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1. Introduction

Collaboration is viewed as a universal concept in modern knowledge work to achieve high levels of inventiveness and effectiveness in businesses. The purpose of human resources management seems to coordinate work and human aspects inside an organization and to enhance the human factor to boost productivity, efficiency, and the economic benefit of a business. The modernization of human resource management has undergone a significant shift as digitalization permeates the time-consuming procedures that are prevalent within its specific activities. Corporations need to hire the top personnel that can help them accomplish their deliberate aspirations if they want to remain competitive in today's complicated and evolving business climate. The hiring process is a crucial one for managing human resources in firms, but it is also dynamic and complex.

These days, both businesses and organizations are turning to internet recruitment (Fernandes & Machado, 2022) in addition to the traditional ways of hiring, such as newspaper advertisements, career fairs, and hiring events, to discover the appropriate profile. This can be generally described as the management of the employment process using contemporary information and communication technologies, particularly the Internet, which is utilized by many businesses as a reliable source of hiring prospects.

The literature evaluations that came before this one has given a foundational grasp of the internet recruiting where Artificial Intelligent exist in human resources. By adhering to academic laws and regulations, the major objectives of this study are to assess prior studies and the gaps in the literature that pertain to this field, compare existing applications, and uncover new scope.

1.1 Background

A crucial, complex, and dynamic phase of human resource management in organizations is the recruitment and selection process. The value that human resources provide in today's fiercely competitive job market is crucial to the knowledge economy, making recruitment an imperative activity (Roaziro & Venkatraman, 2019). The recruitment process is defined as selecting the best individual for the right position after carefully assessing the workforce and skills that the company will require both now and, in the future (Karaboga & Vardarlier, 2020). A perspective contextual aspect was the avalanche of applications for each position because of the digitalization of both vacancy and candidate information through the internet (Black & Stewart, 2020), which transcended the initial reach and richness boundary. Recent technological advancements have profoundly impacted Human resource practices, particularly extensive technology uses in recruitment (Sami & Olsson, 2019), for posting jobs, obtaining resumes, and interacting with the

prospective stream. Unfortunately, organizations appear to be having difficulties with both their hiring practices and the available resources. One of the major challenges confronting human resources managers is to give the business access to a pool of potentially competent job candidates from which smart hiring decisions may be made to fill opening (Haddadi & Tali, 2017).

1.2 Aim

The project's ambition is to develop a progressive web application that will evaluate resumes based on pre-established criteria using artificial intelligence, simplifying, and accelerating the recruiting process. The software will be accessible on any device with an internet connection, regardless of screen size, and it will let users access the human resources talent pool through social matching.

1.3 Objectives

- Perform a literature review on a related problem discussion board.
- Conduct research and gather the primary solution requirements.
- Study requirements and strategies for the proposed solution.
- Develop an application interface that is user-friendly.
- Create a system that fulfills all the required features.
- Evaluate and test the proposed system.
- Set up the system and prepare for its sustenance.
- Enticement a document of the developed system with features and limitations.

1.4 Scope

There are several potential areas for the project to progress in the near future. Additionally, users of the current system can express their thoughts and experiences, which may generate new idea and innovation. Despite the large variety of capabilities available to cover, everything cannot be done owing to time and resource constraints. Nowadays, AI recruiting systems even does virtual interviews in addition to simply analyzing resumes. The following features and functions are not currently included in the project's scope:

- ⇒ The information on a resume might not be sufficient to decide, necessitating more scholarly research.
- ⇒ Personality insights based on resume.
- ⇒ Integration to existing website or Content management software.
- ⇒ Continuously evolving Machine Learning will not be implemented.
- ⇒ Saving resumes for further improvement of the system.
- ⇒ Review of Companies and Candidate feature will be unavailable.
- ⇒ Skills assessment and Certificate Validation will not be implemented.
- ⇒ Automatic Social Media Publishing feature will be unavailable.
- ⇒ Inserting Positions or Resume from additional Platform will be unavailable.
- ⇒ Automatic Resume Sourcing will be not implemented.
- ⇒ Salary and hiring Insights will be not available as not enough data available.

1.5 Nature of Challenges

Since this is an academic research project, every component, including the study, analysis, development, and documentation is a challenging task. Besides, positions involved in a relevant project such as Project manager, Scrum Master, Analyst, Developer, Tester, and report writer all are executed by me alone. Additionally, there are not any actual users to use and to provide feedback of the application, thus I should indeed pretend different user roles.

Even though large-scale projects have resources, expertise, and dynamic sets of abilities, risk management must be completed in a reasonably short amount of time. Thus, it is vital to acquire new abilities to deal with risk management. Since I need to identify concepts that have not been explored before and solutions that nobody else has thought of yet, research is inherently difficult. Moreover, research moves slowly and takes a long time to conduct, which frequently demotivates me.

2. Literature Review

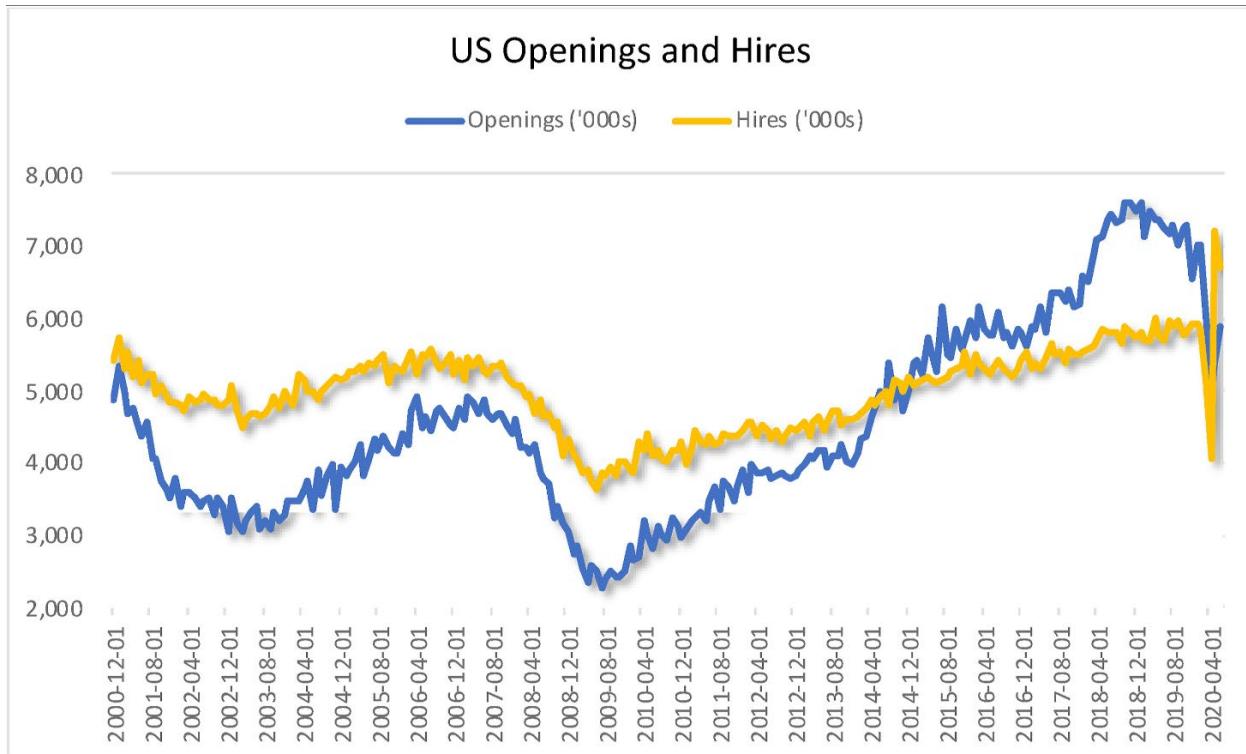
2.1 Approach to literature searching

The digital technologies that use Artificial Intelligence abilities, including deep learning, natural language processing, machine learning, and neural networks, have made the most recent technological developments in e-recruitment apparent. The prime objective of this study is to develop a recruiting system that will employ artificial intelligence to speed up and improve the screening process. The discussion of earlier research prospects addressing the importance of technology in simplifying recruitment procedures with the usage of artificial intelligence will be covered in the sections that follow. Research on the importance of the qualities in the recruitment is required to maximize the use of AI recruitment systems, which are being used by more and more organizations. A synopsis of the theoretical foundations for e-recruitment will be given since recruitment is regarded as the most valuable procedure as a social matching determination that encompasses several steps.

The study makes sure that none of the work done here is a duplication of any other research at all but rather represents brand-new research. The term 'extension' is inappropriate for this study since more than 50% of the works are entirely original, while the remaining works are expansions of earlier research activities. Every material cited in this article has undergone peer review and was compiled from reputable academic papers, conferences, books, and scholarly publications. This paper discusses new challenges that were discovered while integrating multiple problem domains. In addition to discussing strengths and limitations, study pertaining to each domain is carried out independently and organized.

2.2 Identification of the problem

Due to the talent pool's availability, which refers to the caliber of candidates the organization can draw for the position, and the selection process' effectiveness in identifying the best candidate from the talent pool, recruiting has become incredibly difficult (Black & Esch, 2021). Private employer, Johnson & Johnson (McIlvaine, 2018) stated that they received over 1 million applications against 28,000 vacancies making it utterly tough to analyze and comprehend. Google, the largest tech company received an approximated 2 million applications for only 14,500 vacancies in 2017 (Torres, 2017), implying that it was roughly ten times as tough to secure a position at Google than it was to get into Harvard University (Schuschu, 2017).



Source: U.S. Department of Labor

Figure 1: Hiring statics (Black & Esch, 2021)

The challenges associated with handling vacancy applications have led to the development of several technology-based recruitment systems known as E-Recruitment, which offers several advantages including a wider scope, advertising, and better engagement (Okolie & Irabor, 2017). The technology's contribution to recruiting is stereotypically limited to obtaining and displaying straightforward candidate profiles (Hamilton & Davison, 2018). Since its beginning, e-Recruitment has been successful, but it has several drawbacks, one of which is that each resume must still be examined individually before hiring which requires a tedious amount of time (Haddadi & Tali, 2017). Likewise, the challenges associated with handling applications and complexity level tends to rise as the quantity of candidates and resumes increases. A lot of recruitment-related problems stem from a lack of awareness of the social matching viewpoint on decision-making, including concerns like determining the most pertinent selection criteria and candidate selection (Sami & Olsson, 2019).

Employers may receive more unqualified applicants because of their increased visibility, and Internet hiring increases to the workload of HR staff representatives who must now analyze more resumes and emails in addition to purchasing pricey software to keep track of the numerous

applications (Okolie & Irabor, 2017). Even though individuals in charge of choosing the successful application should have enough information on which to make their decisions, they frequently do not put in the work and effort need to find the best candidate (Roaziro & Venkatraman, 2019). Furthermore, human-resource managers recurrently fail to reach right audience for jobs. For instance, Cappelli (Peter, 2019) determined that hiring practices are ineffective because employers for jobs lacks training or experience and occasionally they have unreasonable expectations. As a result, the hiring process becomes composite, leading to the selection of employees that are either under-qualified or irrelevant. Considering human constraints, a poor choice might cost a company both the ideal people it was considering and resources (Ihil & Agustina, 2018). The following sections go into increased transparency about those issues and include enriched study data and supporting evidence.

2.3 Problem domain and possible solution

2.3.1 Primary Discussion

Finding and enticing from a larger pool of potential employees is imperative, but the larger and diverse that pool is, the tougher it will be to screen that pool. Leong (Corissa, 2018) claims that the length of the hiring process, which includes resume screening, selection tasks, analyzing applicant profiles, and setting up screening interviews, may range from a few days to several weeks, depending on the volume of applications. Technology enables businesses to build the digital simulation, which is much more than just a basic screening of a job application or even an interview (Black & Esch, 2019). OKUSANYA A.O (Roaziro & Venkatraman, 2019) claims that, individuals in charge of choosing the effective applicant must have access to sufficient information on which to base their judgments in recruiting process. The authors also stated that more study is required to build a tool for handling recruitment. Recent works (Wheeler & Ronald M, 2021) highlight that even though individuals in charge of choosing the successful application should have enough information on which to make their decisions, they frequently do not put in the work and effort need to find the best candidate. Previous research has shown how the traditional recruiting process is unfair (AL-Alawi & Naureen, 2021) because of prejudice, diversity, ethics, and discrimination frequently related to appearance, gender, color, ethnicity, and religion. There are a variety of advantages that an AI-enabled recruiting system may offer including lower recruitment costs, less paperwork, quicker turnaround times, and a higher likelihood of discovering and hiring the ideal candidate (Ore & Sposato, 2021).

2.3.2 Separating Right Candidates from the pack

Considering the number of individuals seeking employment in the UK (Arthur, 2021), it is practically hard to filter through all the resumes and discover the ideal match. This makes the employment process burdensome and ineffective, costing businesses resources (Salvatori, 2018). Additionally, there are no industry standards for resumes, and nearly every Resume has a distinctive content and structure (Chen & Niu, 2018). This significant obstacle that there is a considerable deal of uncertainty in the structure of resume data, which lowers the success rate of proposing hires who satisfy most of the employer's needs and requires too much time from human resources to perform job matching. This requires a lot of resources and is susceptible to human mistake, making it possible to miss an individual with the right skills. Additionally, it might be difficult to determine whether a candidate can handle the position for which they are being employed (Yan & Le, 2019) by comparing their resume to the job description.

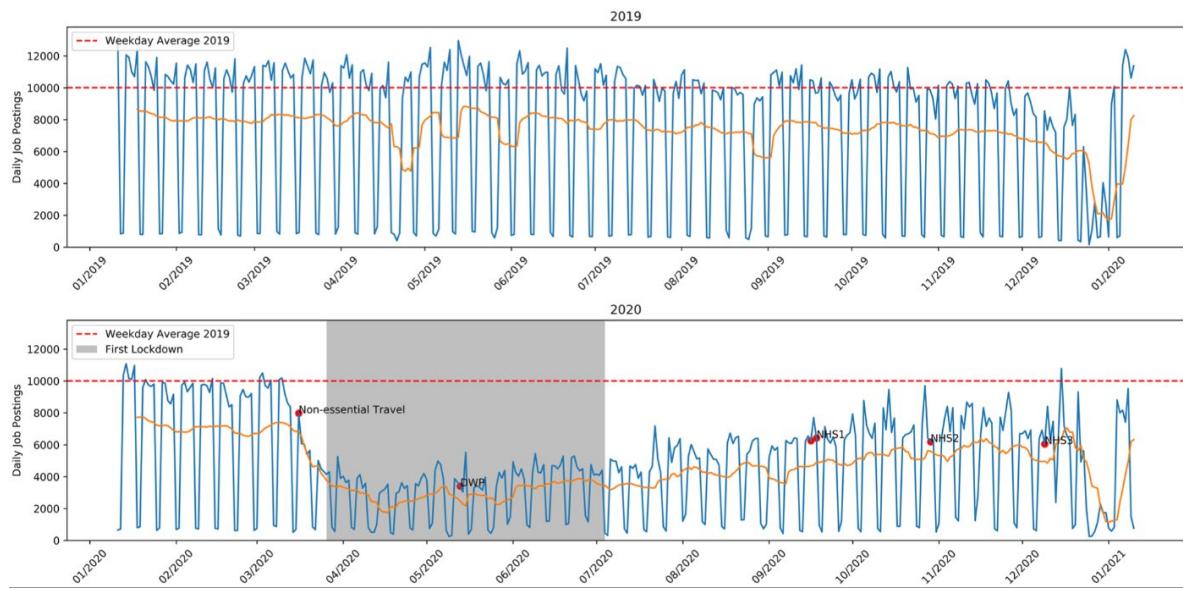


Figure 2: UK Regular Job Posting (Arthur, 2021)

2.3.3 Lack of Skilled Personals for Identifying Applicants

Hamilton (Hamilton & Davison, 2018) claims that because there is such a big pool of applicants, it will become more crucial but also more difficult to find candidates with broad abilities and invite them for an interview. The process of reviewing such applications takes a considerable amount of time, and using technology demands technical expertise which HR

Managers often deficiencies. Amazon (Son Mina, 2019) currently has a recruiting engine that assesses applicant resumes to identify candidates which have a history of being high achievers and eradicating unsuitable candidates. Despite the system's shortcomings, a similar improved system can be created with addressed flaws.

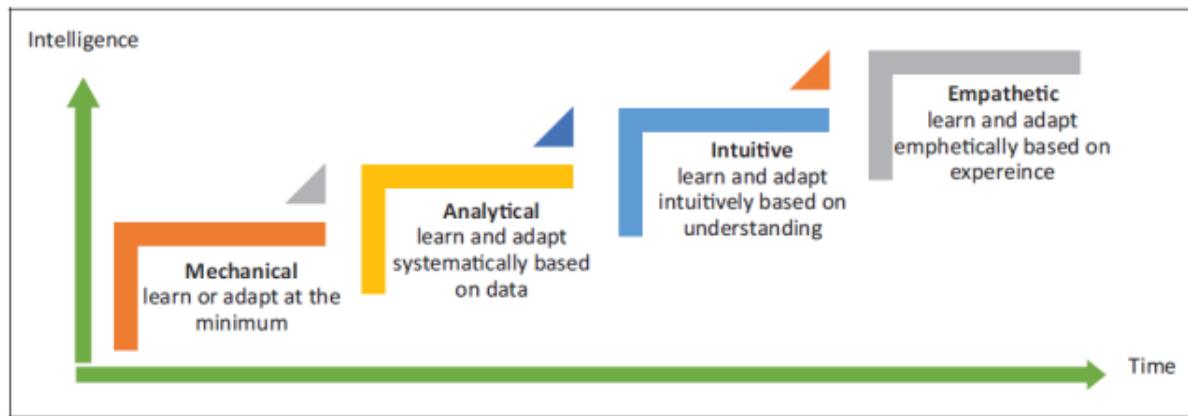


Figure 3 : AI in Service (Hmoud & Laszlo, 2019)

2.3.4 Outdated Hiring Process

Even though these days it is all about inclusion and building a diverse workforce, many businesses are still using outdated recruiting techniques, which is one of the main reasons why countless businesses struggle to find eligible candidates (Votto & Valecha, 2021). In addition, human resource managers frequently have exaggerated expectations and lack a clear understanding of what the organization needs resulting terrible recruiting. Adjusting the recruiting and selection process can address hiring processing concerns because AI intelligence systems can learn and improve over time (Russel & Norvig, 2020). AI has been proven to be minimizing the need for human engagement in hiring and the bias that gets in the way of good hiring judgments (Bhatt, 2021). Furthermore, the processed data can be presented in a contemporary manner for better decision-making.

2.3.5 Lack of Information for Making Decisions

The purpose of a human resources manager is to hire employees and serve as a liaison between employers and job seekers, which necessitates choosing the right applicant with the skill set required for the specific job opening (Geetha & Reddy, 2018). In addition, employers do not exert much effort to use resumes thoroughly, even though they contain sufficient data to make a selection because of data representation. Due to the fact that AI may analyze social media records to determine a candidate's ideals, views, and attitudes (Upadhyay & Khandelwal, 2018), recruiters can have access to information on personality traits and suitability that goes beyond traditional resumes.

2.3.6 Benefits of Involving social Networking

Candidates might not be aware of the company's existence because there are several businesses competing for the exact place on the worldwide market (Keita, 2022). Building a company's internet reputation is therefore important for attracting the best individual where social networking is the most effective tool (Davis & Wolff, 2020) in the contemporary age. To rapidly attract personnel, job listings might be advertised on social media to a huge number of deliberately targeted individuals. Furthermore, a new hire or HR manager may frequently have issues that they have to solve on their own. A social media integration could offer network discussions and community-based solutions.

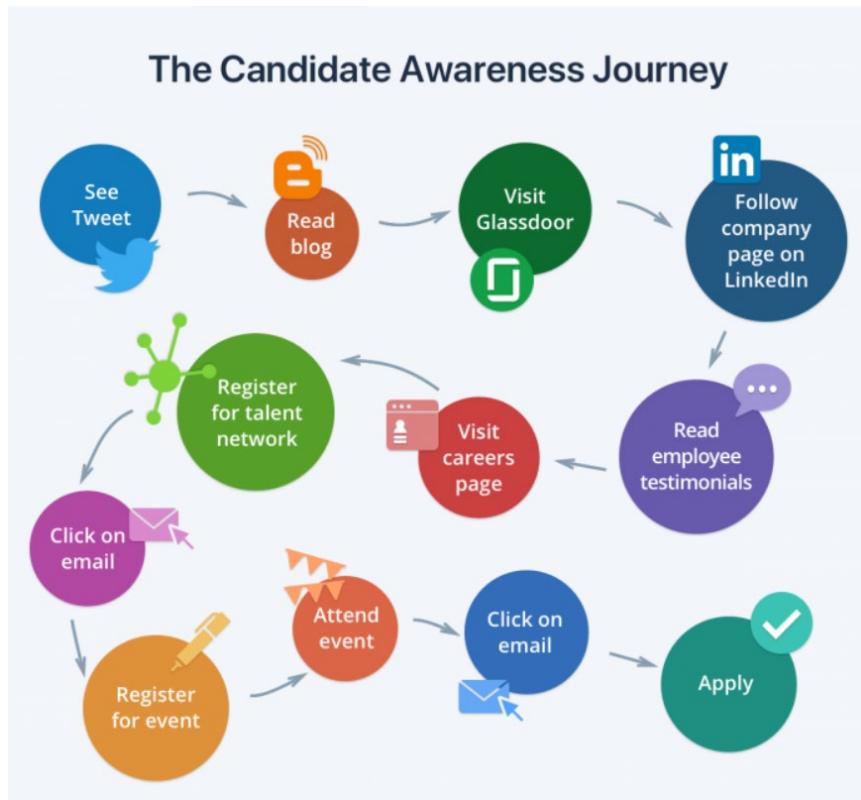


Figure 4: Awareness through social media (Slater, 2019)

2.3.7 Lack of Data for perfecting ML Model

The dataset currently being employed to train the model is not enough rich to allow for flawless prediction. Consequently, there is a chance that the outcomes will be inaccurate. Even though we could employ pre-trained models, some have theorized that these models are only learning templates or syntactic patterns seen in the datasets, unconnected to rationality or interface (Otter & Medina, 2021).

In general, this concern can be resolved by gathering a vast amount of information from pertinent organizations in numerous places. Recently, enterprises have been paying a fair sum to scrape and collect large datasets from reputable job boards (Geyik & Ambler, 2019). Since this is an academic endeavor, it will be unable to get a substantial amount of data; hence, open-source datasets will be employed which are crucial for this project.

2.4 Machine Learning Algorithm for analyzing resumes

For extracting information's from resumes and analyzing that information by natural language processing (NLP) specific types of machine learning algorithms are necessary. However, there are a plethora of ML algorithms widely available:

- **Decision Tree:** Decision trees are particularly good at handling interactions between variables, but they struggle to handle linear relationships between variables, making them unsuitable for natural language processing (Caigny & Coussement, 2018).
- **K Nearest Neighbor:** The k-nearest neighbors' algorithm is regarded for a straightforward but powerful machine learning approach that works for both classification and regression (Taunk & Verma, 2019). The fundamental drawback of this method is that it is inaccurate and particularly wasteful when dealing with enormous amounts of data (Triguero, 2019), which are likely to comprise noise and faults.
- **Linear Regression:** Linear Regression mainly used in signal processing and statistics such as time series analysis, face recognition, and other alike data analysis tasks (Diakonikolas & Kong, 2019). The linear regression algorithm has several drawbacks, including the potential to overfit the data, the probable to overlook relationships that could be complex, and the latent to produce coefficient estimates that are unstable and difficult to understand (Chen & Kees, 2019).
- **Logistic Regression:** In probabilistic situations, such as pattern prediction or data forecasting based on historical data, logistic regression is commonly utilized. While it is particularly good at handling linear relationships between variables, it is incapable of identify and compensate for interdependent effects among variables (Caigny & Coussement, 2018).
- **Neural Network:** Prior to the development of deep learning, neural networks were the greatest option. Neural networks have the capacity to carry out distributed computation, tolerating noisy inputs and training which is more effective learning system than other algorithms (Russel & Norvig, 2020).
- **Recurrent Neural Network:** Recurrent neural networks are a subset of recursive neural networks that produce beneficial results by remembering previously processed elements while they process new ones. Additionally, there are

backward dependencies, where the proper processing of some words may depend on subsequent words (Otter & Medina, 2021).

- **Convolutional Neural Network:** Convolutional neural networks use functions, referred to as filters, that enable simultaneous analysis of many data aspects, which are widely used in image processing and computer vision, speech recognition, and natural language processing (Otter & Medina, 2021).
- **Deep Neural Network:** In essence, it combines deep learning with neural networks, and it has several layers and nodes of neural layers which is regarded as being one of the best algorithms for every machine learning task (Russel & Norvig, 2020). Deep Neural Network works flawlessly with the core issues that are inherently present in any computational linguistic system. The fundamental problems that every computational linguistic system has inherently are perfectly handled by deep neural networks. However, it necessitates additional processing capacity, which can be expensive, such as a supercomputer or cloud computer. (Otter & Medina, 2021).

Recommendation: According to the overview aforesaid, four algorithms, including Deep Neural Network, convolutional Neural Network, and neural network, are suitable for analyzing natural language. Natural Language Processing, which involves the computational understanding of human languages and encompasses tasks like translation, text analysis, sensitivity and appropriateness, and interpretation, benefits greatly from deep neural network technology among those algorithms (Russel & Norvig, 2020). Deep neural networks need a powerful computer with a powerful graphics processing unit, yet this algorithm still produces excellent results and thus Deep Neural Network algorithm is chosen for this solution. Moreover, Google COLAB, which is freely accessible for educational and research purposes (Canesche, 2021), will be used to produce the extraordinary processing capacity required to build the machine learning model.

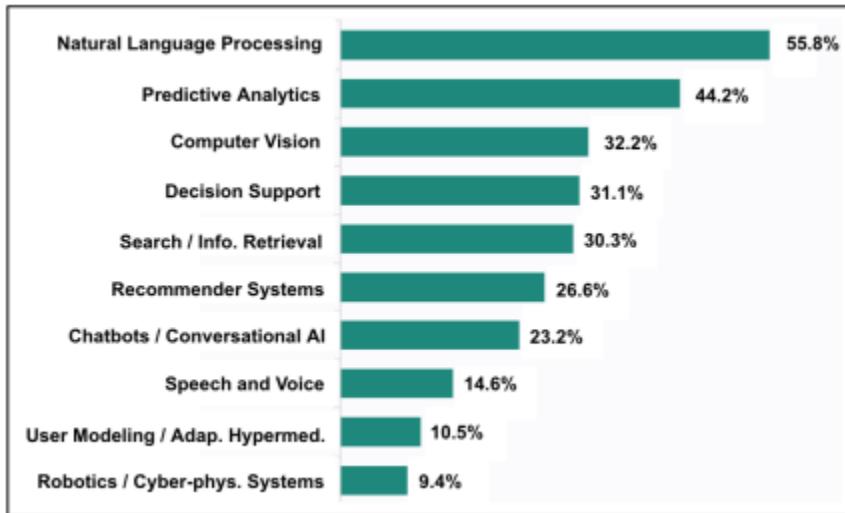


Figure 5: Technology Areas (Holstein & Vaughan, 2019)

2.5 Recommended Approach

It is abundantly clear from an analysis of numerous sources, including academic writing, scientific scholars, conference proceedings, research articles, web articles, and publicized studies in this field, that resume screening is one of the most practical solutions for both the skilled workforce and human resource management. By incorporating information and communication technology to swap out analog manual processes for digital ones or by swapping out outdated digital technologies for new ones, digital transformation not only increases efficiency through automation but also opens new avenues for innovation and creativity (Lee & Kim, 2021).

Some recommended approaches could be followed to develop an **Artificial Intelligent System for Talent Screening** that might addresses the difficulty of assessing numerous, rich resumes for a position and the possibility of human error in a traditional recruiting process.

Firstly, to improve the effectiveness and efficiency of the recruiting process, we need to develop an Artificial Intelligence-based system that may reduce or even eliminate time-consuming recruiting operations. The highly repetitive and low-skilled tasks that recruiters had to perform such as responding to emails, verifying that they received applicants' information, and disclosing applicant info within the organization can be replaced by automated systems and artificial intelligence software (Wheeler & M.R, 2021), which has sped up and improved the process.

