

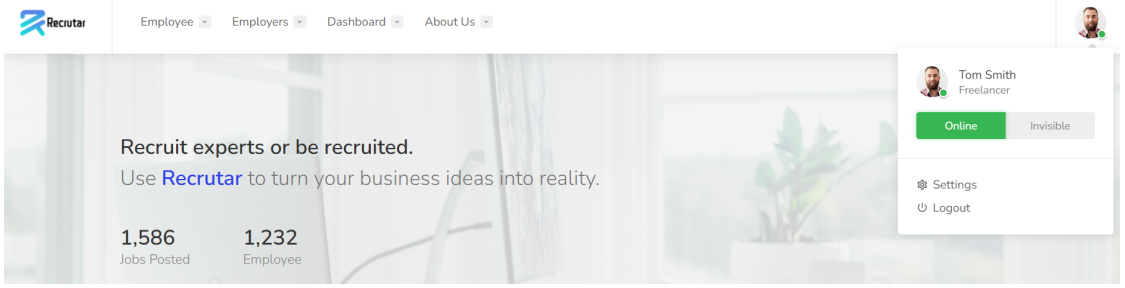

Figure 5.9: : Login

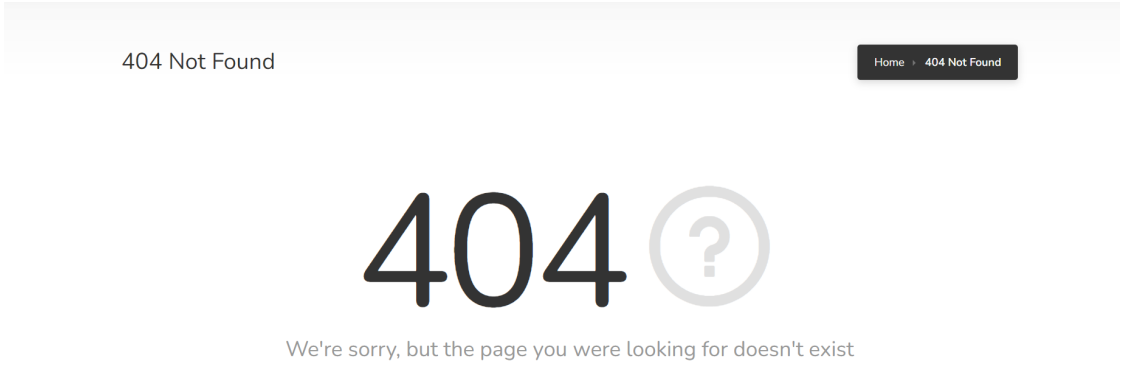

Figure 5.10: : Error Page

• The administrator has access to ensure that the system is meeting all of the job seeker's requirements.

5.5.3 Test Scenarios for Employer Section

• Verify that the employers have the ability to post jobs in accordance with the openings..
• Ensure that employers can find job seekers who satisfy the required qualifications.
• Provide employers with the tools they need to effectively manage all of their jobs.

5.5.4 Test Scenarios for Job seeker Section

•Check to determine if the job seekers are fully capable of looking for employment that match their skills.
• Ascertain that job seekers can search for companies and select their favorites.
• Allow job seekers to drop their resumes in a professional manner.

Chapter 6

Testing and sustainability plan

6.1 Requirements/specifications-based system level test cases

Specification Based Testing is also known as Behavior Based Testing or Black Box Testing because the program is seen as a black box by the testers. They have no idea how the device or part is structured within the box because they don't know how it works. In other words, the tester is only interested in what the program does, rather than how it does it. We've planned test cases in various scenarios for this testing.

6.2 Traceability of test cases to use cases

Verify that an implementation meets all requirements: The customer's requests were all fulfilled. Check that the program just does what the customer asked for: don't add features that the customer didn't ask for. Assist with change management: When any requirements change, we'd like to know which test cases should be redone to reflect the new requirements.

6.3 Techniques used for test generation

We used the unit test method to test our system. In this way, we designed certain test cases that reveal hidden errors.

6.4 Assessment of the goodness of your test suite

The TraceabilityMatrix is used for the assessment of the test suite as it provides a table-based method and gives you easy information on whether the system has faults. It gives a clear understanding to a person without any prior knowledge of the software system. This matrix is therefore useful for testing the project's goal-oriented test approach.

(Which metrics were used for such assessment?)

6.5 Sustainability Plan

Sustainability plan refers to a plan where it determines factors to make a system sustainable

6.5.1 Scalability

beginning reducesmaintenance costs, improves the user experience, and increases agility. For our web application, we used the Django platform. Django is a Python-based web app development framework. Django scales similarly to PHP, Rails, and every other stateless sharednothing web technology. Since Django web nodes don't have any stored state, they can scale horizontally—we just need to fire up more of them as required. The capacity to do so is the essence of scalability.)

(Describe how designers allow for future capacities- number of simultaneous users possible, maximum stored data, etc.)

6.5.2 Flexibility / Customization

Our web app is based on django, which is one of the top web development languages for Python-based backend web applications. Simplicity, versatility, reliability, and scalability are the key objectives. Django for web development gives developers more versatility and dynamism since it is written in Python, a flexible programming language. We can create web applications and customize the code on the fly based on the needs of the users.) 27

Acknowledgement

Bibliography