Additionally, incorporating with robust range of technologies talent hiring could be feasible. Besides, the project will be carried out in a way that ensures there are no biases that could

undermine the initiative's final objective. The completed project will extend up to the point of advanced recruitment, where little human intellect is required, and no paperwork is needed.

Moreover, Natural Language Processing (NLP) can be used to skimming resume contents to find key terms and storing them for later use. By providing Human Resource managers with access to a big database of profiles with interactive visual that fulfill specific criteria, system enables recruiters to be helped, particularly in the second stage of the hiring process, in their quest to discover the most qualified candidate for a given position (Kulkarni & Che, 2019). This might enable recruiters to quickly narrow down a large pool of candidates by using the algorithm to eliminate unqualified candidates.

3. Product Review

3.1 Review

Companies are now using AI solutions to drastically cut on when doing away with time-consuming processes in the hiring process. A critical information technology (IT) strategy for companies in the present internet age, online recruiting platforms utilizing AI technology have been developed and made available to the public to improve the hiring process (Saad & Nugro, 2021). The reviews and comparisons in this section will focus on a few of the well-known, well-established recruiting platforms and tools. These systems were created primarily to reduce the struggle of hiring and provides tremendous effort to the respective organizations. A summary of their best features and limitations will also be factored, as well as a UI interface design perspective based on Jakob's (Nielsen, 2018) Usability Heuristics Law.

3.1.1 INDEED

INDEED, is currently the most widely used employment platform globally. The metasearch engine INDEED collects job posts from a variety of sources, involving a plethora of websites, employment agencies, plus company career web pages (Hantula, 2018). Furthermore, indeed provides a thorough database of open positions that can be searched by term, job title, industry, pay, or experience level.

Website URL: <https://www.indeed.com/>

Figure 6: Resume Insights feature at indeed

Figure 7: Personalized profile with enclosed resume

Best Features

- Parses resume automatically and stores to user profile.
- Resume Insights for better suitability and candidate experience.
- Salary Analytics for optimal compensation and better job satisfaction
- Personalized profile with an enclosed resume.
- Allows candidate to search jobs based on multiple criteria.
- Trends and newsletters pertaining to employment.
- User forums for community support.

Limitations

- Does not have a resume screening feature.
- There is no function that provides percentages of suitability.
- Is lacking talent analytics for data-driven hiring and data-driven decisions.
- There is no Digital Assistant for superlative experience.

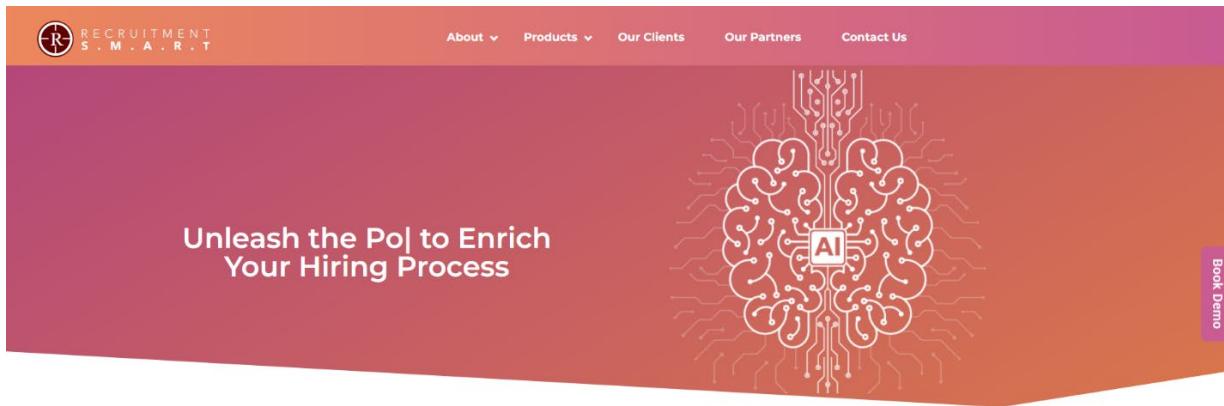
User Experience:

Because of its simplicity, usability, navigation, readability, accessibility, and consistency, INDEED offers an excellent user experience. Additionally, INDEED boasts cutting-edge accessibility features like support for color contrast and screen readers. Since INDEED is the most well-known job board in the world and maintains a strict security policy, it is dependable and flexible for all types of users.

3.1.2 Sniper AI

Sniper AI is a talent Intelligence platform that uses am equitable hiring algorithm to streamline and automate the hiring process. Despite being developed by a UK-based HR IT business, this application is accessible to users worldwide (Recruitment Smart Technologies, 2022). In addition, Sniper AI ranks and produces false positives using machine learning-based searches rather than the conventional keyword strategy.

Website URL: <https://recruitmentsmart.com/>



[Home](#) » About Us

Recruitment Smart Helps You Hire Smart, Diverse & a Dynamic Workforce that Matches the Pace of Your Growing Business

Figure 8: Sniper AI Web Application interface

Best Features

- Automatically sources candidates for related vacancies.
- Parses resume automatically.
- Digital Assistant for superlative candidate experience.
- Talent Analytics for data driven recruiting and decisions based on data insights.
- Provides percentage suitability of candidate based on matching.
- Algorithm based search and filter facility.
- Flawless Integration to currently employed system.

Limitations

- An unworkable user interface due to its complexity.
- Does not let candidates to search for job.
- Does not let candidates gather info about employer.
- There is no detailed user profile for extensive information's.
- No community feature to seek help or discuss something.
- Does not allow direct application from candidates.

User Experience:

SNIPER AI offers a wide variety of capability; however, the user experience is only fair because of the complicated user interface. Additionally, this application's basic security and system correctness make it somewhat less reliable. Consequently, consumers are not genuinely able to adjust to this system due to other important factors like accessibility and capability.

3.1.3 LinkedIn

In general, LinkedIn is a social networking site for professionals and businesspeople, however it also includes a job board as part of its package of services. Users of LinkedIn can establish social networks that are focused on information sharing and use the platform to discover colleagues and acquaintances (Koch & Gerber, 2018). In addition, LinkedIn offers great professional searching and career growth. Its user profiles are packed with information on current job, experience, education, expertise, and professional interests.

Website URL: www.linkedin.com/

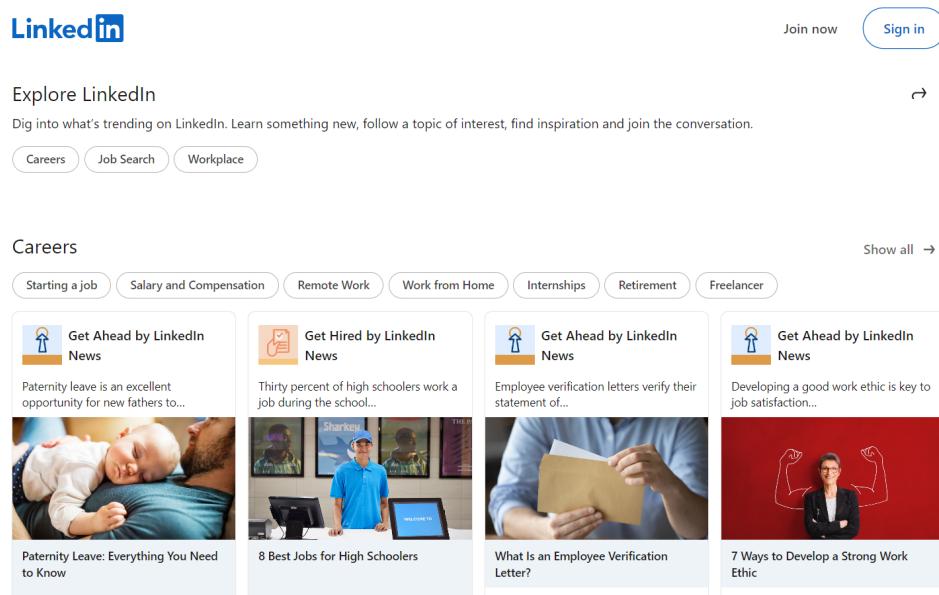


Figure 9: LinkedIn website interface

The screenshot shows a LinkedIn profile page for 'Takinur M'. At the top, there's a navigation bar with icons for Home, My Network, Jobs, Messaging, Notifications, Me, Work, and Reactivate Premium. Below the header is a profile card for 'Takinur M' featuring a circular profile picture, a blue 'T' logo, and the slogan 'Living, learning, & leveling up one day at a time.' The profile summary includes 'Software Engineer | Web Developer' from 'Dhaka, Bangladesh', '86 connections', and three buttons: 'Open to', 'Add profile section', and 'More'. Below this is a 'Providing services' section for 'Web Development' with a 'See all details' link. A 'Take a skill quiz' button is also present. To the right, a sidebar titled 'People also viewed' lists several profiles with their names, connection counts, and short descriptions. At the bottom right of the sidebar is a 'Messaging' button.

Figure 10: User profile in LinkedIn

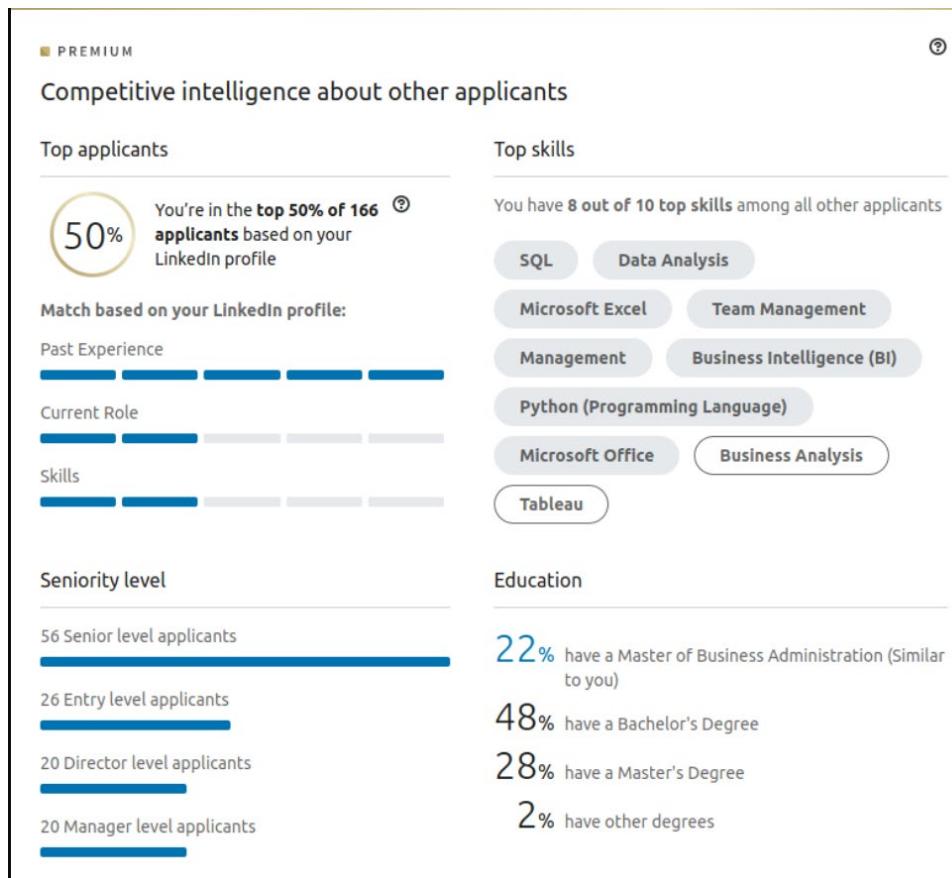


Figure 11: Job applicant insights LinkedIn

Best Features

- Rich user profile that serves as a replacement for a resume.
- User profile Insights for better suitability and candidate experience.
- Elegant user interface that has better user experience.
- Skills assessment against job requirements.
- Personalized profile with an enclosed resume and professional interests.
- Allows candidate to search jobs based on multiple criteria.
- Employment-related trends and newsletters.
- Vast Social network for connecting and communicating with everyone.

Limitations

- Does not include a function for screening resume.
- There is no system that provides percentages of suitability.
- Is missing talent insights for data-driven hiring and data-driven decisions.
- There is no Live Chat feature present in the system.

User Experience:

Given that LinkedIn is already a social media platform, using it and navigating through it are rather simple chores. Additionally, the LinkedIn community's connectivity helped more users adapt to the system and has a massive data capability. Importantly, this app boasts cutting-edge accessibility features like voice search, screen reading, and a stunning color palette.

3.1.4 SKEELED

SKEELED is an automated application tracking platform that contains AI to analyze resumes and evaluate applicants' capabilities (Skeeled, 2022). Additionally, advanced ranking algorithms have been used to offer a selection based on qualification indications and the system also verifies specific requirements that employers demand. Moreover, this system uses a sophisticated search engine and filtering tool to find the best candidate from resume databases.

Website URL: www.skeeled.com/

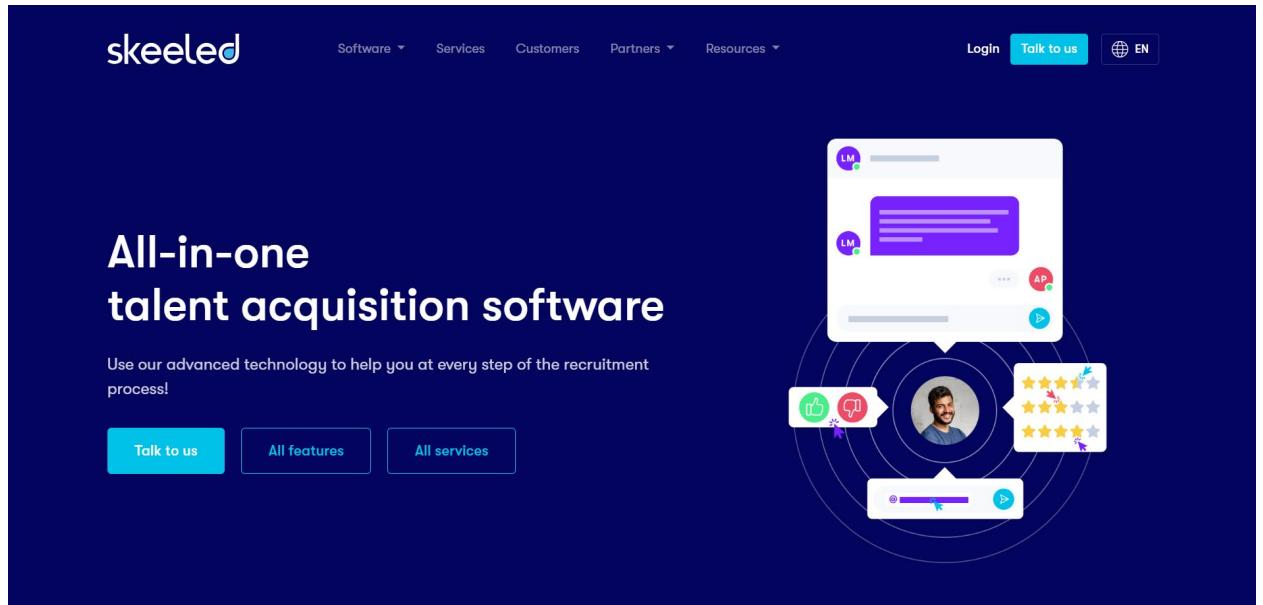


Figure 12: Website Home page of SKEELED

The screenshot shows the Skeeled dashboard interface. On the left is a vertical sidebar with icons for Home, Current Jobs, Finished Jobs (selected), Saved Jobs, Spontaneous Applicants, and Help. The main area displays a grid of 12 job cards under the heading "Finished Jobs". Each card includes the job title, language (EN), number of applicants (e.g., 86, 31, 61, 5), and status (Closed). A search bar is located at the top of the main content area. At the bottom, there are navigation arrows and a page number indicator (1-5).

Figure 13: Dashboard Interface of SKEELED

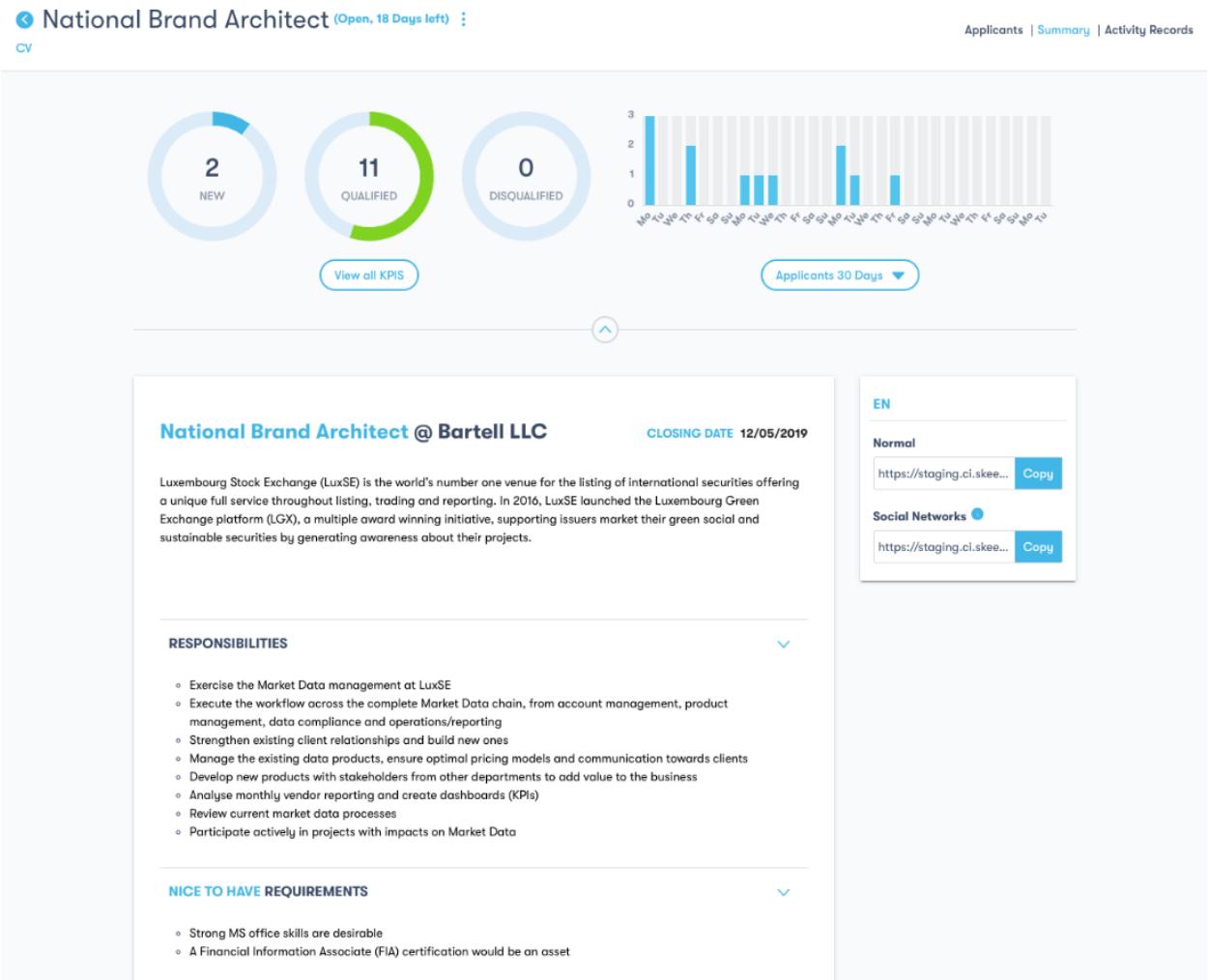


Figure 14: Job posting Insights feature

Best Features

- Hiring team roles and permissions.
- Automated resume screening based on criteria.
- Job distribution to a wide range of pre-contracted media channel.
- Cognitive and problem-solving skills assessment.
- One-way video interviews to enhance candidate screening.
- Algorithm based search and filter capability.
- Advanced reporting and analytics.

Limitations

- An unusable user interface due to its complexity.
- Does not let candidates search for job.
- Does not let candidates gather info about employer.
- There is no personalized user profile for extensive information's.
- No community feature to seek help or discuss something.
- There is no Live Chat feature present in the system.

User Experience:

Although SKEELED AI has a wide range of capabilities, the user interface is challenging, which limits the user experience. Furthermore, this application's fundamental security and system accuracy reduce its dependability. Due to other significant aspects like accessibility and capability, customers are not actually able to adapt to this system.

3.1.5 Glass Door

Glassdoor is a smart employment platform that includes corporate reviews from both current and former employees, providing a wealth of information about the business, employers, and their cultures (Das Swain & Saha, 2020).

Website URL: www.glassdoor.com/

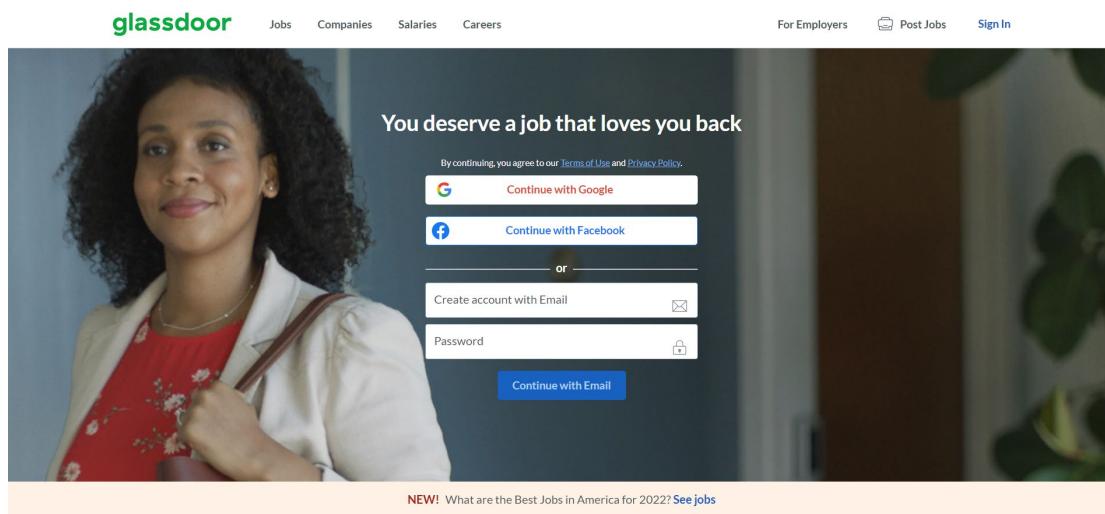


Figure 15: Primary interface of Glassdoor

Panda Express

Engaged Employer

Panda Express Overview

Work Here? Claim your Free Employer Profile

Website: www.pandacareers.com Headquarters: Rosemead, CA

Size: 10000+ Employees Founded: 1983

Type: Subsidiary or Business Segment Industry: Restaurants & Cafes

Revenue: \$1 to \$5 billion (USD)

Competitors: Unknown

Panda was founded in 1983 in Glendale, California. Panda Express is the largest family-owned American Chinese Restaurant concept in America. As America's favorite Chinese restaurant, Panda Express has over 2,200 locations globally and continues to grow over 100 restaurants ... [Read more](#)

Affiliated Companies

Expert Career Advice

[Guide to Getting Your First Job](#)
Find a Great First Job to Jumpstart Your

Figure 16: Company Overview Feature

Overview ▾ 4.4k Reviews 21 Jobs 4.7k Salaries 944 Interviews 930 Benefits 80 Photos + Add a Salary

Search job titles Find Salaries

Clear All United States - All Cities Filter

Display as: Annual Pay Periods Sort: Most Salaries Submitted

| Job Title | Total Pay | Total Pay Range |
|--------------------|-------------------------------|-----------------|
| Counter Help | \$xx,xxx \$xxxxx \$xxxxx | |
| General Manager | \$xx,xxx \$xxxxx \$xxxxx | |
| Cashier | \$xx,xxx \$xxxxx \$xxxxx | |
| Restaurant Manager | \$xx,xxx \$xxxxx \$xxxxx | |
| Shift Leader | \$xx,xxx | |

Leaders: This event ignited conversations from our panelists and highlights our commitment to celebrating different backgrounds, experiences and perspectives in a way that gives everyone a voice. We are One Team Panda, and all are welcome and celebrated. #diversity #inclusion #diversityandinclusion #culture

0 Likes See All >

Panda Express Photos + Add Photo

See All Photos >

Expert Career Advice < >

Figure 17: Salary Insights Glassdoor

Best Features

- Rich user profile that serves as a replacement for a resume.
- Company Insights for better satisfactory and candidate experience.
- Salary Analytics for optimal compensation and better job satisfaction
- Personalized profile with an enclosed resume.
- Allows candidate to search jobs based on multiple criteria.
- Trends and newsletters pertaining to employment.
- Allows direct application from candidates.

Limitations

- Does not have a resume screening feature.
- There is no feature that provides percentages of suitability.
- Is lacking talent analytics for data-driven hiring and data-driven decisions.
- There is no Digital Assistant for superlative experience.

User Experience:

Glass Door offers a special function like corporate reviews, and it is trustworthy and flexible for all types of users while upholding a strict security policy. Besides, Glass Door provides a fair user experience due to its cleanliness, usability, navigation, readability, accessibility, and consistency. Furthermore, innovative accessibility features including support for color contrast and screen readers are also included in Glass Door.

3.2 Weighted Scoring Model

| CRITERION | Weight | INDEED | | SNIPERAI | | LINKEDIN | | SKEELED | | GLASSDOOR | |
|---------------|--------|--------|------|----------|----|----------|----|---------|----|-----------|----|
| | | RS | CS | RS | CS | RS | CS | RS | CS | RS | CS |
| Functionality | 30% | 7 | 21.0 | 7 | 21 | 8 | 24 | 7 | 21 | 7 | 21 |
| Usability | 20% | 9 | 18.0 | 5 | 10 | 8 | 16 | 6 | 12 | 7 | 14 |
| Reliability | 15% | 8 | 12.0 | 5 | 8 | 9 | 14 | 5 | 8 | 8 | 12 |
| Adaptability | 10% | 8 | 8.0 | 4 | 4 | 9 | 9 | 4 | 4 | 7 | 7 |
| Accessibility | 10% | 9 | 9.0 | 7 | 7 | 8 | 8 | 5 | 5 | 6 | 6 |
| Security | 15% | 8 | 12.0 | 6 | 9 | 9 | 14 | 7 | 11 | 8 | 12 |
| TOTAL | 100% | 49 | 80 | 34 | 59 | 51 | 84 | 34 | 60 | 19 | 72 |

Figure 18: Weight Scoring Model Breakdown

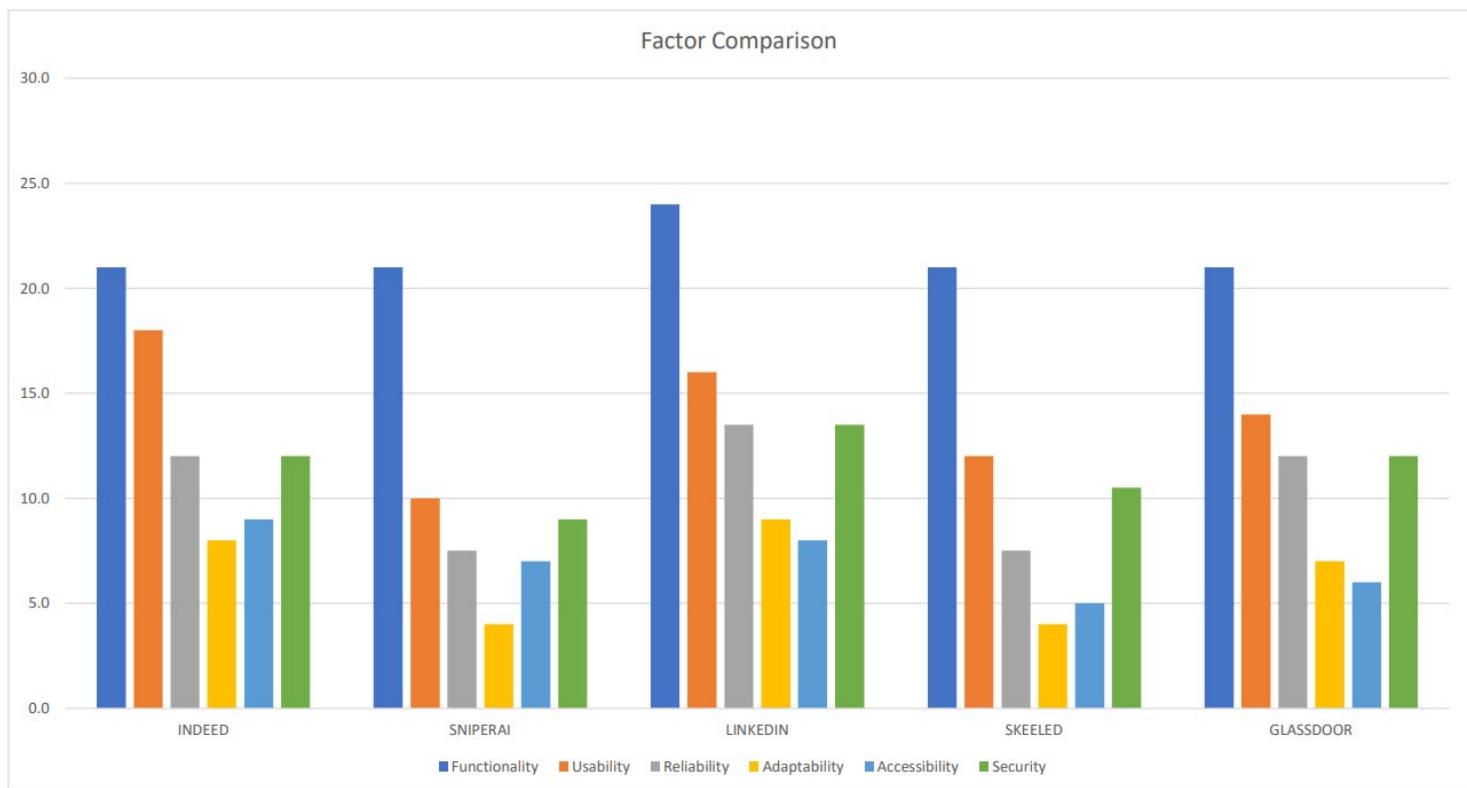


Figure 19: Weight Scoring Model Chart

3.3 Recommended Approach

The problem areas and prospective solutions discussed above will be used to evaluate the development roadmap for the SkirmisherAI system in this section. During developing the system, existing product strengths will be factored, and most flaws of elaborated systems will be resolved by adopting suitable solutions. Furthermore, the system will be made feasible for real-life circumstances by using the most recent equipment and technology available. The following is a discussion of some suggested methods:

- ⇒ Anyone with internet access ought to be able to access the system and obtain details about it.
- ⇒ Both job seeker and employers should be able to register in the system.
- ⇒ Employers that are registered should be able to post vacancies for hire.
- ⇒ Registered candidates should be able to apply for jobs posted by employers.
- ⇒ Employer should have the ability to filter, search, analyze submitted resumes.
- ⇒ Employers and Candidates data should be securely and safely stored in an organized way in the database.
- ⇒ Employers should be allowed to monitor and analyze submitted applications.
- ⇒ Every user should be allowed to write blogs, questions or seek help in community.
- ⇒ Users who have been authenticated should be able to see progress and activity in their dashboard.
- ⇒ Employers should be able to analyze, filter, and search using custom criteria.
- ⇒ Employer should be able to gather insights from dashboard for decision making.
- ⇒ System should allow digital live chat for faster insightful communication.
- ⇒ The system should allow users to subscribe for trends and newsletter.
- ⇒ Employer should be able to invite candidates and schedule for interview.
- ⇒ Implementing a RESTful API based backend that can be consumed by client side reducing server load and making it a progressive web application.
- ⇒ Enabling managerial users to perform site management including user management, tracking and logs.
- ⇒ Ensure strong privacy policy and security for users.

4. LSEP Issues and Considerations

While developing the web-based system, there will be various worries regarding socialization, law, ethics, and profession that, if neglected, could have a significant impact on the project's success. Hence, in this part, these issues will be considered and discussed.

4.1 Discrimination

Bias can arise based on a diversity of aspects, involving physical traits, sexual orientation, ethnicity, gender, nationality, and many others. According to BCS (BCS, The Chartered Institute for IT, 2021), discrimination should be avoided at all costs because it could have a significant, unfavorable business consequence. So, the process of system development and deployment will be carried out in a way that prevents the emergence of these types of discrimination in the foreseeable future.

4.2 Security & Data protection

Data is regarded as the most crucial component of any system, especially user-oriented ones. Data protection is essential since collected data may end up being the most valuable resource for managing and running a corporation (Harrison & Luna-Reyes, 2019). As a result, user data ought to be acquired and stored in accordance with regulations that has safety and security measures since data breaches and unwanted access are both possible (BCS, The Chartered Institute for IT, 2021). The suggested system will need collecting data from both employers and candidates. Therefore, the actions listed below measures will be implemented to ensure data protection and security.

- Multiple sets of roles will be made for a variety of user roles to present only pertinent information.
- Without legitimate login credentials, users cannot access or manipulate available data.
- Only Data that are essential will be collected along with encryption will be done to evident data.
- Periodical backup will be available to recover lost data.

4.3 Software Licensing

To use the system, the eventual users must have a license in legal standpoint. Besides, a license might offer legal support to the company in the event that users of the system engage in undesirable unlawful activity (Yuan & Mu, 2022). Thereby, it will be ensured that users are permitted to use certain features and engage in certain acts as described in the license agreement (Miller, 2019). Since the suggested system can be utilized by the public and I, a student, am unable to assume responsibility or make any warranties, an MIT License (Saltzer, 2020) will be issued, which contains the requisite agreement. Apache 2.0 (Apache, 2021) is a license that is like the MIT license, but MIT is considerably easier to attribute. Additionally, software with an MIT license can be used, shared, and modified in any way—even for exclusive purposes.

4.4 Legal Issues

A legal dispute is a circumstance in which the adoption of legal principles is the main matter and where there are laws prohibiting or mandating certain society activities (Asher, 2016). The SkirmisherAI system will aggregate personal information from both candidate and employers for a fair use case. To prevent legal disputes, users will be conscious of data collection and a set of legal precedent, including a sufficient privacy policy and data subject rights. Furthermore, periodical security measures and patches will be available to the system to avoid unwanted data loss and legal concern.

4.5 Social Issues

Conflicts among commitments to moral presumptions and social difficulties emerging from the social context of a profession are possible (Motta & Oliveira, 2018). The concerns of responsibility and control, information rights and duties, property rights and obligations, and quality of life are all pertinent for social issues. There will be a community division on the SkirmisherAI system where each user can express their viewpoint and engage in discussion. This might lead towards online harassment, spamming, or cyberbullying with adverse social effects. A stringent community code of conduct and relevant sanctions for misconduct will be enforced to prevent such societal issues.

4.6 Environmental Issues

The proposed system will be a progressive web application in which a backend server will provide API endpoints and a front-end to display a contemporary User Interface and consume those API. The system uses less power to operate because it is a server-based program that may be set up in the cloud. Besides, the system will have efficient cache policy, minimized data exchange and appropriate lifecycle of stored data along with features like dark mode. In the end, this will result in zero environmental impact due to reduced electronic waste and reduced energy usage by users.

5. Development Method and Tools

Every endeavor that eventually results in success starts with planning. Like this, adequate planning is essential at the outset of software development to ensure the best chance of success. Every project requires thorough, actionable planning that will direct the project throughout development (Buengeler & Frederik B.I. Situmeang, 2021) and assist in achieving the project's eventual goal. Variety of approaches were created over the years by experienced software developers based on the software's type, time frame, size, and qualities. To successfully develop and deploy SkirmisherAI, we will examine several approaches and their use cases in the software industries. We will then generalize the pathway and choose an appropriate methodology for our application development.

5.1 Necessity of Development Methodology

The software development approach serves as a roadmap for successfully completing a software project. It might be extremely troublesome to carry out software development without using development methodology. Jimmy (Molina-Ríos & Nieves, 2020) claims that the failure of one-fourth of all software projects is attributable to the lack of any development methodology; for this reason, it's crucial to use the right methodology throughout the project to develop a high-quality solution. Furthermore, time management, cost management, and requirements management could all suffer from a lack of a methodology (Dima & Maassen, 2018). Moreover, A methodology divides a project into different components, making it simple to track the software development lifecycle and ensuring that the project is effectively completed with all the desired requirements and features.

5.2 Methodology Comparisons

There are plenty of development methodology or framework available in the software industry. In this section, I will highlight about approaches that are extensively and frequently used in the IT sector and compare their advantages.

5.2.1 Waterfall

The most well-known and oldest methodology for software development is waterfall. The Waterfall model is modeled by designs used in other sectors and provides for the distribution of a project into numerous fixed phases (Alexandru & Cosmin, 2019), each of which needs the analysis and work from the preceding phase. According to the author, the Waterfall methodology presumes that the development team will have an unobstructed path to closure once the basic criterions are instituted and all goals are clear of any ambiguities which is not the case in real-life situation.

The Waterfall Model

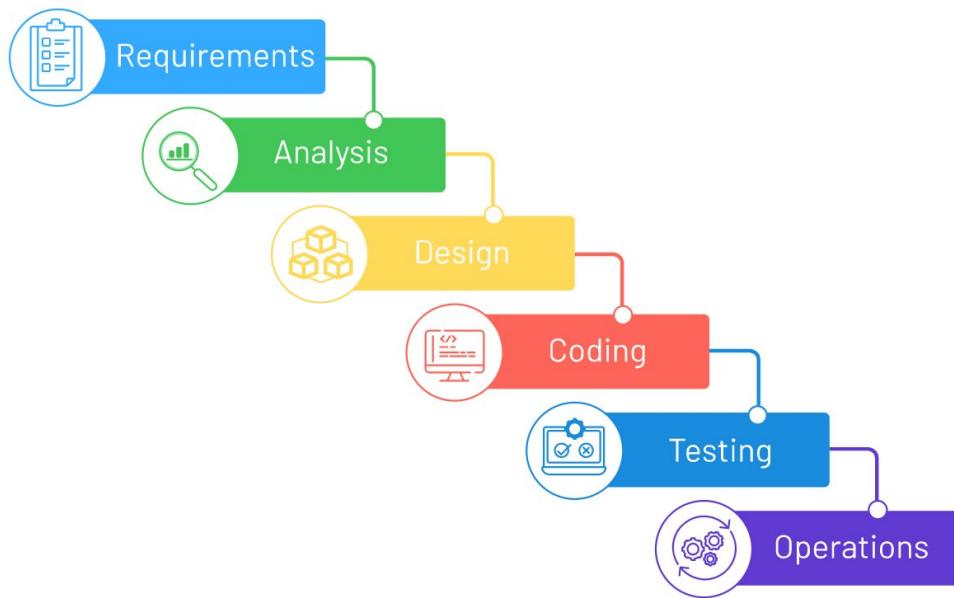


Figure 20: Waterfall Process (ActiTime, 2021)

The following are some benefits and drawbacks of waterfall methodology:

Advantages:

- Adequate project planning.
- The project documentation will be simple to comprehend (Chairi & Agrawal, 2018).
- A clear development path that will take to complete the project.
- Each phase depends on the one before it, making follow-up and tracking simple (Alexandru & Cosmin, 2019).

Disadvantages:

- Requirements changing in the middle of project is complicated.
- Not an ideal choice for large-scale and complex projects (Alexandru & Cosmin, 2019).
- Ambiguous for team collaboration (Chairi & Agrawal, 2018).
- Changes of features makes the plan mess causing disaster (Alexandru & Cosmin, 2019).

5.2.2 Agile

Agile development practices include iterative planning, designing, developing, testing, and reviewing throughout the product cycle. One of the most popular agile techniques is the retrospective, which allows for contemplation on previous implementation, discussion of current advancement, and setting forth directions for future improvement (Hoda & Salleh, 2018).

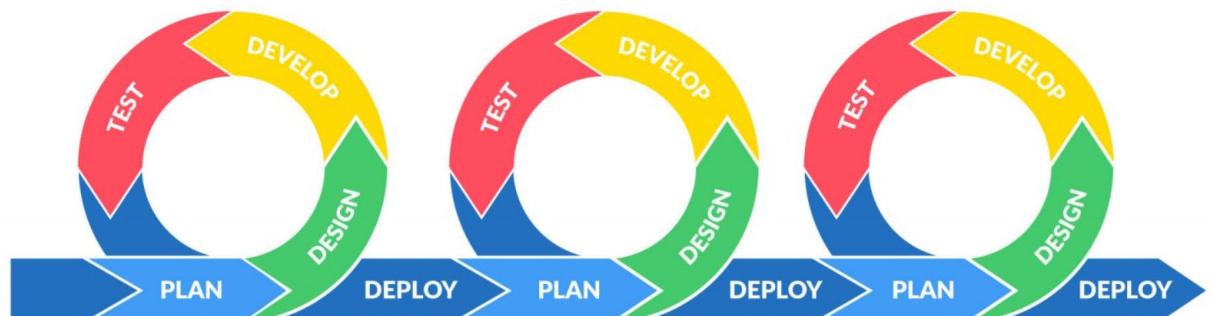


Figure 21: Agile Process (Tipton, 2020)

Advantages:

- The project development employs an iterative methodology (Hoda & Salleh, 2018).
- For excellent efficiency and better outcome, all stakeholders can be involved in the development cycle (Ribeiro & Domingues, 2018).
- After the solution is developed, it can be continually improved and tested to identify any flaws and potential areas for improvement (Osman, 2020).

Disadvantages:

- If the deliverables cannot be divided into smaller components, it is difficult to anticipate the project's outcome (Osman, 2020).
- Communication and coordination within the development team are more difficult when some members work independently (Ribeiro & Domingues, 2018).
- Poor Documentation and often lack of documentation fails to comprehend the solution (Ribeiro & Domingues, 2018).

5.2.3 DSDM

Dynamic System Development Method often known as the DSDM, an agile software development strategy, makes use of the rapid application development approach (RAD) where software's quality is a crucial factor (Chapram, 2018). The prime objective of the DSDM is to establish and specify the project's resources, timeframe, and amount of functionality that can be accomplished within those parameters (Sawalha & AbdelNabi, 2020).

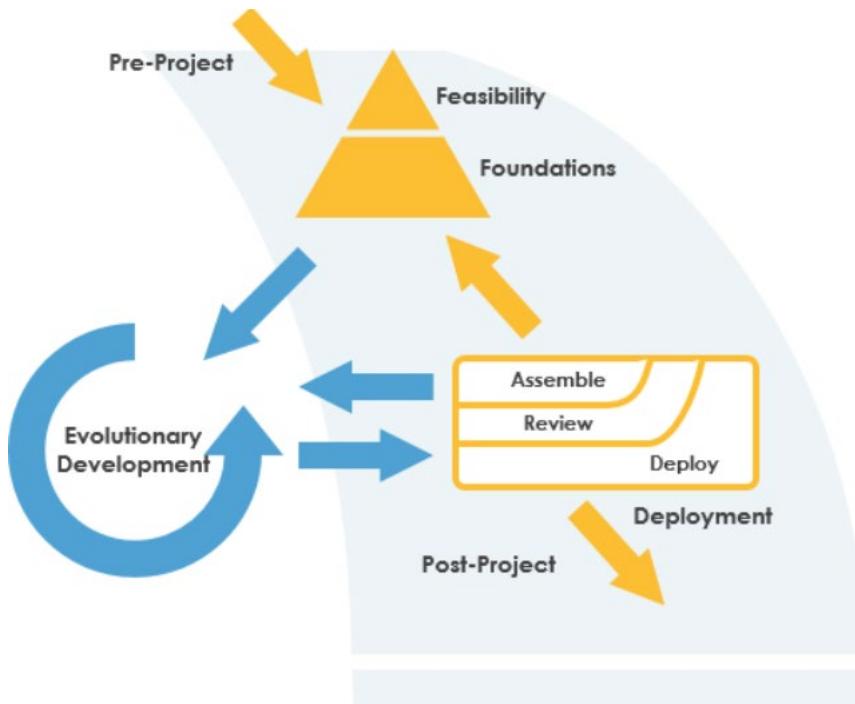


Figure 22: DSDM Process (Visual Paradigm, 2018)

Advantages:

- Development of applications rapidly using agile principles (Sawalha & AbdelNabi, 2020).
- Consistently high-quality solution and on-time delivery.
- Easy to prioritize business constraints.
- Iterative, incremental development with constant feedback (Sawalha & AbdelNabi, 2020).
- Development of wrong solution is almost impossible.

Disadvantages:

- Large number of roles leads to challenging administration of the project.
- Team size and iteration duration-related issues are not subject to any special guidelines (Sawalha & AbdelNabi, 2020).
- Not suitable for small-sized projects.

5.2.4 SCRUM

Scrum is a concrete execution of an agile framework in which initiatives are divided into intervals known as sprints (Morandini & Coleti, 2021). Each sprint begins with planning, which is used to determine what can be produced in the subsequent sprint and what must be done to accomplish it (Hron & Obwegeser, 2022). In addition, a sprint retrospective is done at the conclusion of each sprint to encourage team improvement and continual learning.

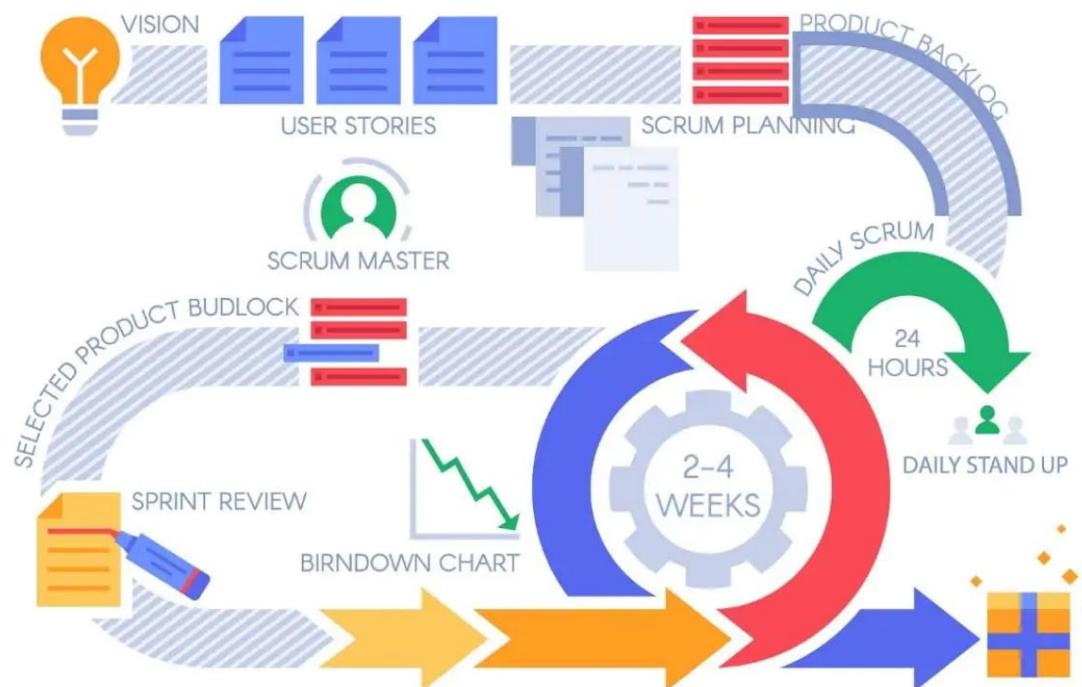


Figure 23: Scrum Methodology (Digite, 2019)

Advantages:

- Easy scalability since processes are iterative and handled periodically.
- The teams communicate and understand one another better because they share software components that are clearer and simpler (Morandini & Coleti, 2021).

- More productivity as a self-evaluation tool presented to compare achieved goals to those that are still needed after each sprint (Sawalha & AbdelNabi, 2020).
- The team is informed of everything, including the communication and input from the product owner, through the many meetings that are held (Hron & Obwegeneser, 2022).

Disadvantages:

- Since the duties of each team member are not clearly defined, some duty violations may occur (Hron & Obwegeneser, 2022).
- Scrum does not impose any workflow, processes, or recommendations for engineering practices (Sawalha & AbdelNabi, 2020).
- Requires a high level of cooperation and comprehension.

5.2.5 FDD

The FDD methodology, often known as feature driven development, is one of the agile development methodologies, handles brief incremental iterations that produce functional software (Rezvan & Raman, 2015). FDD primarily concentrates on two stages: first, identifying the list of features that will be implemented, and second, implementing each feature one at a time (Chowdhury & Huda, 2011). The first stage includes creating an overall project model, which is extremely crucial and not provided by any other agile methodologies (Tirumala, et al., 2016). Moreover, FDD can produce high-quality results throughout all stages of the development process while accepting last-minute adjustments to the software requirements.

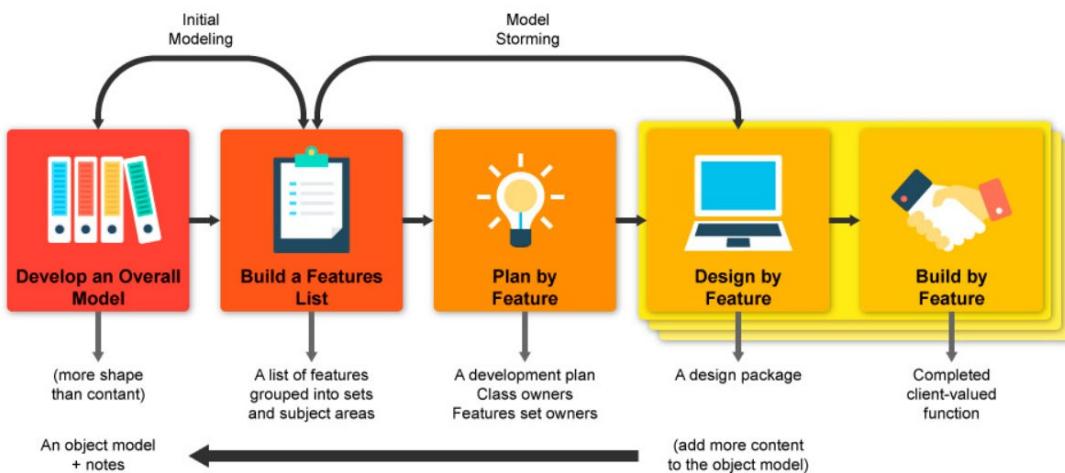


Figure 24: Feature Driven Development Model (Lvivity, 2018)

Advantages:

- Optimal user experience is achieved by using a user-centric strategy (Sawalha & AbdelNabi, 2020).
- After each phase, deliver outcomes of the highest caliber (Tirumala, et al., 2016).
- Offers the squad with a comprehensive interpretation of the project's context and scope.
- FDD uses documentation to communicate, so fewer meetings are needed (Rezvan & Raman, 2015).
- Provides frequent iterative deployments and divides feature sets into smaller pieces, making it simpler to detect and correct code faults (Tirumala, et al., 2016).

Disadvantages:

- FDD contains no guidelines for gathering requirements, analysis, or risk management (Sawalha & AbdelNabi, 2020).
- On smaller projects, FDD is not suitable.
- Requires a highly skilled team of designers and modelers (Tirumala, et al., 2016).

5.3 Recommendation and Justification

All the models and approaches I have discussed above are intended to be utilized when software is built collaboratively. Since I am the only person who will develop this project and I am the only person who has played every role in it, I must customize the methodologies to assure and accomplish the project development. Consequently, from these approaches, various features can be derived to create a unique management strategy for the project. Hence, For the proposed approach, I'll merge the feature-driven development methodology (FDD) and the dynamic system development model (DSDM). The approach will be referred as **FDDSDM** or Feature Driven Dynamic System Development Method.

5.3.1 Justification for Chosen Method FDDSDM

- The project requires extensive business analysis. Here DSDM will assist in comprehending and analyzing business objectives.
- The system requirements must be provided once the business objective has been clearly defined. Before beginning the development, DSDM will make it possible to determine all the requirements.
- Prior to system design, all requirements should be prioritized. To determine the requirements in accordance with usefulness, necessity and revise the list, MoSCoW prioritizing from DSDM will be used.
- The creation of various schematics is required during the development process. FDD can be helpful in this circumstance because the overall model's creation.
- The project will be broken up into manageable segments with the help of DSDM where each piece will be constructed under stringent time constraints.
- Using FDD, features can be further isolated for optimum flexibility and refactoring.
- Debugging and testing features can be done via FDD iterative deployment and development.
- DSDM encourages feedback and incremental improvement, which can be used to improve and modify features.

5.3.2 Phases of Chosen Method

Initial Study

In comparison to pertinent studies and existing solutions, this phase will help to thoroughly evaluate the project and the rationale for the research. Additionally, research will be done regarding the uniqueness and importance of this endeavor to relevant domain.

Requirement Analysis

To accomplish the business goal, a comprehensive study of the requirements is conducted in this phase. There should be actual user interaction who can support the requirements to guarantee they are authentic.

Prioritization of the Requirements

During this phase, all criteria will be prioritized according to their functionality and significance. All requirements must be classified as Must Have, Should Have, Could Have, and Won't Have using the MoSCoW prioritization process. Understanding the level of priority is crucial for allocating the appropriate timeboxes to that requirement.

Design

The requirements will be turned into comprehensive and thorough system design specifications during this phase. Additionally, diagrams will be created and developed for the desired feature.

Implementation

This stage of the process involves implementing the system through code after the design and diagrams are accomplished.

Testing

The solution will be evaluated repeatedly using various use cases and settings when the system is built.

Evaluation

This stage will see the completion of the project's evaluation. The project authorities will observe a demonstration of this procedure. When the authority is pleased with the outcome, the procedure will go forward to the next stage of development. Unless the criticism is considered, and the iteration process is restarted with the business analysis.

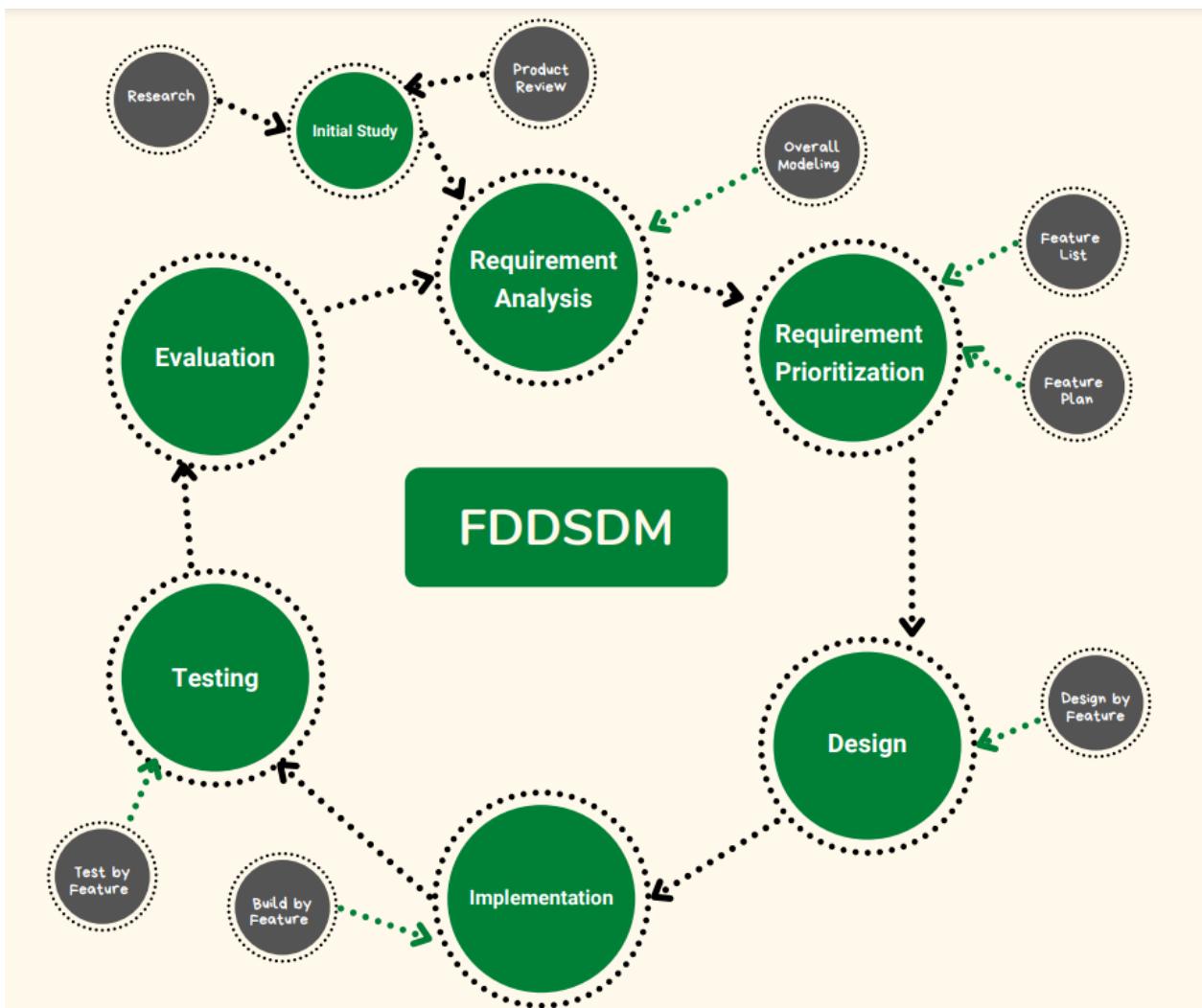


Figure 25: FDDSDM Lifecycle

5.4 Requirement Gathering Techniques

Requirement gathering is essentially a technique used to comprehend and pinpoint a company's project's technical requirements and go forward with a clear strategy (Kiran & Ali, 2018). A clear major purpose is necessary for a successful project; hence, requirements should be gathered to achieve the project's main objective. Additionally, this project places limitations on the ability of a single developer to compile requirements and undertake in-depth research. I have, however, stuck to a few specific data collection techniques.

Interview

An interview ends up being one of the best ways to gather requirements. This method involves the business analyst speaking with users and stakeholders to obtain essential data that may be correlated to system functionalities. To gather requirements for this project, several job seekers and a few hiring managers were interviewed. Additionally, questions regarding problems encountered during hiring as well as expectations for improvements were asked from job seekers and HR managers.

Focus Group

It refers to a specific group of individuals who could perhaps serve as the project's ultimate users. Several groups were requested to submit their thoughts and offer solutions to collect needs for the SkirmisherAI system. Furthermore, to determine what was needed, their recommendations and opinions were analyzed.

Document Analysis

Documents were evaluated since analyzing an existing system's documentation can assist with building the system and major gap analysis for determining the scope of conversion efforts.

Survey

Another efficient way to quickly gather information and requirements is through surveys. People were asked several questions about the system as part of an online survey for this project, and they were asked to provide feedback using a google form. All the responses were later evaluated, and several requirements were found in the responses.

5.5 Technical Tools with Justification

Subsequent to the completion of the requirements specification process, some tools were utilized to amiably oversee those requirements. Their most significant ones below are described:

Use Case Diagram

The use case diagram demonstrates how users interact with software and demonstrates what a system performs. Additionally, it relates to the user's roles, the capabilities that are granted to them within the system, as well as the identification of every user activity. There will be a proper UML use case diagram with the relevant user.

Sequence Diagram

The interactions between the components in a system are shown sequentially in a sequence diagram, which is a Unified Modeling Language (UML) diagram. Additionally, It depicts the flow of communication within the objects in charge of preserving system performance.

Activity Diagram

This diagram illustrates the steps that must be taken to finish a task. This will be used to explain the prioritized activity of the project.

ERD

Entity relationship diagram is the blueprint for the database that provides a graphical representation of relationships among entities. This will be used to develop and represent the database schema for SkirmisherAI system.

IDE

An Integrated Development Environment or in short IDE provides comprehensive functionality for software development. Since Visual Studio Code provides an excellent user experience and consumes minimal resources, I preferred to use it to develop the Project.

6. Planning

Planning enables the reduction of waste and the most effective use of already-available resources, which boosts output and lowers expenses. Additionally, the first and most crucial requirement for success is proper planning. The development process will undoubtedly be successful if the entire project is carefully planned from the start. As a result, I have covered project planning, risk planning, test planning, and change management planning to develop the SkirmisherAI project.

6.1 Project Planning

The project plan is the most crucial one to have because it is essential to monitoring the project's development among all other plans. This section will cover the "SkirmisherAI" strategic plan.

6.1.1 Management Planning

| PROJECT TITLE | | START DATE | PROJECT DURATION | | | |
|-----------------|--------------------------------|-------------|------------------|------------------|------------------|----------|
| SkirmisherAI | | 01-Jun-22 | in days | | | |
| PROJECT MANAGER | | END DATE | | | | |
| TAKINUR M | | 16-Oct-22 | 138 | | | |
| WBS NO. | TASK NAME | ASSIGNED TO | START DATE | END DATE | DURATION in days | COMMENTS |
| 1 | General Research | Takinur | 01-Jun-22 | 07-Jun-22 | 7 | |
| 1.1 | – Literature Review | | 01-Jun-22 | 05-Jun-22 | 5 | |
| 1.2 | – Product Research | | 06-Jun-22 | 07-Jun-22 | 2 | |
| 2 | Critical Analysis | Takinur | 08-Jun-22 | 15-Jun-22 | 8 | |
| 2.1 | – Rich Picture | | 08-Jun-22 | 09-Jun-22 | 2 | |
| 2.2 | – Root Definition | | 10-Jun-22 | 11-Jun-22 | 2 | |
| 2.3 | – Conceptual Model | | 12-Jun-22 | 13-Jun-22 | 2 | |
| 2.4 | – Information System Analysis | | 14-Jun-22 | 15-Jun-22 | 2 | |
| 3 | Business Evaluation | Takinur | 18-Jun-22 | 02-Jul-22 | 15 | |
| 3.1 | – Business Goal Identification | | 18-Jun-22 | 22-Jun-22 | 5 | |
| 3.2 | – Potential Scope Analysis | | 23-Jun-22 | 02-Jul-22 | 10 | |
| 4 | UI Design | Takinur | 04-Jul-22 | 15-Jul-22 | 12 | |
| 4.1 | – Sketch | | 04-Jul-22 | 05-Jul-22 | 2 | |
| 4.2 | – Low-fidelity prototype | | 06-Jul-22 | 09-Jul-22 | 4 | |
| 4.3 | – High-fidelity prototype | | 10-Jul-22 | 15-Jul-22 | 6 | |
| 5 | System Development | Takinur | 18-Jul-22 | 06-Sep-22 | 51 | |
| 5.1 | – User Auth | | 18-Jul-22 | 24-Jul-22 | 7 | |
| 5.1.1 | — Registration System | | 18-Jul-22 | 20-Jul-22 | 3 | |
| 5.1.2 | — Login System | | 21-Jul-22 | 22-Jul-22 | 2 | |
| 5.1.3 | — Profile System | | 23-Jul-22 | 24-Jul-22 | 2 | |
| 5.2 | Database Development | | 25-Jul-22 | 28-Jul-22 | 4 | |
| 5.2.1 | — PostgreSQL Config | | 25-Jul-22 | 25-Jul-22 | 1 | |
| 5.2.2 | — Schema Creating | | 26-Jul-22 | 27-Jul-22 | 2 | |
| 5.3 | – API Development | | 28-Jul-22 | 13-Aug-22 | 17 | |

Figure 26: Plan for Project Management (Part 1)

| | | | | | | |
|------------|---|----------------|------------------|------------------|-----------|--|
| 5.3.1 | — Users API | | 28-Jul-22 | 30-Jul-22 | 3 | |
| 5.3.2 | — Jobs API | | 01-Aug-22 | 05-Aug-22 | 5 | |
| 5.3.3 | — Application API | | 06-Aug-22 | 08-Aug-22 | 3 | |
| 5.3.4 | — Resume API | | 03-Aug-22 | 07-Aug-22 | 5 | |
| 5.3.5 | — Forum API | | 09-Aug-22 | 11-Aug-22 | 3 | |
| 5.3.6 | — Settings API | | 11-Aug-22 | 11-Aug-22 | 1 | |
| 5.3.7 | — Profile API | | 12-Aug-22 | 13-Aug-22 | 2 | |
| 5.4 | — Front-end Development | | 15-Aug-22 | 06-Sep-22 | 23 | |
| 5.4.1 | — Essential Landing Pages | | 15-Aug-22 | 20-Aug-22 | 6 | |
| 5.4.2 | — Dashboards for Users | | 21-Aug-22 | 24-Aug-22 | 4 | |
| 5.4.3 | — Profile Page | | 25-Aug-22 | 26-Aug-22 | 2 | |
| 5.4.4 | — Jobs Search Interface | | 28-Aug-22 | 31-Aug-22 | 4 | |
| 5.4.5 | — Job Details Page | | 01-Sep-22 | 02-Sep-22 | 2 | |
| 5.4.6 | — Application Filter and Search Interface | | 03-Sep-22 | 04-Sep-22 | 2 | |
| 5.4.7 | — Functional Components | | 05-Sep-22 | 06-Sep-22 | 2 | |
| 6 | Testing | Takinur | 07-Sep-22 | 15-Sep-22 | 9 | |
| 6.1 | — Test Plan | | 07-Sep-22 | 08-Sep-22 | 2 | |
| 6.2 | — Test Case | | 09-Sep-22 | 13-Sep-22 | 5 | |
| 6.3 | — Test Report | | 15-Sep-22 | 15-Sep-22 | 1 | |
| 7 | Evaluation | Takinur | 17-Sep-22 | 23-Sep-22 | 7 | |
| 7.1 | — Theoretical Discussion | | 17-Sep-22 | 20-Sep-22 | 4 | |
| 7.2 | — Experimental Report | | 21-Sep-22 | 23-Sep-22 | 3 | |
| 8 | Project Report | Takinur | 25-Sep-22 | 16-Oct-22 | 22 | |
| 8.1 | — Quality Deliverables | | 25-Sep-22 | 25-Sep-22 | 1 | |
| 8.2 | — Complete Documentation | | 28-Sep-22 | 15-Oct-22 | 18 | |
| 8.3 | — Project Performance | | 16-Oct-22 | 16-Oct-22 | 1 | |

Figure 27: Plan for Project Management (Part 2)

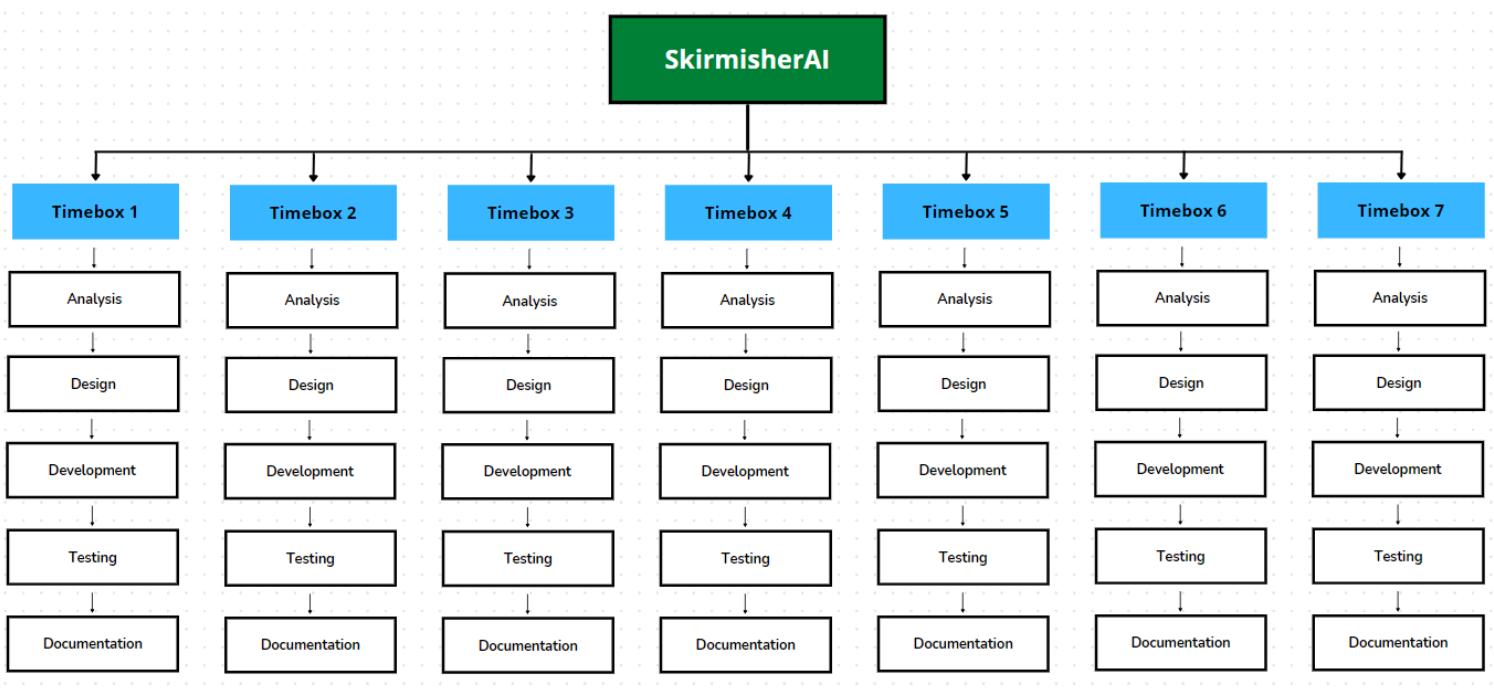


Figure 28: Plan for Project Management (WBS)

6.1.2 Timebox allocation

| PROJECT TITLE | | START DATE |
|---------------------|------------------------------------|---|
| SkirmisherAI | | 01-Jun-22 |
| PROJECT MANAGER | | END DATE |
| TAKINUR M | | 16-Oct-22 |
| N O. | TASK NAME | ASSIGNED TO |
| 1 | Feasibility Study | Analyst |
| 1.1 | – Feasibility | Analyst |
| 2 | Timebox 1 | Analyst, Designer, Developer, Tester, User |
| 2.1 | – Analysis | Analyst, User |
| 2.2 | – Design | Designer, User |
| 2.3 | – Development | Developer |
| 2.4 | – Test | Tester, User |
| 2.5 | – Product Increment, Documentation | Tester, User |
| 3 | Timebox 2 | Analyst, Designer, Developer, Tester, User |
| 3.1 | – Analysis | Analyst, User |
| 3.2 | – Design | Designer, User |
| 3.3 | – Development | Developer |
| 3.4 | – Test | Tester, User |
| 3.5 | – Product Increment, Documentation | Tester, User |
| 4 | Timebox 3 | Analyst, Designer, Developer, Tester, User |
| 4.1 | – Analysis | Analyst, User |
| 4.2 | – Design | Designer, User |
| 4.3 | – Development | Developer |
| 4.4 | – Test | Tester, User |
| 4.5 | – Product Increment, Documentation | Tester, User |

Figure 29: Timebox Allocation (Part 1)

| | | |
|----------|------------------------------------|---|
| 5 | Timebox 4 | Analyst, Designer, Developer, Tester, User |
| 5.1 | – Analysis | Analyst, User |
| 5.2 | – Design | Designer, User |
| 5.3 | – Development | Developer |
| 5.4 | – Test | Tester, User |
| 5.5 | – Product Increment, Documentation | Tester, User |
| 6 | Timebox 5 | Analyst, Designer, Developer, Tester, User |
| 6.1 | – Analysis | Analyst, User |
| 6.2 | – Design | Designer, User |
| 6.3 | – Development | Developer |
| 6.4 | – Test | Tester, User |
| 6.5 | – Product Increment, Documentation | Tester, User |
| 7 | Timebox 6 | Analyst, Designer, Developer, Tester, User |
| 7.1 | – Analysis | Analyst, User |
| 7.2 | – Design | Designer, User |
| 7.3 | – Development | Developer |
| 7.4 | – Test | Tester, User |
| 7.5 | – Product Increment, Documentation | Tester, User |
| 8 | Timebox 7 | Analyst, Designer, Developer, Tester, User |
| 8.1 | – Analysis | Analyst, User |
| 8.2 | – Design | Designer, User |
| 8.3 | – Development | Developer |
| 8.4 | – Test | Tester, User |
| 8.5 | – Product Increment, Documentation | Tester, User |

Figure 30: Timebox Allocation (Part 2)

6.1.3 Resource Allocation

This phase will involve creating a roadmap for effective resource allocation. In this project, I will be playing a variety of roles, including analyst, designer, developer, tester, and system user. In the following table, sufficient time and resources has been allotted to each role.

| ID | Task | Duration | Resource |
|----|-----------------------------------|----------|--|
| 1 | SkirmisherAI Project | 138 Days | Analyst, Developer, Designer, Tester, and User |
| 2 | Project Proposal | 2 Days | Analyst |
| 3 | Introduction | 1 Day | Analyst |
| 4 | Initial Study | 6 Days | Analyst |
| 5 | Literature Review | 7 Days | Analyst |
| 6 | Methodology | 3 Days | Analyst |
| 7 | Project Plan | 6 Days | Analyst, Developer, User |
| 8 | Test Plan | 4 Days | Analyst, Developer, Tester |
| 9 | Risk Management | 3 Days | Analyst, Developer |
| 10 | Change Management | 3 Days | Analyst, Developer |
| 11 | Feasibility Study | 10 Days | Analyst, Developer |
| 12 | Foundation | 4 Days | Analyst, Developer, User |
| 13 | Exploration | 6 Days | Analyst, Developer, User |
| 14 | Engineering | 5 Day | Analyst, Developer |
| 15 | Designing | 15 Days | Designer, User |
| 16 | Development and Deployment | 45 Days | Analyst, Developer, Tester |
| 17 | System Implementation | 12 Days | Analyst, Developer, Tester |
| 18 | Training | 2 Day | Analyst, Developer, Tester |
| 19 | Critical Appraisal and Evaluation | 3 Day | Analyst, Developer, Tester |
| 20 | Conclusion | 1 Day | Analyst |

6.1.4 Activity Network

Below is the activity network diagram for SkirmisherAI Project.

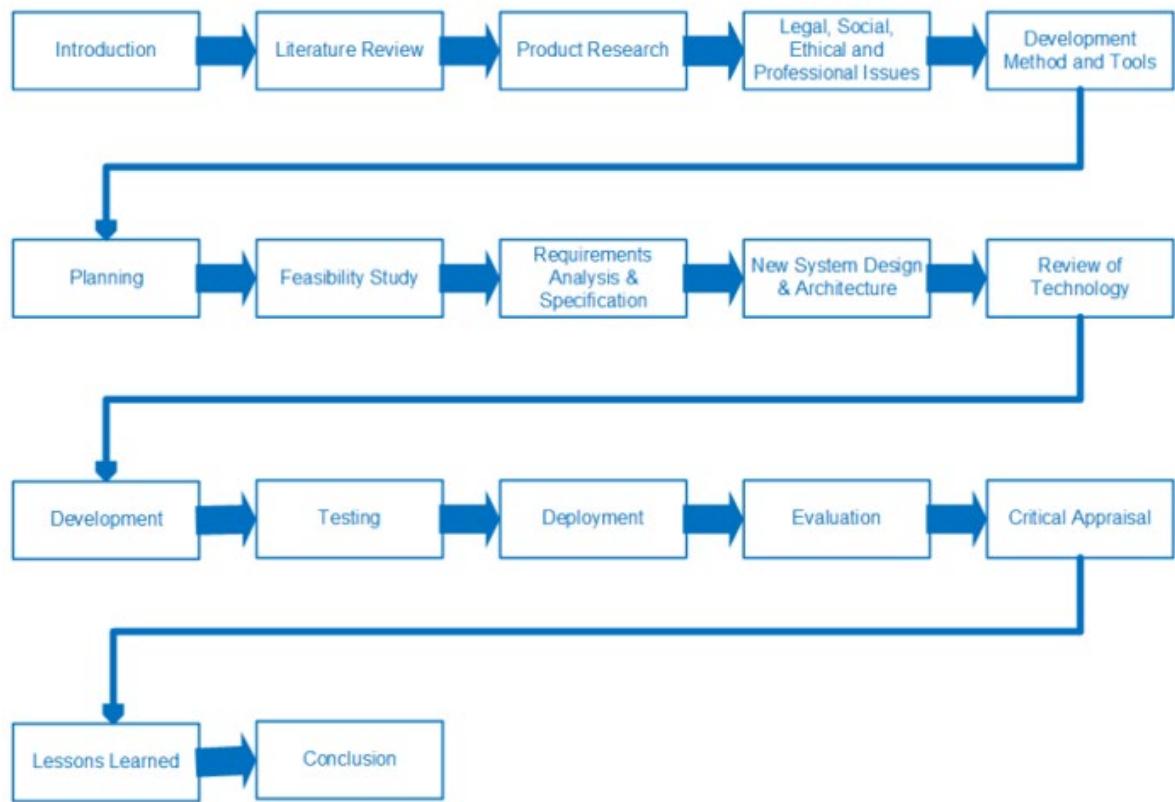


Figure 31: Activity Network

6.1.5 Critical Path

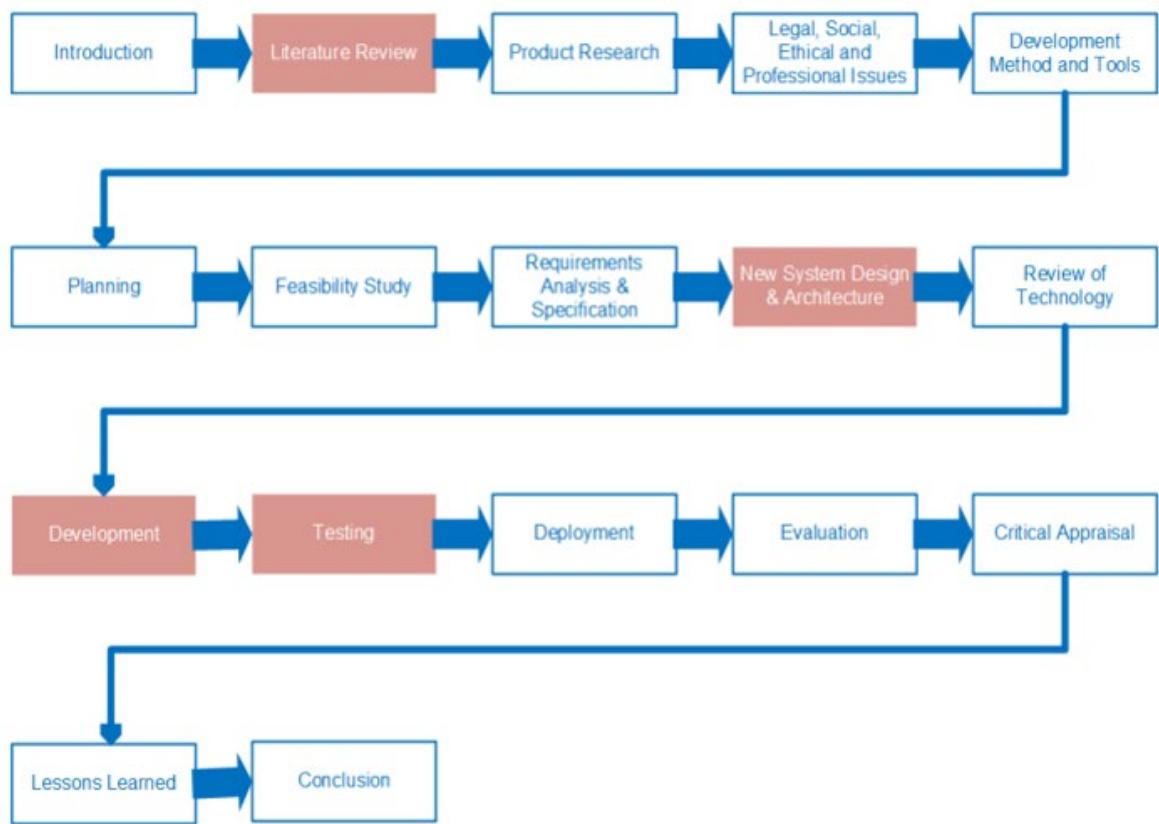


Figure 32: Critical Path in Diagram

6.1.6 Gantt Chart

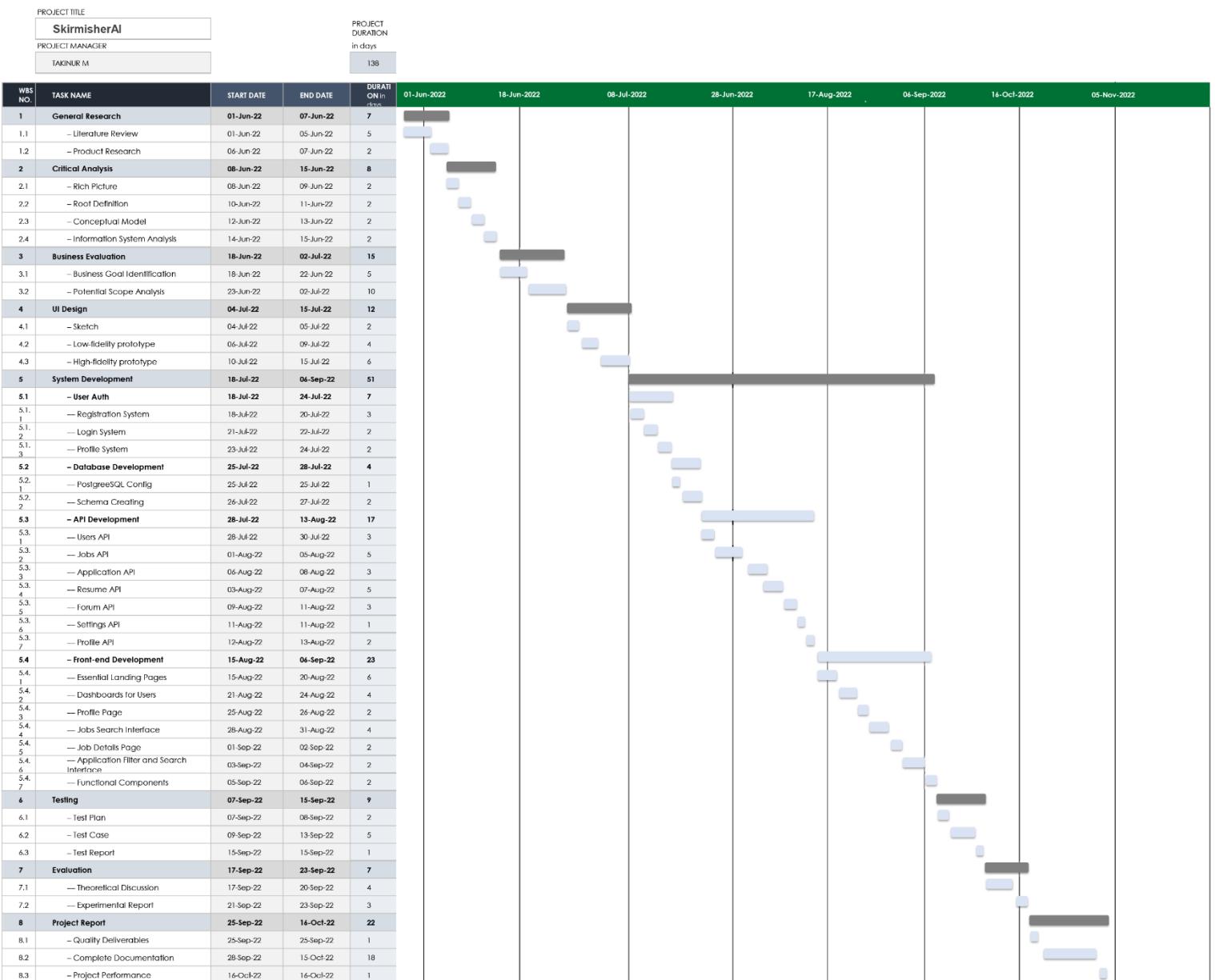


Figure 33: Gantt Chart

6.2 Test Plan

The SkirmisherAI Project is being developed for use scenarios in the real world. Hence, the system must therefore undergo a thorough testing procedure to make sure the solution is prepared for usage in a real-life setting. Additionally, a test plan helps lower the likelihood of project failure.

6.2.1 Required Tests

Software testing is a procedure for determining whether the actual software product complies with the required specifications and ensures that it is error-free. In comparison to the actual requirements, testing's objective is to identify flaws, inadequacies, or missing requirements (Graham, et al., 2021) as well. The necessary major features and minor features will be evaluated using the following standards to maintain system quality and enhance performance:

Unit Testing:

In unit testing, individual software units or components are tested to make sure that each piece of software code functions as intended (Zhang & Yan, 2018). In this process, a single or numerous input boxes will be evaluated to see if they function.

Integration Testing:

Integration testing is used to evaluate how numerous elements work together, how they interact, how distinct systems connect to form a larger system, and how intimately the code adheres to the specifications (Yang & Li, 2020).

System Testing:

An entire feature is tested using system testing technique. Using this testing policy will make it simple to assess whether the system complies with the required requirements (Reuys & Kamsties, 2005). Additionally, it provides access to a level of test execution where a number of integrated tests are being conducted.

Acceptance Testing:

This segment will assess the entire SkirmisherAI solution to see whether it is ready to deliver or not.

Performance Testing:

Performance testing is a non-functional software testing method (Pradeep & Sharma, 2019), evaluates how well an application retains its stability, scalability, speed, and reaction under a particular workload. The overall effectiveness of the SkirmisherAI system will be evaluated during this procedure.

Security Testing:

Security testing verifies whether software is susceptible to internet cyberattacks and assesses the effects of unauthorized or unanticipated inputs on its functionality (Mai & Pastore, 2020). SkirmisherAI will undergo security testing to demonstrate that its data and systems are safe, reliable, and do not accept illegal inputs.

Usability Testing:

Usability testing, a non-functional testing method, evaluates how simple the system is for the end user to use (Sasmito & Nishom, 2019). The SkirmisherAI solution will undergo an evaluation process to determine how users react to the system and whether it is simple to use and comprehend.

6.2.2 Testing Environment

Required Testing Components

- A computer with the Windows, Linux, or Mac OS operating systems.
- Python and Node.js Runtime for Code Execution.
- One iPhone or Android for Responsiveness.
- A contemporary web browser, such as Chrome, Firefox, Microsoft Edge, or Safari.

- Access to system Database.

Testing against timeboxes

This will guarantee that the time-boxed deliverables satisfy the objectives and expectations. Below a template for carrying these tests.

| Username | Role | | | | | |
|----------------|---------------|-----------------|---------------|---------|--|--|
| Timebox ID | | | | | | |
| Timebox Object | | | | | | |
| Test Type | Testing Steps | Expected Result | Actual Result | Comment | | |
| Unit | | | | | | |
| Integration | | | | | | |
| Module | | | | | | |
| Usability | | | | | | |
| Reliability | | | | | | |
| Security | | | | | | |
| Performance | | | | | | |
| Acceptance | | | | | | |

6.2.3 What needs to be tested

To make sure the accomplishment and dependability of the project, all the test cases described above should be tested and correctly carried out. Additionally, every unit will be subjected to these tests until it fails. Moreover, testing will be done on each feature and integration. To ensure that the system's performance is up to par and that it can support the recommended load, both functional and non-functional components should also be evaluated.

6.3 Risk Management Plan

Risk exists in every phase of our lives. The successful management and reduction of risk is essential to any project. During the cycle of developing the SkirmisherAI solution, there will be several risk factors. It is critical to recognize and effectively manage all the risks connected to this project. This section contains discussions of the SkirmisherAI Solution's risk management process.



Figure 34: Risk Management Process

6.3.1 Risk Identification

Risks of all kinds could materialize during the SkirmisherAI application development process. Every potential risk of various kinds will be discovered at this phase at an early point of the development process. Here are some of those definitions:

Technical Risks

- Since the system will be built using a variety of hardware, hardware failures could cause the system to crash or become damaged.
- Different modern technologies will be implemented to the system's development. System issues can arise because of major version changes.

Schedule Risks

- Frequent changes or modifications to the requirements could have an impact on the timeboxes and lead to scheduling failure.
- Scheduling failure may also result from inaccurate resource allocation.

Internal Risks

- Internal risk may be brought on by financial incapability. There can be an unexpected need to manage sophisticated equipment. The possibility of being unable to continue would then arise from financial insolvency.
- Any team member's illness or condition could constitute an internal risk.
- Internal risk might result from server downtime or a lack of IT support as well.

External Risks

- The term "external risk" describes problems that the corporation cannot manage. It may occur because of political circumstances, social developments, or a variety of other factors.
- External dangers to the project can arise if the electricity fails or the internet connection goes down.

Environmental Risks

- It alludes to dangers posed by the natural world or the environment. Potential environmental threats include cyclones, thunderstorms, and other natural calamities.
- The current Coronavirus outbreak can serve as a fantastic illustration of environmental risk. In a variety of nations, it has altered the business landscape.

6.3.2 Risk Assessment

It is crucial to analyze all the hazards when they have been found using a few criteria. For instance, how frequently these risks can materialize and how they might affect the project. Following that, the appropriate actions should be done to handle them effectively. Here are some potential methods for managing risks in the SkirmisherAI project.

| Risks | Risk Specification | Likelihood | Impact | Frequency |
|---------------|--|----------------|--------|-----------|
| Technical | Hardware crash | Rare | High | 0-1 |
| | Dependency Version Changes | Likely | High | 1-2 |
| Scheduling | Too much modification of the requirement | Likely | High | 0-5 |
| | Bad management of resources | Certain | High | 0-2 |
| Internal | Sickness of the team members | Certain | High | 0-5 |
| | Financial instability | Likely | High | 1-3 |
| External | Political instability | Almost certain | Medium | 10-20 |
| | Internet or power supply issue | Certain | High | 20-30 |
| Environmental | Natural Disaster | Likely | High | 5-6 |
| | Shutdown for virus outbreak | Certain | Medium | 5-6 |

6.3.3 Risk Action Plan

| Risks | Risk Specification | Likelihood | Impact | Action Plan |
|-----------|----------------------------|------------|--------|--|
| Technical | Hardware crash | Rare | High | To determine whether there is a problem that could lead to hardware failure, all the hardware used in the project will be tested beforehand. |
| | Dependency Version Changes | Likely | High | Along with designating a functional version at the system, |

| | | | | |
|----------------------|--|----------------|--------|--|
| | | | | the most recent version of dependencies will be used. |
| Scheduling | Too much modification of the requirement | Likely | High | Potential requirements should be categorized and given a priority early in the project to minimize changes later. |
| | Bad management of resources | Certain | High | Before beginning the development, an estimated time will be chosen so that features could be produced and delivered on time if resources were allocated effectively. |
| Internal | Sickness of the team members | Certain | High | When someone on the team becomes ill, they should all receive essential care, and an alternative plan should be in place. |
| | Financial instability | Likely | High | Before beginning the development, the necessary equipment and resources should be gathered to prevent future financial difficulties. |
| External | Political instability | Almost certain | Medium | Avert political squabbles and make sure there is no unlawful behavior taking on within the enterprise. |
| | Internet or power supply issue | Certain | High | It is advisable to get a UPS so that an unexpected power outage won't stop progress. Mobile data ought to be used in addition to Wi-Fi as a backup. |
| Environmental | Natural Disaster | Likely | High | Before the project is developed, the necessary measures and |

| | | | | |
|--|-----------------------------|---------|--------|--|
| | | | | safety procedures will be implemented to minimize any potential impact from a natural disaster. |
| | Shutdown for virus outbreak | Certain | Medium | if the length of the lockdown is undetermined, all necessary development tools will be available inside the house. |

6.4 Change Management Planning

The proprietary approach known as FDDSDM, which is primarily based on DSDM and FDD and is ideal for midway change, will be used to build SkirmisherAI. A common characteristic of software development is the updating and revision of requirements. A comprehensive management plan should be created to handle those situations appropriately. In such cases, the MoSCoW prioritization method of DSDM is useful. Additionally, segmenting work into separate components facilitates mid-course modifications. Any further specifications will be implemented in the following iteration.

6.4.1 Factors for Change

If complications arise in the middle of developing a solution, it could have an impact on the development process. The following factors could have an impact on the project development and alter the features:

- Because of the evaluation of the timebox, requirements may change.
- If the assets are altered or adjusted, changes could happen.
- Project adjustments could also be brought on by technical difficulties.
- Bugs or errors could lead to modifications to the system.
- Due to a change in the working environment, requirements could alter.

6.4.2 Business Value Consideration

Since this project is being developed using the DSDM process, any modifications will be evaluated before being put into practice to determine the real business value they will bring. Besides, only updated criteria that have real business value for the system will be adopted.

6.4.3 Workshop Changes

It is crucial to set up expedited discussions to discover and consider necessary improvements. Typically, these workshops are attended by stakeholders, analysts, and developers to discuss project requirements and potential adjustments. Although, users occasionally participate in these seminars to express their opinions from a user perception.

6.4.4 Allowed Changes

It is crucial to understand the system's permissible changes and modifications to the requirements. There are several requirements that can be altered during a project. Such as,

- If the modification benefits the project's objectives.
- If the modification has no significant impact on the timeboxes.
- If the modification has no impact on the deadline.
- If it doesn't increase project costs.
- If no additional risk factors are introduced.
- If the project's quality is maintained.
- If the modification benefits the system's business.

6.4.5 Key Decision Takers of Change

The project involves several different roles, including those of a designer, developer, analyst, tester, and user. As an academic endeavor centered on research, each job should be filled by a single person. As a result, that individual will make the project-related decisions.

6.5 Quality Management Plan

Only when a project reaches a particular level of quality can it be considered successful. Consequently, quality management should be considered as the SkirmisherAI project is being developed. This will guarantee that the solution is stable and that each of the system's components is operating as it should. In addition, this uses a short-term strategy to accomplish long-term objectives.

6.5.1 Rules Applied to Maintain Quality

To maintain the standards of SkirmisherAI, the pursuing guidelines were used:

Software Quality Assurance (SQA)

By adhering to specific measuring criteria, this will guarantee that the SkirmisherAI project is of the greatest caliber. To determine the project's quality, a set of guidelines outlined by the ISO 9000 standard model will also be used.

Software Quality Planning (SQP)

With the relief of contextual principles and procedures, a build quality plan will be produced for the SkirmisherAI project. The quality plan will support to explain the quality of the SkirmisherAI application and will provide the process for evaluating those needs.

| | | |
|------------------------|--------------------------|---------------------|
| Safety | Understandability | Portability |
| Security | Testibility | Usability |
| Reliability | Adaptability | Reusability |
| Resilience | Modularity | Efficiency |
| Robustnecx | Complexity | Learnability |
| Maintainability | | |

Figure 35: Software Quality Plan

Software Quality Control (SQC)

A variety of procedures will be carried out to guarantee that the SkirmisherAI project's solution meets the stated quality standards. Furthermore, within the lifespan of development, this will proceed iteratively. The following activities will be completed:

| Review | Testing |
|------------------------|---------------------|
| Requirement Review | Unit Testing |
| Code Review | Integration Testing |
| Design Review | Module Testing |
| Deployment Plan Review | System Testing |
| Test Plan Review | Acceptance Testing |
| Test Case Review | |

Figure 36: Software Quality Control

6.5.2 Quality Plan and Measuring Meter

Planning for software quality will help to distinguish the project's main elements. This will allow for the measurement and evaluation of the entire project, ensuring that the needs of the client are met. Besides, an effective plan and measuring device will help to guarantee the system's quality.

The following are some crucial inquiries we can use to gauge the system's quality discussed by TJ (Tudor, 2010).

- Is business participation sufficient?
- Are all members of the development team given sufficient authority?
- Is the SDLC being adhered to correctly?
- Are products of value being produced?
- How are the reviewers' comments assessed?
- Is it possible to reverse the course of development?
- Are the timeboxes being adhered to correctly?
- How are the priorities being prioritized?

7. Feasibility Study

The feasibility study stage determines if a proposed project will be financially successful from both a business and technical perspectives. It entails a thorough analysis of the project's potential solutions, prices, advantages, dangers, and timetables. Moreover, it aids in deciding whether to continue working on the project or to end it entirely. Here is how the SkirmisherAI project's viability will be assessed:

- Determine the application Skirmisher AI's main goal.
- Assess how the created system will help the company achieve its objectives.
- Establish whether it is possible to finish the job within the allotted time.

7.1 Technical Feasibility

A feasibility study is carried out to establish whether a resource which is already available is required and whether the technology that will be employed is practical to effectively complete the project within the resource allotted. Since the proposed system SkirmisherAI will be a web API and a machine learning project in addition to being an academic individual effort, a single user will need to use resources. Therefore, a feasibility analysis should be done while considering the capabilities of a single developer. This will assess the following aspects:

- Examining the technical expertise, efficacy, and feasibility of the proposed project.
- Check to see if the chosen technology has adequate backing from the community.
- Verifying that the resources and technology used to develop the solution are sufficient.

Researching all the hardware and software required to build the solution is a component of this phase. Consequently, a feasibility study will be conducted with a cost-benefit analysis that considers all this hardware and software.

7.2 Operational Feasibility

The operational feasibility assessment measures the planned system's capacity. Additionally, it assists in determining whether the solution is effective at resolving the problem. It determines the project's scope and the procedures necessary to finish it. Furthermore, making decisions on the development of a solution and researching current systems to determine whether improvements are possible both aid in decision-making. Moreover, to guarantee a superior quality of the final product, this feasibility study needs to concentrate on a few important matters including usability, ease of maintenance, supportability, reliability, and other correlated issues.

7.3 Economic Feasibility

The economic feasibility study's central emphasis is on the project's financial advantages. It advances in calculating the project's financial resources as well. Besides, this helps in deciding if the project can be completed with the financial support or not. Economic viability allows for the determination of the project's total expenses and gains.

7.3.1 Required Hardware and Software cost

A lone person will come up with the solution since this is an academic project, Below are some examples of the gear and software needed to develop this project:

Hardware

- ⌚ Two 24-inc Desktop Monitors
- ⌚ A Personal Computer
 - Processor: AMD Ryzen 7 5800x3d
 - Ram: 32 GB DDR4 3600MHz
 - Graphics Card: RTX 3070 TI
 - SSD: 1TB M.2 NVME
 - Mouse, Keyboard, and other peripherals
- ⌚ Gigabit Wi-Fi Router
- ⌚ Online UPS
- ⌚ One Mobile Device
- ⌚ Essential Cables

Software

- ⌚ Operating System: Windows 10
- ⌚ Prototyping: Figma
- ⌚ IDE: Visual Studio Code
- ⌚ Microsoft Office 2022
- ⌚ Google Collab
- ⌚ Adobe Photoshop 2022
- ⌚ GitHub
- ⌚ Node.JS
- ⌚ Google Chrome
- ⌚ Microsoft Edge

⌚ PostgreSQL pg. Admin

⌚ ZSH Terminal

Hardware Cost

| Name | Cost (GBP) |
|--------------------------------------|------------|
| AMD Ryzen 7 5800x3d CPU | £355 |
| Asus TUF VG24VQE (two piece) Monitor | £320 |
| Corsair Vengeance DDR4 3600MHz Ram | £105 |
| Asus TUF GeForce RTX 3070 TI | £680 |
| Samsung EVO 980 1TB SSD | £120 |
| Razer Viper Ultimate Mouse | £85 |
| Red Dragon Keyboard and Other | £110 |
| NETGEAR AC1600 R6260 | £40 |
| Max Green Online UPS 240VA | £50 |
| Google Pixel 6 | £499 |
| Total Hardware Cost | £2,364 |

Software Cost

| Name | Cost (GBP) |
|-------------------------------|------------|
| Windows 10 64bit Professional | £90 |
| Figma | Free |
| Visual Studio Code | Free |

| | |
|------------------------------|------------|
| Microsoft Office 2022 | £120 /Year |
| Google Collab, Google Chrome | Free |
| Adobe Photoshop 2022 | £240 /Year |
| GitHub, Node, Microsoft Edge | Free |
| PostgreSQL | Free |
| ZSH Terminal | Free |
| Total Software Cost | £450 |

Hosting Cost

The project must be hosted on the cloud server for it to be available to everyone. The services that can be utilized to host the project are listed below.

| Service Name | Package | Rent/Month | Total Cost (GBP) |
|--------------------|------------|------------|------------------|
| AWS EC2 | Linux | £20 | £240 |
| AWS RDS | PostgreSQL | £25 | £300 |
| AWS S3 Bucket | LONDON | £15 | £180 |
| Namecheap | Domain | £2 | £24 |
| Total Hosting Cost | | | £744 |

Additional Cost

Other expenses including internet costs, electricity prices, and hosting fees are extra to the costs of the hardware, software, and hosting plans.

| Service Name | Interval | Rent/Month | Total Cost (GBP) |
|------------------|----------|------------|------------------|
| Gigabit Internet | 6 Months | £100 | £600 |
| Electricity | 6 Months | £20 | £120 |
| Total Cost | | | £720 |

Cost benefit analysis

The cost of developing the application will be substantial. The section below provides a three-year cost-benefit analysis for this project:

| Cost Sector | 1 st Year | 2 nd Year | 3 rd Year |
|-----------------|----------------------|----------------------|----------------------|
| Hardware | £2,364 | | |
| Software | £450 | £360 | £360 |
| Hosting | £744 | £744 | £744 |
| Others | £720 | £720 | £720 |
| Employee Salary | £50,000 | £55,000 | £60,000 |
| Total | £54,280 | £56,824 | £61,824 |

This table demonstrates how much less expensive the second and third years of the application will be than the first. However, only compensation for employees will increase as they gain expertise over time.

7.4 Major Organizational Changes

Any big alterations to an organization's environment may result in serious issues. The implementation of a comprehensive smart solution for human resources will take a lot of time. Due to the project's extensive involvement by so many stakeholders, society is greatly impacted. In addition, organizations may benefit from helping HR managers with thorough AI-based hiring processes. They will be able to learn more about potential applicants and make choices based on predetermined criteria. However, there are several probable drawbacks to this method that might materialize.

7.4.1 Business Structure Change

An entirely new environment is included with a new system. As a result, the corporate structure may be significantly impacted by this shift. The entire data collection and recruiting procedure would be conducted digitally because the suggested system is an AI-based hiring system with resume screening. As a result, many people may be shocked by the new procedures when they are implemented.

7.4.2 Business Procedure Change

Previously, the talent hiring system's functional operations were manual, and data had to be manually collected using a variety of techniques. Additionally, for a variety of reasons, the hiring process was challenging for human resource managers. However, since the entire process is standardized using technological solutions, every procedure is now simpler to follow.

7.4.4 Employee Attitude Change

Employees are accustomed to a policy that has been in place for some time because they have used it. Nevertheless, if the system compels individuals to switch from their long-established working method to a new method, this could irritate or unnerve them, which could lead to possible misbehavior.

7.4.5 Business Policy change

It will be a major undertaking to convert the current data collection procedure and software recruiting system because new tools and training are required. In addition to the current manual procedural policies, additional policies will need to be developed.

7.5 SWOT analysis

A project's SWOT analysis considers its advantages, disadvantages, opportunities, and threats.

The SWOT analysis for the SkirmisherAI project is discussed below.

| Strengths | Weaknesses | Opportunities | Threats |
|---|---|--|---|
| <ul style="list-style-type: none">Automatic Resume Screening with rich data representation.Reduce Time consuming hiring process.Integrated Video Interview facility.Eliminate Paperwork. | <ul style="list-style-type: none">Lack of data for Perfecting ML Model.Requires technical knowledge to fully utilize the system. | <ul style="list-style-type: none">There is little rivalry.May reduce the lack of skilled worker.Might become popular for tech industries | <ul style="list-style-type: none">The transition to smart systems may not be desired by traditional businesses.Unfavorable media exposure.Persistent cyberattacks may occur to ruin the reputation. |

8. Requirement analysis and specification

At this segment, SkirmisherAI projects specification will be overlooked to find out which ones will provide for most excellent project outcome.

8.1 Rich Picture

8.1.1 Diagram

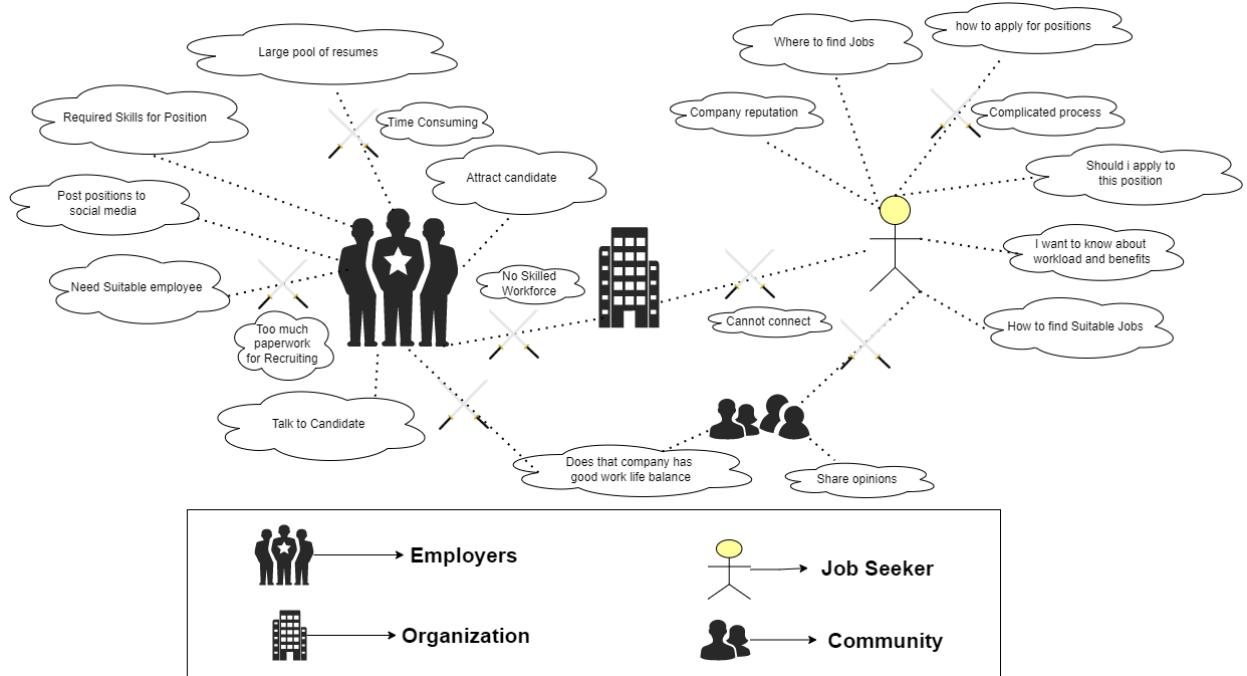


Figure 37: Rich Picture

8.1.2 Description

Prior to applying for a job, a job seeker needs evaluate several aspects, including the workload, amenities, etc. Thus, finding suitable jobs is more difficult than it seems. The illustrations above show how a job seeker chooses a suitable employment based on a few considerations. On the other side, employers or organizational human resource managers have difficulty locating qualified workers for their farm. Due to the time and effort required, companies frequently are unable to choose among a significant number of applications. In addition, employers need to use social media and ads to get applicants to apply for

open positions. Furthermore, because talent matching necessitates careful resume analysis, choosing the right candidate becomes challenging. Moreover, every task necessitates substantial paperwork and inevitable costs. On the other hand, members of the community rarely express their hopes and ideas in public because of complexity.

8.1.3 Key Issues

The field of human resources currently requires excellent technology support. The majority of businesses frequently struggle to recruit skilled labor for their operations.

- Numerous applications for a single position are complicating things for HR managers.
- Most employers struggle to determine the skilled workers they require.
- The expense of general operations is rising on all fronts.
- Companies seek to reduce the amount of paperwork needed for hiring.
- HR managers want to review resumes rapidly and easily.
- Employers want to readily communicate with candidates before making a hiring decision.
- After researching the employing organization, job searchers want to apply for openings.
- Before applying for a job, job seekers also want to assess their suitability.
- Individuals enjoy discussing about businesses and jobs, as do employers and job seekers.

8.1.4 Areas of Conflicts

Conflicts arise because of the general recruiting process's challenges and slowness.

Some of conflicts includes:

- The process of hiring a new employee is quite expensive and time-consuming.
- Employers frequently lack access to appropriate media to engage applicants.
- Prior to scheduling an interview, employers must get in touch with candidates.
- Candidates require accurate information about the position and the employer.
- The data collection relies for a lot of documentation and expertise.

8.2 Organizations Structure

Understanding the organizational structure is crucial for achieving an organization's business objectives. To accomplish the company objectives, we must adhere to certain rules and regulations and maintain certain constraints. Additionally, a proper organizational structure aids in a company's ability to concentrate on business operations. The SkirmisherAI solution I'm recommending can provide HR Managers with instructions for finding talent and make it simple for them to do so. Furthermore, if the organizational structure is effective, providing a comprehensive answer for the human resource would be simple for us.

8.3 Project Stakeholders

The people who work for a corporation are either directly or indirectly engaged in the development of a software project are referred to as stakeholders. The suggested SkirmisherAI is a smart hiring solution with stakeholders for human resources and job searchers. For instance,

Owner

The owner is the person who is financially in charge of a project's progress.

Chief Operational Officer

An individual who oversees making any decisions on the project's investment strategy.

Project Manager

Someone in charge of overseeing the full project lifecycle and taking accountability for all project-related events.

Authority

A person who will keep an eye on every action taken within the SkirmisherAI program.

End User

It alludes to those who will ultimately make use of the solution. The system's users offer insightful feedback after utilizing it.

8.4 Eliciting Business/User Requirements

Numerous tools and procedures were used to gather requirements for this project from a variety of users. The following list includes each technique and tool:

- Interview
- Survey
- Observation and Experience
- Document Analysis

8.4.1 Interview Summary

Interviews with project-related stakeholders and users were conducted to collect requirements because this method is efficient for doing so. Each of them is interviewed using a different set of questions based on their roles. Numerous criteria emerged once the interview was over.

For instance, the authority wishes to automate the entire process so they can respond as quickly and as feasibly. Besides, to be able to pick candidates, recruiters need a digital mechanism for filtering candidate data. Furthermore, before applying for a job, candidates wanted to learn more about the organization.

In the appendix, the interview questions are presented.

8.4.2 Survey Summary

A series of questions about the solution were posed to users and stakeholders at this phase. Having so many responses from people was incredibly helpful. Users had to check their selections for some multiple-choice questions.

For example, many users wanted to salary rate and benefits for the job they are interested. Additionally, most of the businesses desire to advertise their establishment to improve company reputation and attractiveness.

In the appendix, the survey questions are presented.

8.4.3 Observation and Experience Summary

In this step, the entire field analysis is completed. It is crucial to do this research among local participants, including job searchers, HR professionals, recruiters, etc. It assisted me in grasping

the practical scenario, thus I was constrained to observe the present hiring procedure in silence because none of the questions could be answered without first analyzing the fieldwork.

For instance, I discovered that recruiters read through every applicant's résumé for an excessive amount of time. Additionally, they often store data in numerous systems and programs, which makes it difficult to find them.

In the appendix, the observation details are presented.

8.4.4 Document Analysis Summary

At this segment, several research articles were analyzed. Additionally, the knowledge gaps in each proposed solution for AI recruiting were examined, along with the potential development of those solutions' planned projects, in the case of this solution.

As an occasion, I learned that Amazon Inc. had a comparable system, but that the project utterly failed owing to variety and an unexpected approach. Furthermore, another document recognized the algorithm that outperforms general natural language processing, which is crucial to this endeavor.

Further details available in the appendix.

8.5 Specific problem area identification

After analyzing the current procedure for hiring human resources in the contemporary age, several problems were discovered. Some of them are as follows:

Resume Insight

The traditional approach involves recruiting managers screening resumes to identify qualified candidates manually. Additionally, they look up pertinent data to shortlist, including experience, education, projects, and other pertinent information.

Skills Match

In this method, employers identify if the applicant has all the required skills and optional skills. Employers use this strategy to determine whether an applicant possesses all necessary and desirable abilities. This ultimately involves a lot of effort, documentation, and a lengthy procedure. Additionally, applicants look over the job description to see if they possess the necessary skill set.

Live Communication

Due to a lack of connectivity, employers are unable to communicate with applicants about the position and important details.

Lack of Community

Employers and applicants currently find it difficult to discuss or dispute either questions or viewpoints. Resulting transparency of data for businesses where applicants are frequently uninterested.

Repetitive Task

To find the finest employees for their business, hiring managers must carefully evaluate each Resume. This is constant throughout all resumes, leading to the same monotonous task being performed repeatedly.

8.6 Possible Solutions

Web based Automation

To reduce hiring costs and flawlessly manage the talent pool from a distance, a web server can be used to construct a full recruiting automation system. This may include extensive workflow like scheduling interview, skill assessment and certificate validation service.

AI based Resume Screening

The existing resume screening procedure as well as resume insight might be automated using artificial intelligence and handled by a web service. Additionally, Leverage AI to reduce the hiring cost and improve quality of recruitment.

AI based Skill match

The existing skill matching approach might be enhanced by artificial intelligence, managed by a web-based machine learning solution.

Live Video Chat system

For pre-interview, vacancy, or applicant explanations, as well as other discussions, a live group chat module can be implemented for authenticated individuals.

Online Community

The ability to exchange experiences, engage in public discourse, and lend a hand to one another should be a community element.

8.7 System requirements from a diverse perspective

First, based on discussions and preliminary research, the system is designed for four different user groups. Additionally, the business requirements gathering identified the system's clear users. The first is the obvious—any visitor who has access to internet can visit the website—then comes the employer from the company posting jobs for hiring. Additionally, there are two additional user groups in the system: job seekers and administrators. The perspectives of each user, **visitor**, **job seeker**, **employer**, and **administrator** are shown below:

Guest Visitor

- Guest users want to see the newest job openings.
- Guest users desire to look for job openings using predetermined criteria.
- Guest users wish to know more about the job opening and company.
- Guest visitors desire access to conversations and blog entries.
- Guest users are curious about the system.
- Guest visitors wishes to register with the system.

Employers

- Employers desire to log on to the platform.
- Employers desire to use a system for hiring.
- Employers are looking to post positions for qualified applicants.
- Employers desire an automated system for screening resumes.
- Employers are looking for the ideal applicant with the right skills.
- Employers want to connect with applicants quickly.
- Employers desire to control the recruiting and posting of jobs.
- Employers desire to blog about their thoughts.
- Employer desires to produce and extract comprehensive reports.

Candidates

- Candidates desire to log on to the system.
- Candidates are interested in the most recent job openings.
- Candidates want to use specified criteria to search for job openings.
- Candidates are interested in learning more about the vacancy and corporation.
- Candidates are considering applying for suitable positions.
- Candidates desire a straightforward, seamless application process.
- The urge of candidates to blog about their ideas, questions, and confusions.

Administrator

- The aim of the administrator is to maintain and regulate system performance.
- The system's administrator desires to manage all users.
- The administrator desires to modify or add user roles.
- The system administrator wishes to control the settings.
- Administrator's desire to keep an eye on user behavior.
- Administrator wants to keep track of and manage both blog articles and discussions.
- Administrator wishes to produce comprehensive reports.
- Administrators want control over and periodic data backups for the system.

8.8 Requirements List with Specifications

A thorough business study was conducted, and several essential requirements for this project were found. Additionally, requirements associated to the project's specification were identified and gathered using requirements gathering approaches.

The requirements are distributed into functional and non-functional categories below:

Functional Requirements

- User Authentication.
- Management of users.
- Setup user profile.
- Create Personalized resume by resume Extraction.
- Provide Suitability score through screening resume.
- Evaluate Skills Match.
- The generation and export of various reports.
- Live Video Chat.
- Engagement at Blog.
- System Logs and Activity.
- Search, sort, and filter job openings as well as applications.

Non-Functional Requirements

- The user interface should be simple and convenient.
- The system must operate quickly and efficiently.
- The application must be secure.
- The application should be responsive.
- The system should be maintainable.
- The data must be protected and encrypted.
- The system should be scalable.

8.9 Prioritized requirements list

Prioritization is the crucial stage (Hudaib & Masadeh, 2018) where the stakeholders, requirements analysis, and understanding the impact of many factors that may interfere with the requirements order implementation importance must all be considered to ensure that the greatest value is obtained.

Every requirement for SkirmisherAI has been classified according to a set of criteria for the **MoSCoW** prioritization method. The first and most important criterion is benefit, which identifies the requirements with the greatest business value. Like this, penalty criteria to uncover

requirements that satisfy the organization's regulatory obligations. Cost criteria are used to specify the time and money necessary to implement a requirement. Moreover, dependency criteria used to indicate requirements that cannot be satisfied unless the other requirement is fulfilled. Furthermore, along with essential success aspects and development factors, user needs, factors that influence the characteristics, scope, and usefulness are also taken into consideration.

The following is a list of the requirements that have been compiled for the SkirmisherAI project.

RQ_1: Authentication and authorization of User.

RQ_2: User management.

RQ_3: Create Personalized Resume by Resume Extraction.

RQ_4: User profile Setup.

RQ_5: Suitability Score Prediction.

RQ_6: Evaluate Skill Match score.

RQ_7: Reports Generation.

RQ_8: Live Video Chat for Interview.

RQ_9: Blog Engagement and Management.

RQ_10: Job Management.

RQ_11: Job Application Management.

RQ_12: Company Reviews.

RQ_13: Interview management.

RQ_14: Resume Management.

RQ_15: Job filter and multi-criteria searching.

RQ_16: Sending Email notifications.

RQ_17: Newsletter subscription.

RQ_18: Contact with administrator.

8.9.1 MUST HAVE Requirements

| ID | Requirements |
|-----------|--|
| RQ_1 | Authentication and authorization of User. |
| RQ_2 | User management. |
| RQ_3 | Create Personalized Resume by Resume Extraction. |
| RQ_5 | Suitability score Prediction. |
| RQ_6 | Evaluate Skill Match score. |
| RQ_10 | Job Management. |
| RQ_11 | Job Application Management. |
| RQ_4 | User profile Setup. |

8.9.2 SHOULD HAVE Requirements

| ID | Requirements |
|-----------|------------------------------|
| RQ_7 | Report Generation. |
| RQ_8 | Live Video Interview. |
| RQ_16 | Sending Email notifications. |

| | |
|-------|--|
| RQ_15 | Job filter and multi-criteria searching. |
| RQ_9 | Blog Management and Engagement. |

8.9.3 COULD HAVE Requirements

| ID | Requirements |
|-------|--------------------------|
| RQ_13 | Interview Management. |
| RQ_17 | Newsletter subscription. |
| RQ_18 | Contact messages. |

8.9.4 WON'T HAVE Requirements

| ID | Requirements |
|-------|--------------------|
| RQ_12 | Company Reviews. |
| RQ_14 | Resume Management. |

8.10 Requirements Catalogue

The following phrase combines the functional and non-functional criterion from the list of requirement specifications. The SkirmisherAI system is developed using many of these specifications. The catalogue of all the requirements is given here.

| Source: Candidate | Sign off: Candidate | Priority: Must Have | Requirements ID: RQ_1 |
|---|---------------------|---------------------|---|
| Functional Requirement: User authentication and authorization. | | | |
| Candidate should be allowed to sign up and log in to the system. | | | |
| Non-functional Requirement(s): | | | |
| Description | Target Value | Acceptable Range | Comments |
| Login with wrong credentials should be regulated. | 5 times per hour | 7 sessions per day | While attempting to log into the system using incorrect information, the candidate can view errors. |

| Source: | Sign off: | Priority: | Requirements ID: |
|---|---------------|------------------|--|
| Guest Visitor | Guest Visitor | SHOULD Have | RQ_15 |
| Functional Requirement: Job filter and multi-criteria searching. | | | |
| Everyone should be allowed to view, search and filter jobs available on the system. | | | |
| Non-functional Requirement(s): | | | |
| Description | Target Value | Acceptable Range | Comments |
| View requests can be made as many times as need. | Unlimited | Unlimited | Users can search based on predefined criteria. |

| Source: Employer | Sign off: Employer | Priority: Must Have | Requirements ID: RQ_10 |
|--|--------------------|---------------------|------------------------|
| Functional Requirement: Job Management. | | | |
| Employer should be allowed to post new jobs for hiring and manage existing jobs. | | | |
| Non-functional Requirement(s): | | | |
| Description | Target Value | Acceptable Range | Comments |
| Job posting should be limited for Employer. | 10 Post Per Day | 15 Post Per Day | N/A |

| Source: Super User | Sign off: Authority | Priority: Must Have | Requirements ID: RQ_2 |
|---|---------------------|---------------------|-----------------------|
| Functional Requirement: User Management. | | | |
| Authority users of the system should be able to set restrictions, alter roles, and set activity limits for all the users. | | | |
| Non-functional Requirement(s): | | | |
| Description | Target Value | Acceptable Range | Comments |
| User activity tracking. | 400 Per Day | 600 Per Day | N/A |

9. New System Design and Architecture

In this section, the SkirmisherAI project's system design and architecture are covered. In addition, several different sorts of diagrams were produced to develop and deploy SkirmisherAI application.

9.1 Use Case Diagram

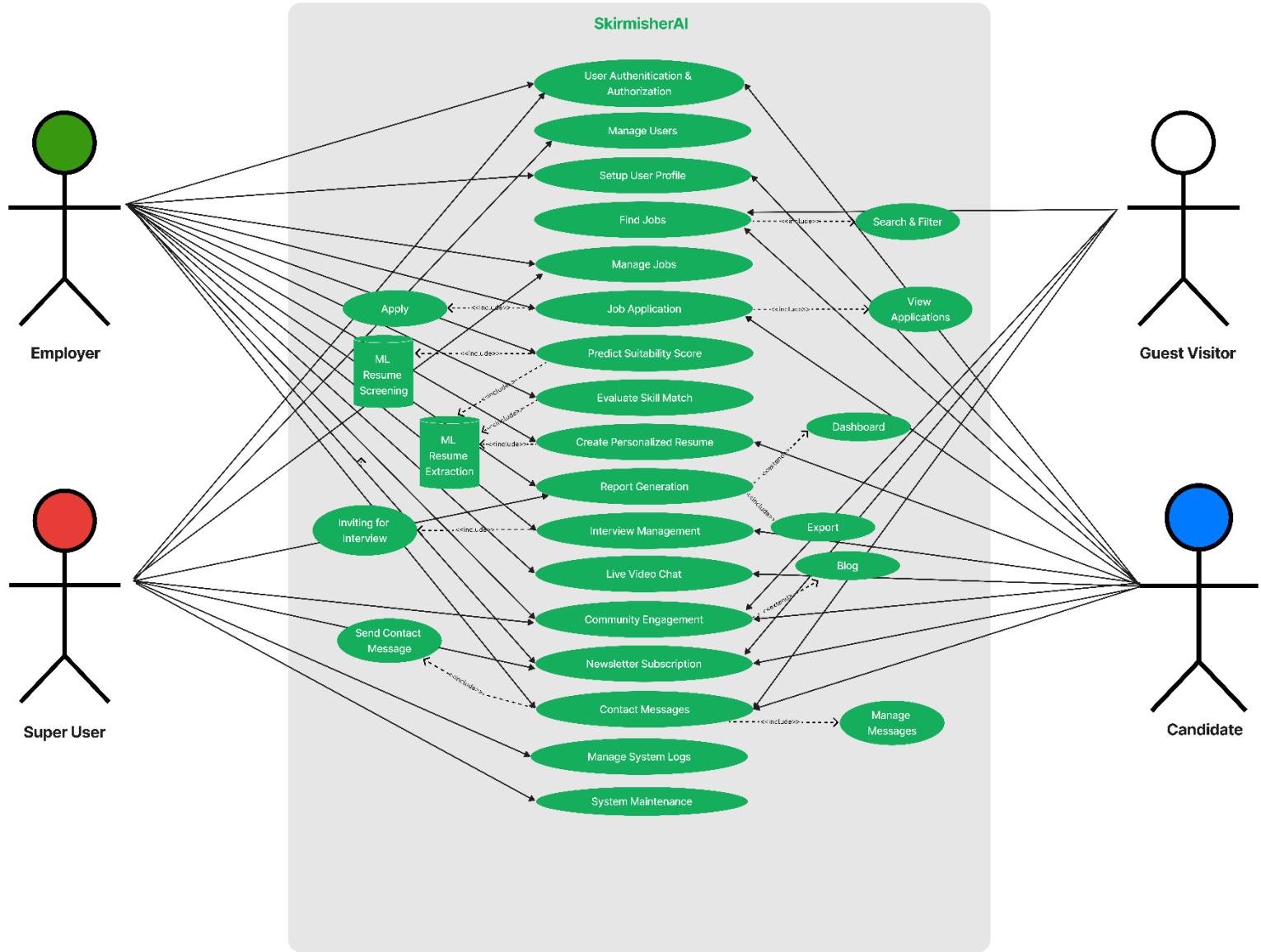


Figure 38: Use Case Diagram for SkirmisherAI

9.2 Use Case Documentation

| Use Case ID | Primary Actor | Use Case |
|-------------|-------------------------------------|---------------------------------------|
| UC_1 | Employer Candidate Super User | User Authentication and Authorization |
| UC_2 | Super User | Manage Users |
| UC_3 | Employer Candidate | Setup User Profile |
| UC_4 | Visitor Candidate | Finding Jobs |
| UC_5 | Employer Super User | Manage Jobs |
| UC_6 | Candidate Employer | Job Application Management |
| UC_7 | Employer | Predict Suitability Score |
| UC_8 | Employer | Evaluate Skill Match |
| UC_9 | Employer Candidate | Personalized Resume |

| | | |
|-------|--|-------------------------|
| UC_10 | Super User Employer | Report Generation |
| UC_11 | Employer Candidate | Interview Management |
| UC_12 | Candidate Employer | Live Video Chat |
| UC_14 | Super User Employer Candidate | Community Engagement |
| UC_15 | Super User | Manage System Logs |
| UC_16 | Visitor Candidate Super User Employer | Newsletter Subscription |
| UC_17 | Visitor Candidate Employer Super User | Contact Messages |

| | |
|------------------|--|
| Use Case ID: | UC_1 |
| Use Case Name | User Authentication and Authorization. |
| Actors | Employer, Candidate and Super User |
| Pre-conditions | Except super users, Employers and candidates can register to the system where email address is absolute. |
| Normal Flow | <ul style="list-style-type: none"> I. User provides an Email address. II. System checks if the email is valid to allow them register. III. Users can login using email and password. IV. System will check if the user exists in the database and matches given credentials to sign into the system. |
| Alternative Path | <ul style="list-style-type: none"> I. If user is registered but unable to log in, user can reset password through forget password action. II. A form will open to enter the user email address. III. A password reset link will be sent to user email. |
| Post-Conditions | Email address needs to be unique to sign to the system. |

| | |
|----------------|--|
| Use Case ID: | UC_2 |
| Use Case Name | Manage Users. |
| Actors | Super User |
| Pre-conditions | Only Super users are allowed to perform these tasks. |

| | |
|------------------|--|
| Normal Flow | <ul style="list-style-type: none"> I. Login to system administrator page. II. Super user can add new user, restrict existing user, or remove user permanently. |
| Alternative Path | |
| Post-Conditions | Every action will have a success message. |

| | |
|------------------|---|
| Use Case ID: | UC_3 |
| Use Case Name | Setup User Profile |
| Actors | Candidate, Employer |
| Pre-conditions | The user must be an authorized user of the system. |
| Normal Flow | <ul style="list-style-type: none"> I. User requires to be signed into the system. II. User needs to provide accurate user information to system. III. User needs to submit applicable profile information. |
| Alternative Path | Provide applicable information during registration. |
| Post-Conditions | User will see updated profile info with success message. |

| | |
|----------------|--------------------|
| Use Case ID: | UC_4 |
| Use Case Name | Finding Jobs |
| Actors | Visitor, Candidate |
| Pre-conditions | N/A |

| | |
|------------------|--|
| Normal Flow | <ul style="list-style-type: none"> I. User needs to visit find work page. II. User can perform multi-criteria jobs search. III. User can filter jobs. IV. User can view job details and company details. |
| Alternative Path | Signed in user can navigate from their dashboard. |
| Post-Conditions | N/A |

| | |
|------------------|---|
| Use Case ID: | UC_5 |
| Use Case Name | Manage Jobs |
| Actors | Employer, Super User |
| Pre-conditions | The user must be an authorized user of the system. |
| Normal Flow | <ul style="list-style-type: none"> II. User requires to be signed into the system. III. User needs to provide accurate user information to system. III. User needs to navigate to dashboard. IV. User can add new job posting. IV. User can delete or modify existing job posting. |
| Alternative Path | N/A |
| Post-Conditions | Rich table with Jobs will be present if enough data. |

9.2.1 Primary and Secondary Use Case Scenario

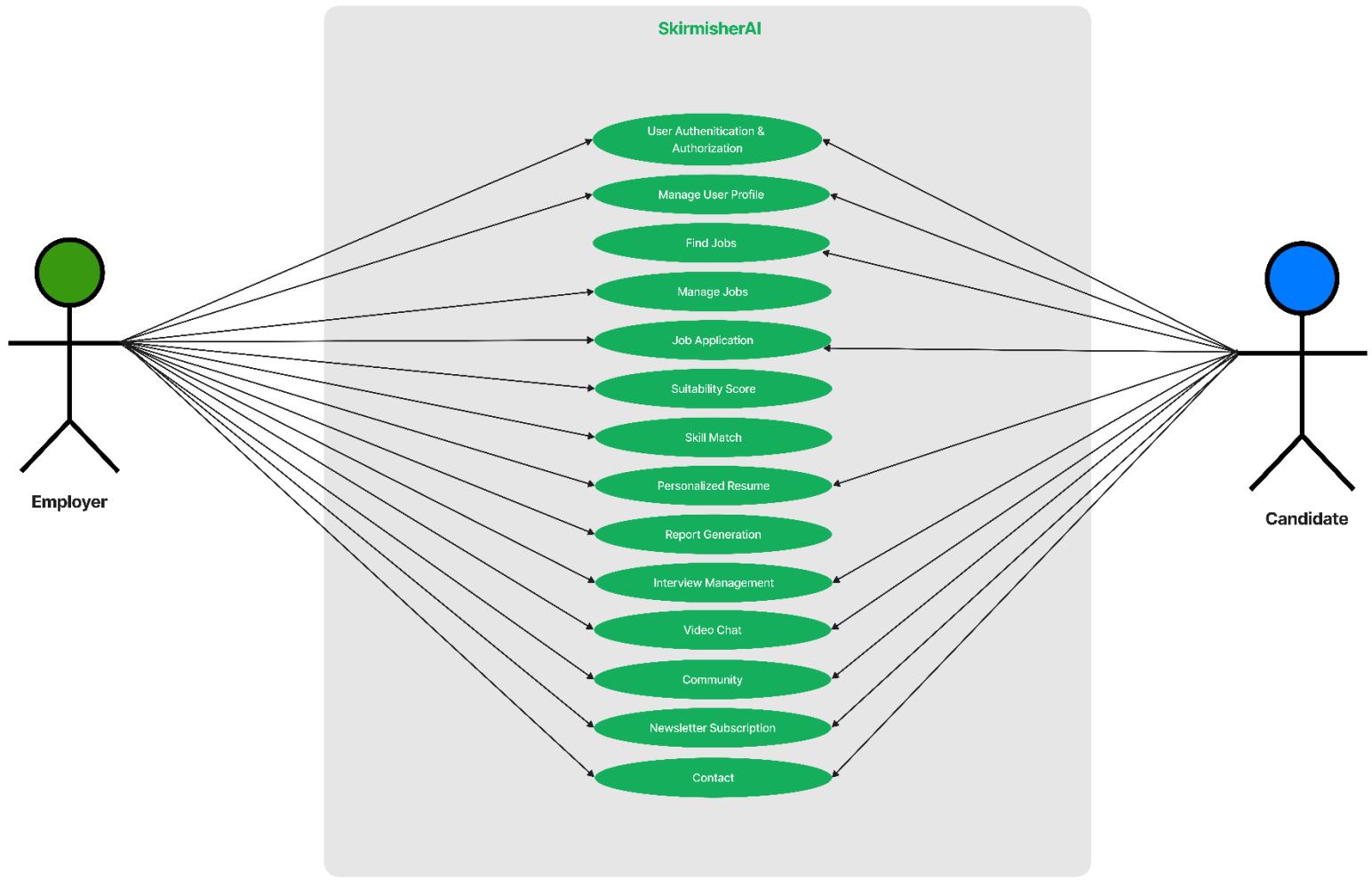


Figure 39: Primary and Secondary Use Case

In this use case scenario, the Employer and Candidate are the primary actors while super user and visitors are secondary.

Employers can post new job openings so that candidates can look for them and apply. To perform these actions both users need to be logged into the system with appropriate profile completion. Additionally, employers can view job applications and candidate profile with personalized resume to make their decision. Furthermore, employer might invite candidate for interview which can be carried out through live video chat. Both users can also join to community to read and write blogs along with contacting with system administrators.

9.3 Database Design

The sections that follow demonstrate the pertinent components for designing databases.

9.3.1 Entity Relationship Diagram

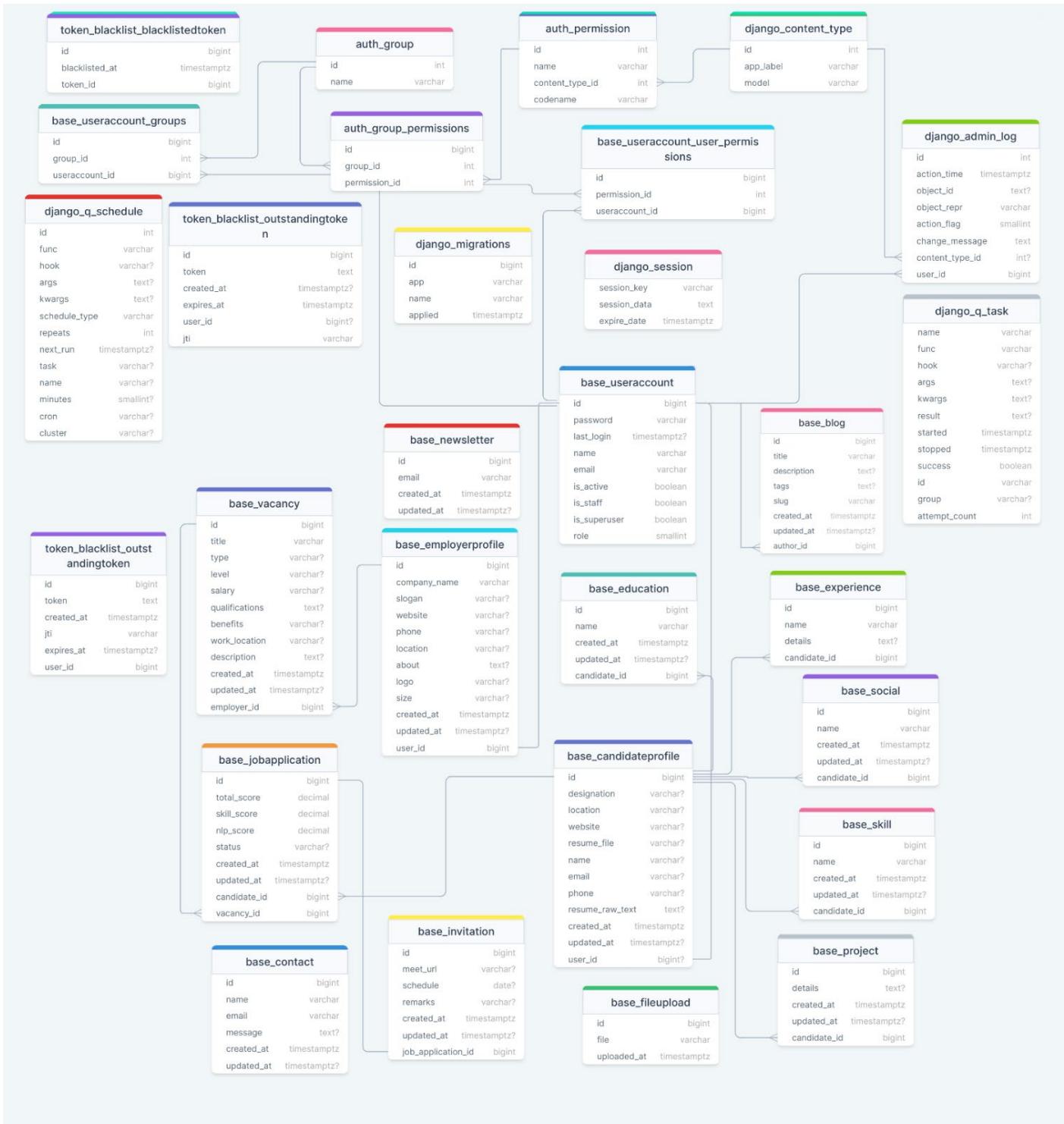


Figure 40: Entity Relation for SkirmisherAI

9.3.2 Database Mapping

| | |
|--------------------------|--|
| User Account | ID, Name, Email, Password, Is Super User, role, Last Login |
| Employer Profile | ID, Company Name, Slogan, Website, Phone, Location, About, Logo, Size, Timestamps, User ID |
| Candidate Profile | ID, Designation, Location, Website, Resume File, Name, Email, Phone, Resume Text, Timestamps, User ID |
| Vacancy | Vacancy ID, Job Title, Type, Qualifications, Work Location, Salary, Description, Benefits, level, description, timestamps, Employer ID |
| Job Application | ID, Total Score, Skill Score, NLP Score, Status, Timestamps, candidate ID, Vacancy ID |
| Job Invitation | ID, Meet URL, Schedule, Remarks, Timestamps. Job Application ID |
| Education | ID, Name, Details, Timestamps, Candidate ID |
| Experience | ID, Name, Timestamps, Candidate ID |
| Social | ID, Name, Timestamps, Candidate ID |
| Skill | ID, Name, Timestamps, Candidate ID |
| Project | ID, Details, Timestamps, Candidate ID |
| Newsletter | ID, Email Address, Timestamps |
| Blog | Post ID, title, description, tags, Slug, Author ID, Timestamps. |
| Contact | ID, Name, Email, Message, Timestamps |
| File Upload | ID, File, Timestamps |

9.3.3 Normalization

The third normal form was used to create the database architecture to get rid of transitive dependencies. This implies that data tables were segregated at a higher level to avoid data duplication and ensure data integrity.

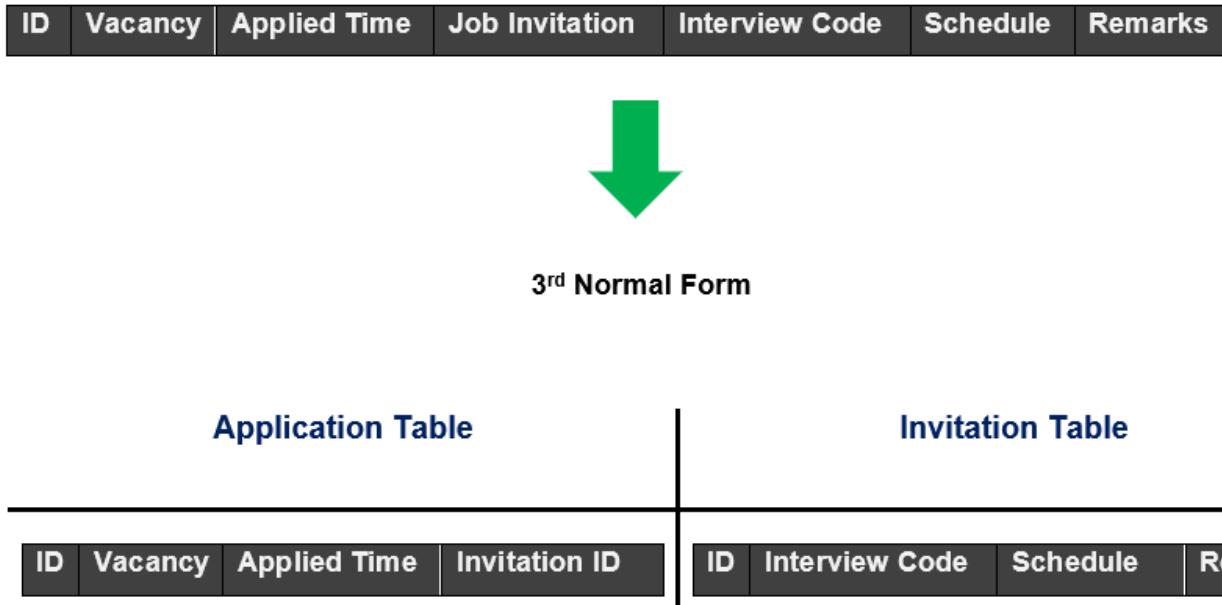


Figure 41: 3rd Normalization

9.4 Class Diagram

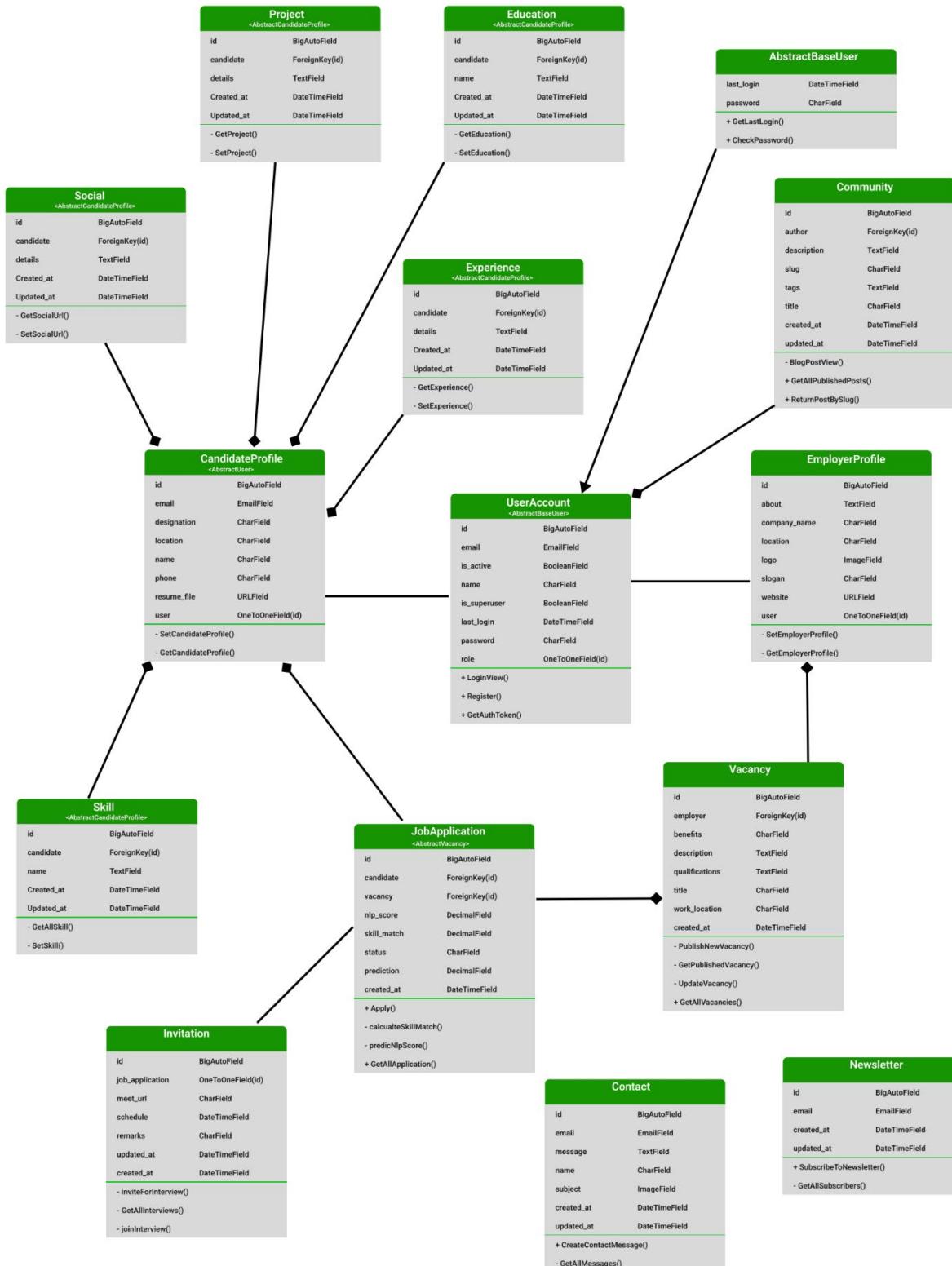


Figure 42: UML Class Diagram

9.5 Sequence Diagram

9.5.1 Recruiting Sequence

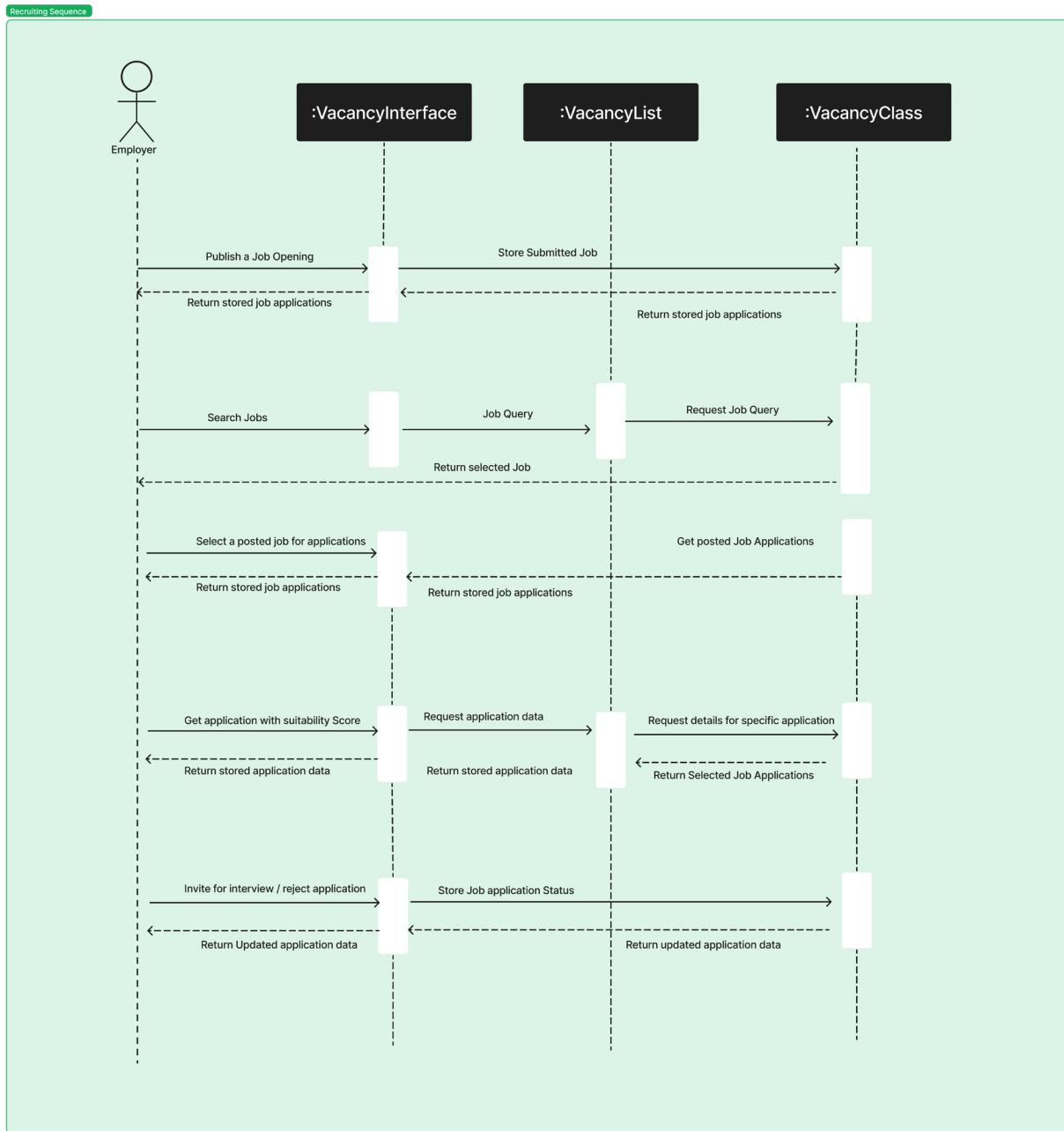


Figure 43: Recruiting Sequence

9.5.2 Job Posting Sequence

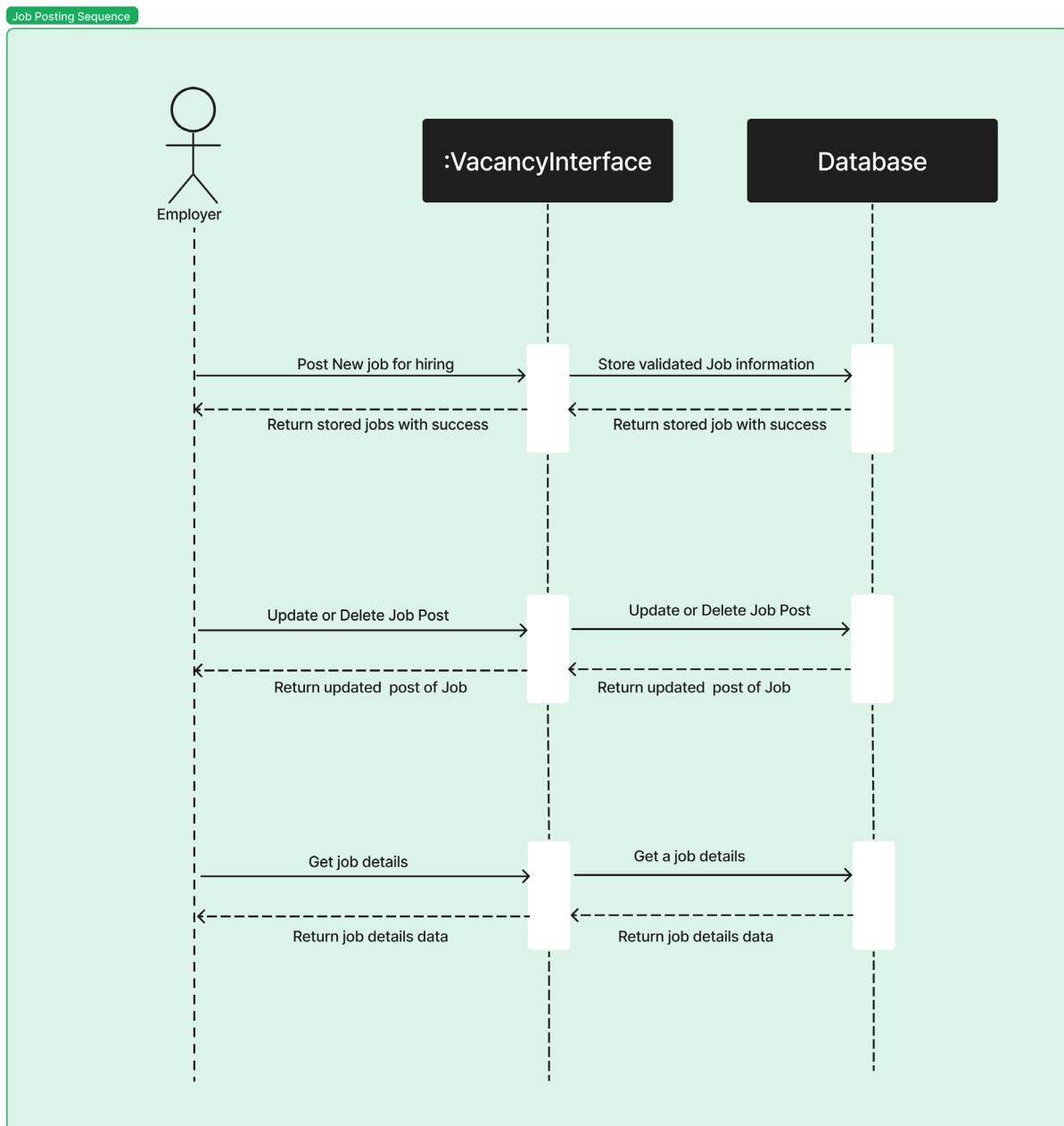


Figure 44: Job Posting Sequence

9.5.3 Job Application Sequence

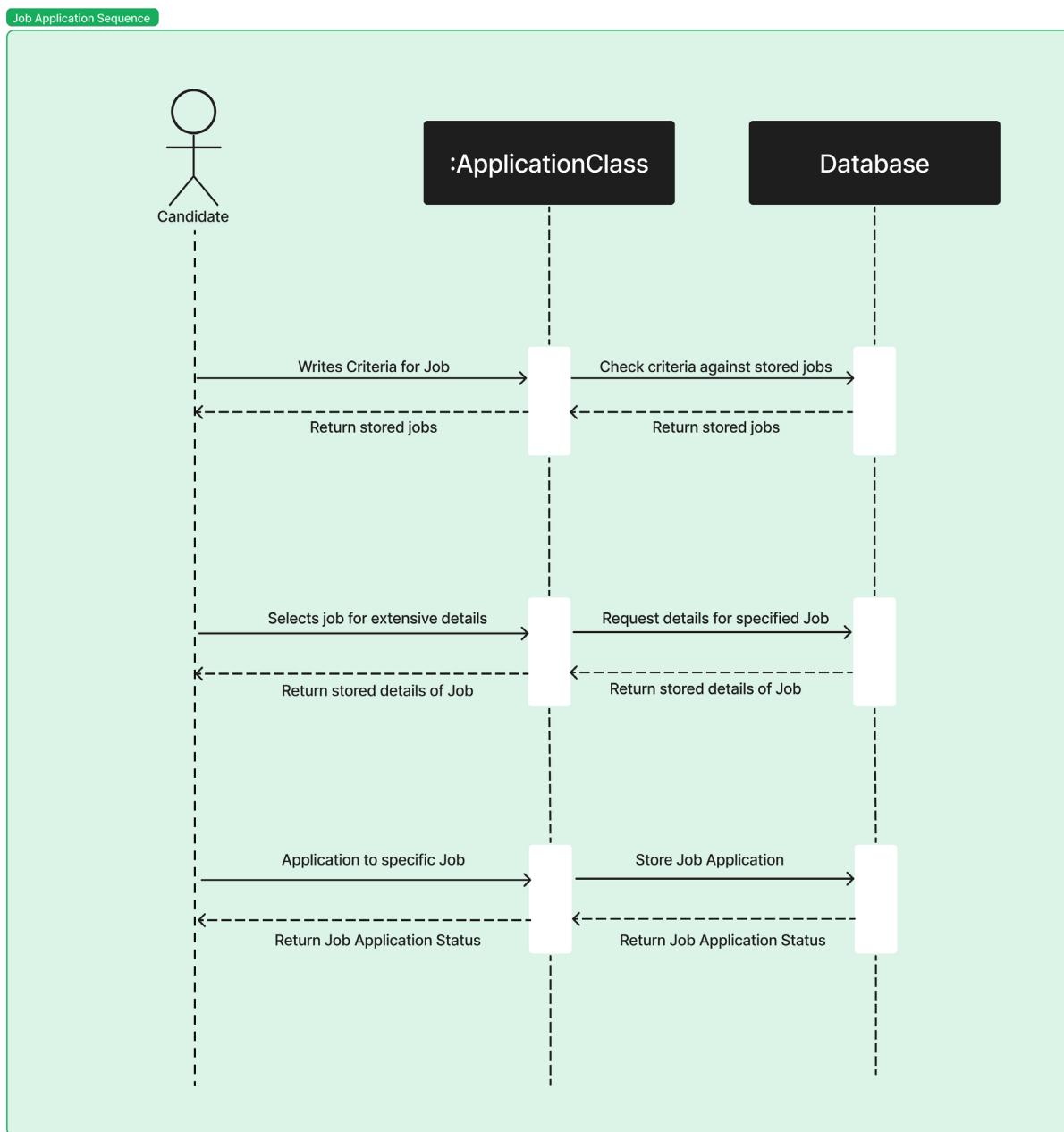


Figure 45: Job Application Sequence

9.5.4 Community Activity Sequence

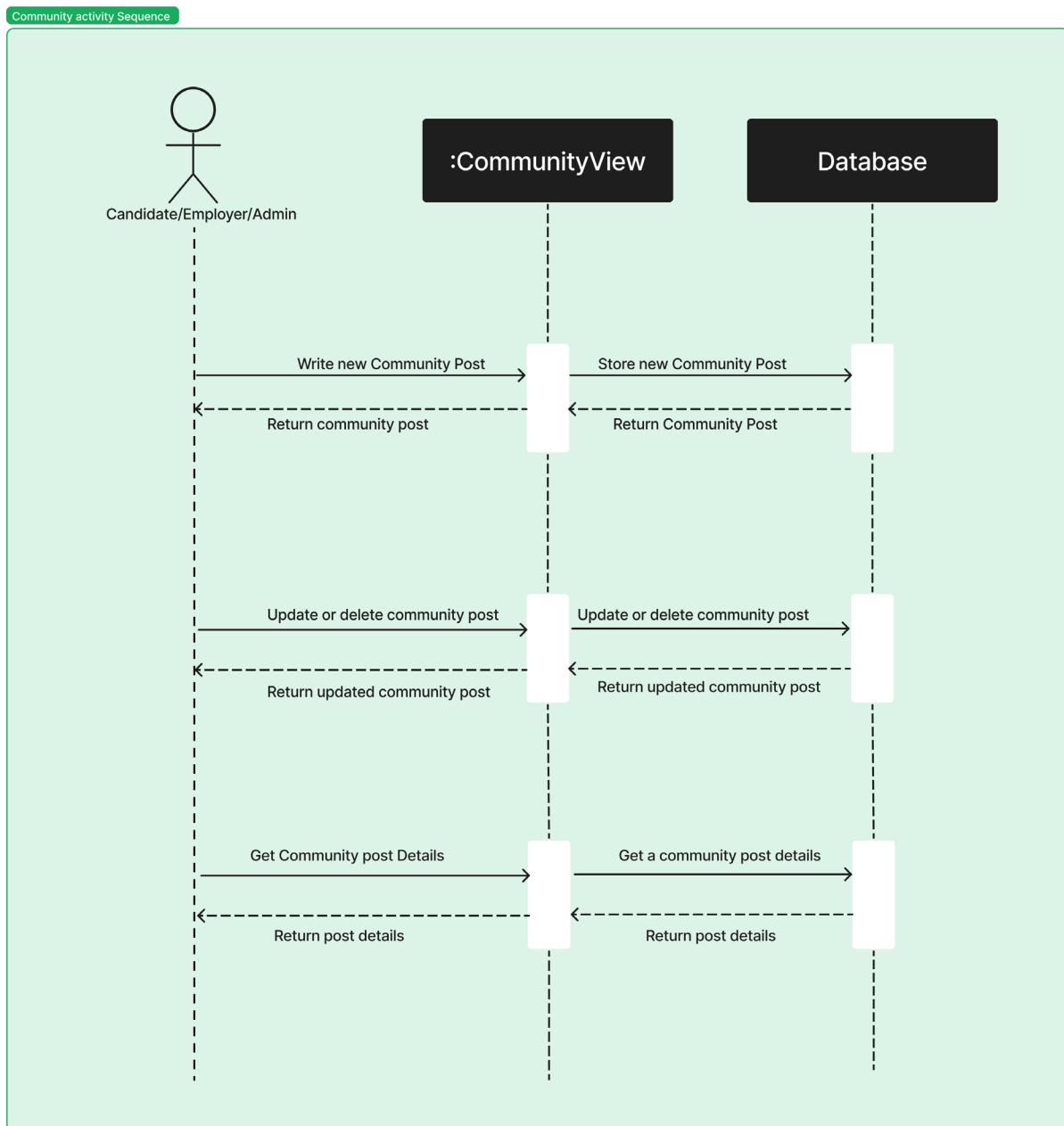


Figure 46: Community Activity Sequence

9.5.5 Video Interview Sequence

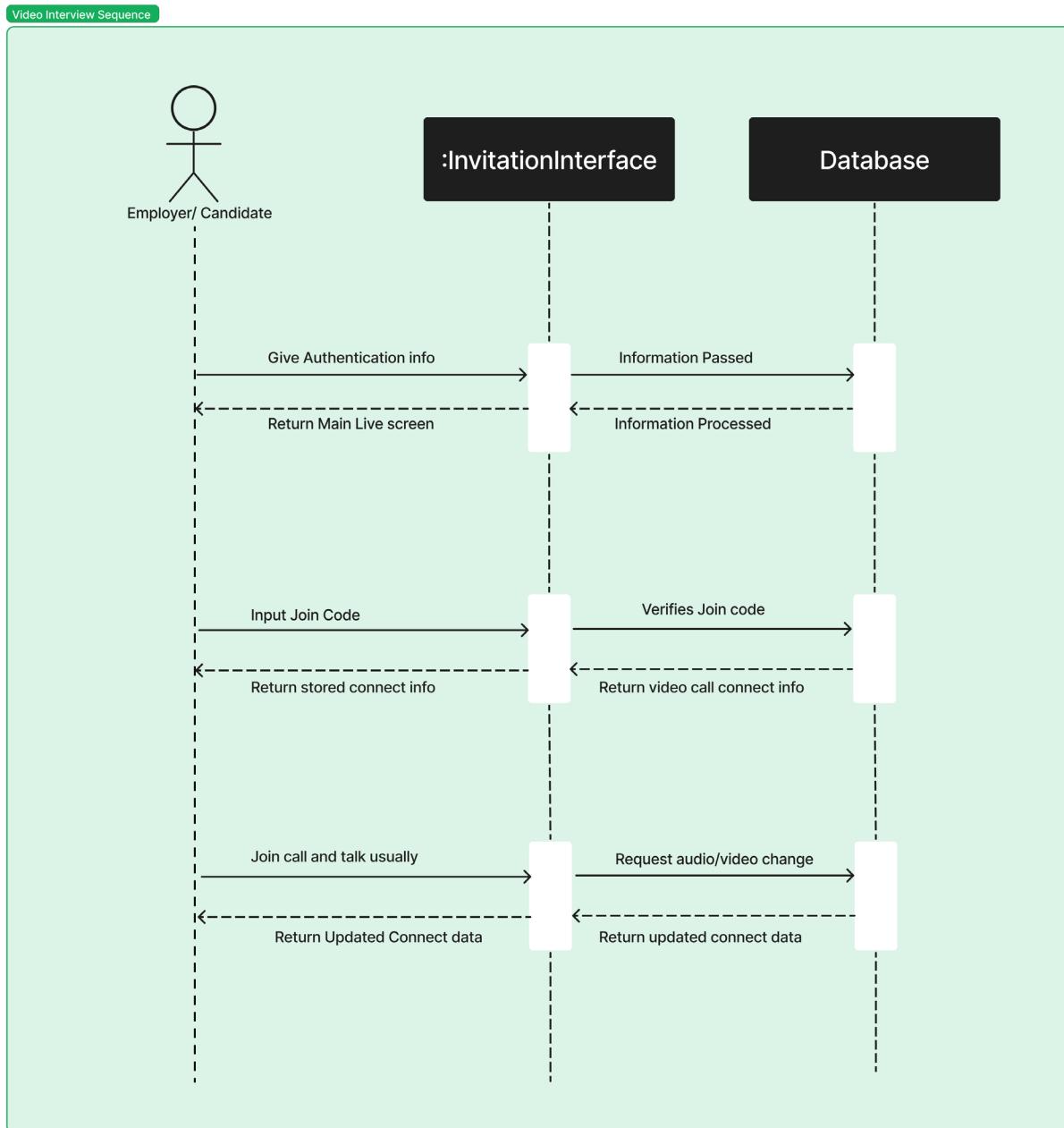


Figure 47: Video Interview Sequence

9.5.6 Help Sequence

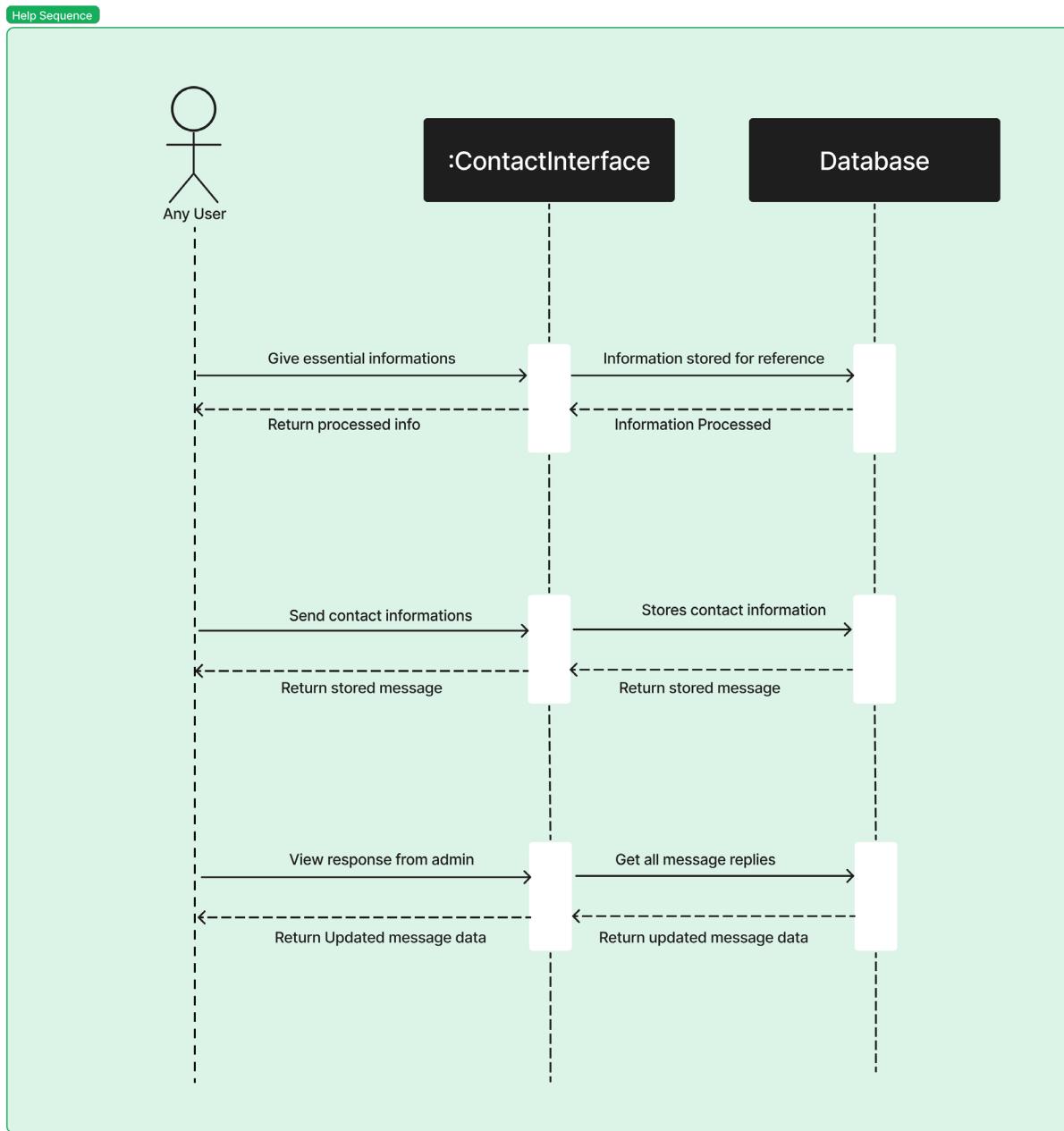


Figure 48: Help Sequence

9.6 Component Diagram

Component diagrams are used to describe a system's visible components. The artifacts utilized for the SkirmisherAI system, including files, executables, and libraries, are illustrated here.

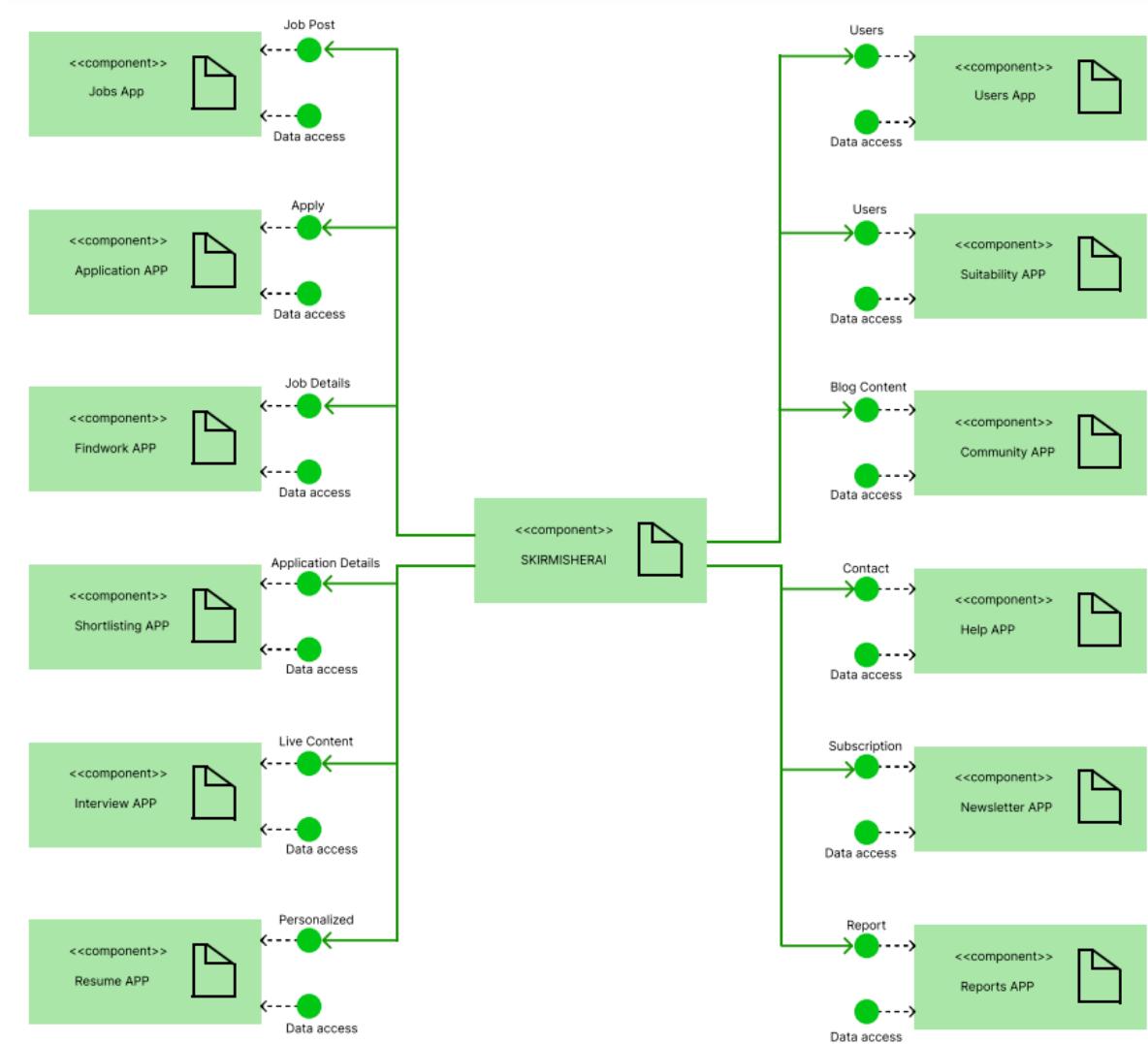


Figure 49: Components of SkirmisherAI

9.7 Deployment Diagram

Deployment diagrams are used to show how the physical parts of a system are organized and where the software components are placed (Nelaturu & Mavridoul, 2020). The deployment diagram for the SkirmisherAI system, which describes the static deployment view made up of nodes and their connections, is shown below.

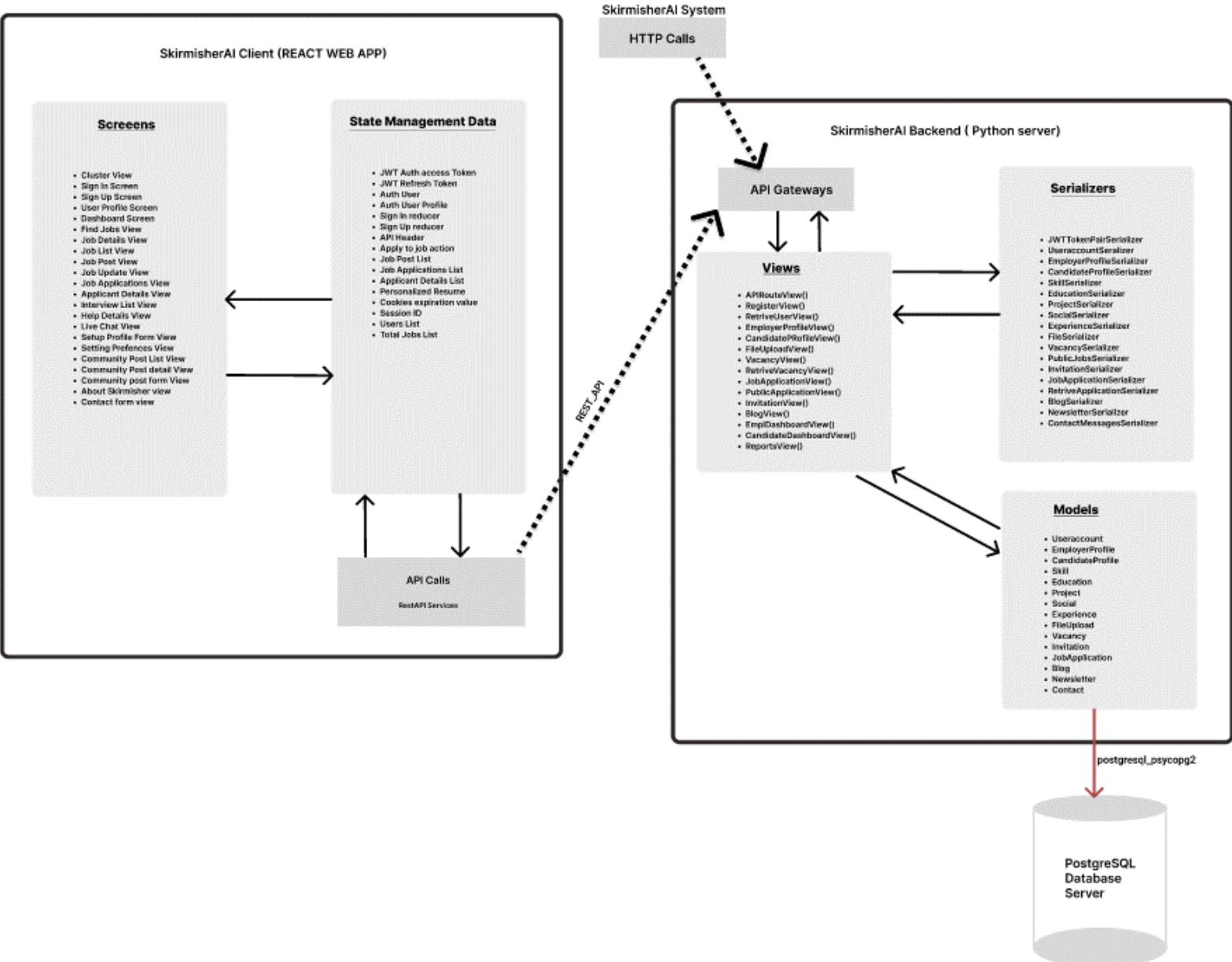


Figure 50: SkirmisherAI Deployment

9.8 Low-Fidelity Wire Frames for Prototype

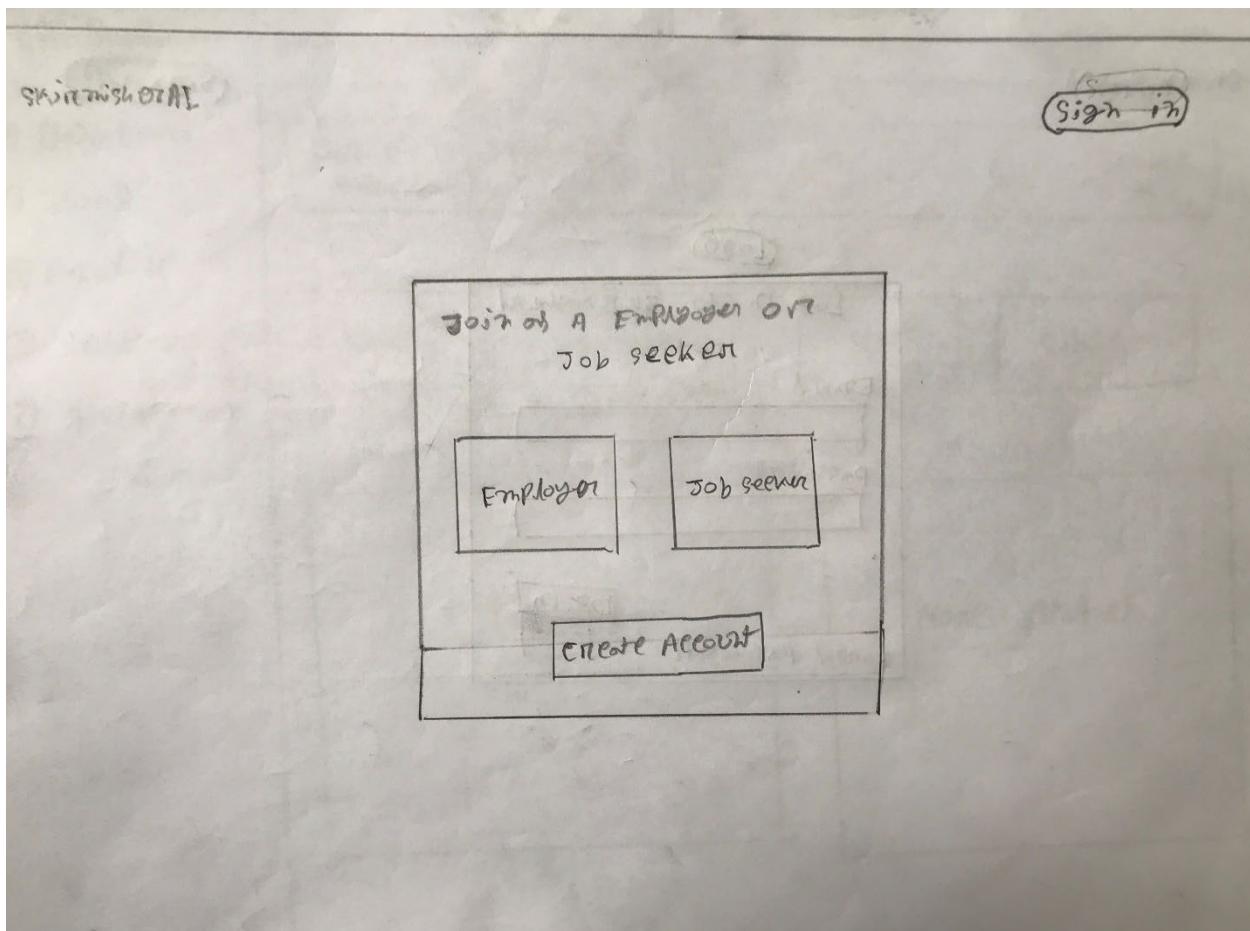


Figure 51: Registration Page

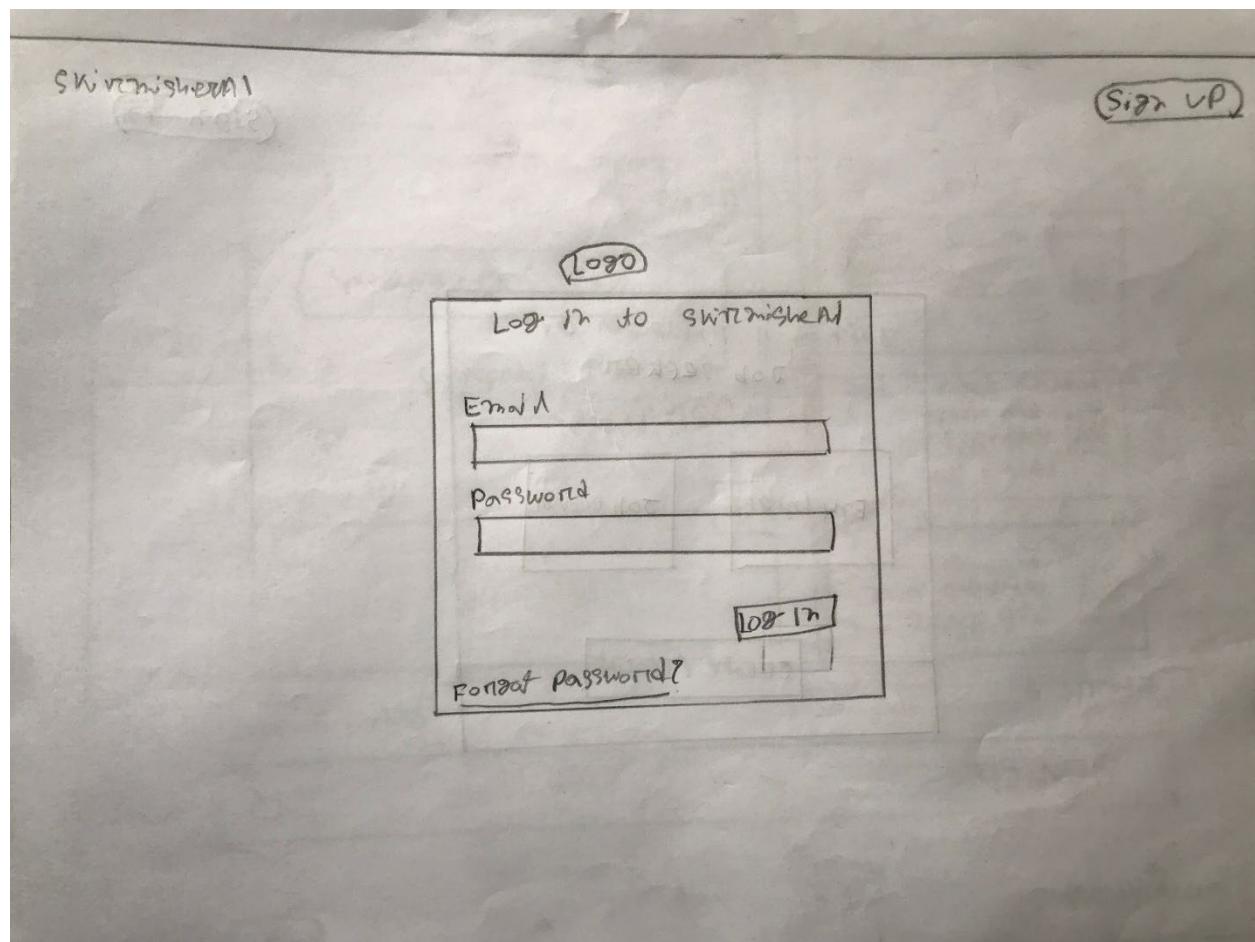


Figure 52: Sign in Screen

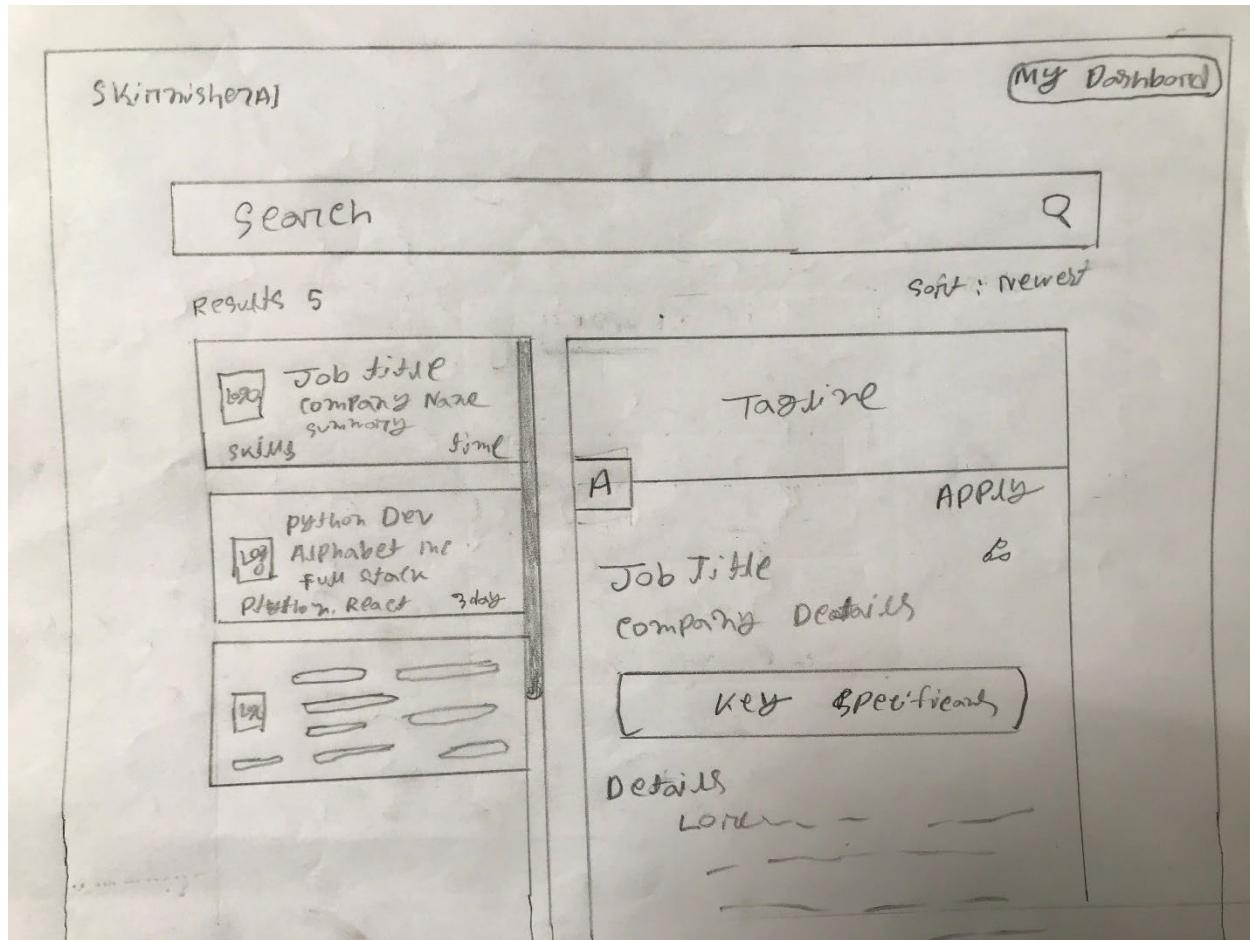


Figure 53: Find Jobs Screen

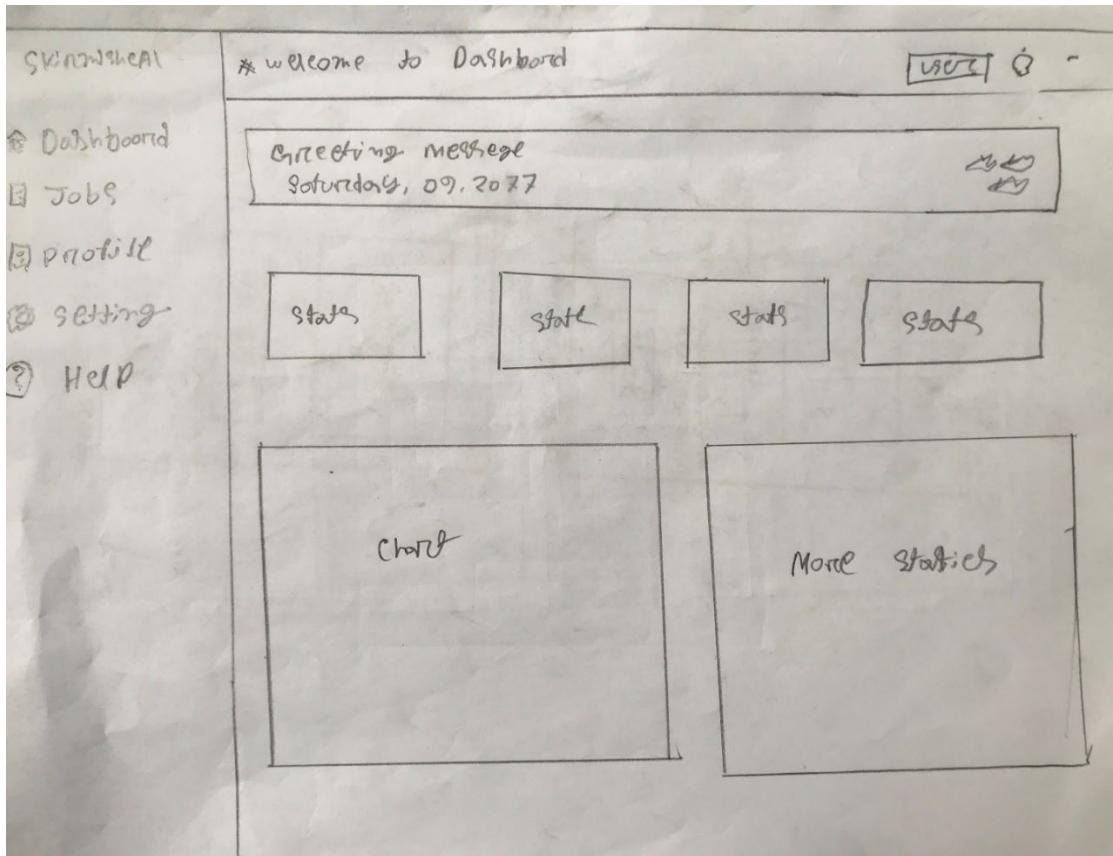


Figure 54: Dashboard Page

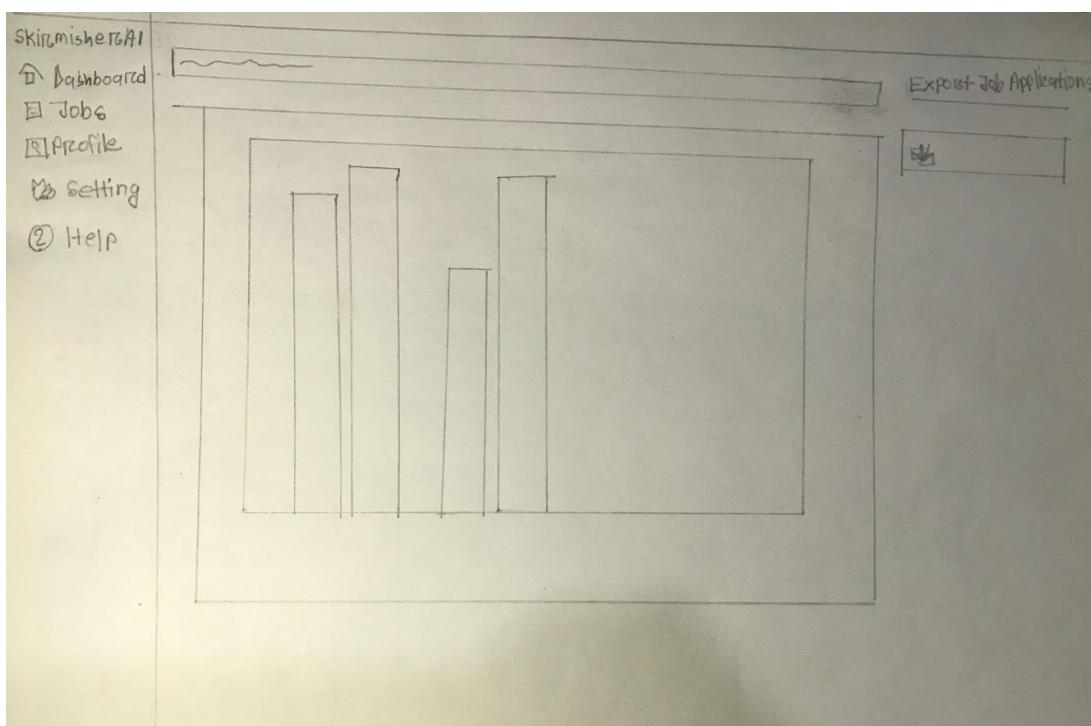


Figure 55: Report Generation

The image shows a hand-drawn wireframe of a user interface for 'SkirmisherAI'. On the left is a vertical sidebar with icons for Dashboard, Jobs, Profile, Settings, and Help. The main area has a header '# View Job Details - Applications' and a sub-header 'Back To Jobs'. It displays a table of four job applications:

| # | Candidate Name | Email | Skill Match | Suitability | Applied | Action |
|-----|----------------|------------|-------------|-------------|----------|-----------|
| # 1 | [redacted] | [redacted] | ○ | 50% | 11.10.22 | shortlist |
| # 2 | [redacted] | [redacted] | ○ | 60% | 14.10.22 | shortlist |
| # 3 | [redacted] | [redacted] | ○ | 70% | 16.10.22 | shortlist |
| # 4 | [redacted] | [redacted] | ○ | 90% | 20.10.22 | shortlist |

Figure 56: Job Applications List

Rest will be provided in appendices.

10. Review of Technology

There is a plethora of evolved technologies available nowadays for developing any form of software. As a result, the same system can be constructed utilizing a variety of approaches and technologies. Additionally, a survey must be conducted to determine how the intended consumers will benefit before choosing technologies and a development strategy. The SkirmisherAI application will aid human resources in streamlining their hiring procedure and assisting job seekers locate convenient employment. Since nearly all internet-connected smart devices can use web applications, the SkirmisherAI will be developed as a progressive web application. The user interface will have elements like ease of use, accessibility, and guidance for a better user experience in addition to being fully responsive for both mobile and computer platforms. Moreover, the application will be developed using a RESTful API as a middleware for the client side, and server side to provide the highest performance and scalability, or even go one step further and serve as serverless application.

Backend Application:

The backend oversees developing the application's core logic, which is stored on the server. Additionally, the backend application will deliver API endpoints that the frontend application will use. Moreover, the backend manages sophisticated use cases including database management, user authentication, running machine learning algorithms, and scheduling various tasks. Furthermore, system architecture, business logic, processes, and activities are performed at the backend. Some advantages are below:

- Building Restful API.
- Handling database query.
- Performing Complex logic.
- Application Architecture.

Rest API

A RESTful API, which is built on an HTTP request-based software architecture, enables secure online data transfer between two computer systems. It receives a valid request from the application server and responds to it. Additionally, the client-side uses backend API to enhance business logic to the user interface. Moreover, the rest API facilitates interaction and communication with outside services, which streamlines work for most applications.

Frontend Application:

The client-side application consumes the backends' rest API to process requests and data transferring. Additionally, client-side application restricts the kinds of data that users can access or requires authorizations. The frontend application also specifies data presentation and an interactive user interface. Furthermore, client-side application guarantees data encapsulation for increased security and data integrity. Few advantages include:

- Easier to interact and experience.
- Render entire website at browser for rapid response.
- Fully functional visual aspects.

Recommendation and Justification

A responsive website may be accessible from any mobile or computer device if there is an internet connection, unlike mobile apps, which can only function on certain platforms. Additionally, since everyone can access a web-based system via the internet, it helps to reach the widest number of users. Besides, while websites are simple to update, manage, and maintain, mobile apps frequently require the installation of new versions or upgrades. The SkirmisherAI system will be developed as a web application due to the system's large variety of users, diversity of platforms, scalability, maintainability, and upgradeability. Moreover, if necessary, web applications may be converted soon to native mobile applications utilizing sophisticated technologies.

The SkirmisherAI backend application will be built using the **Django Framework**, a **Python**-based framework that has a substantial community (Vincent, 2021) and is straightforward to comprehend and develop application. **TensorFlow**, a machine learning library, will also be employed to build and execute ML models at the backend. Also, for creating and initializing Deep Neural Network model, **KERAS** will be Utilized. Additionally, **PostgreSQL** will be used to manage massive data collection and storage. These days, it is impossible to envision front-end apps without JavaScript (Retzius & Sundholm, 2022), the essential programming language for the World Wide Web. Thus; **React.js**, a **JavaScript**-based framework, will be used to develop the SkirmisherAI frontend application to manage user interactions, design, functionality, progressiveness, and consuming **RESTful API**. Moreover, to build a website that looks contemporary, **Tailwind CSS** will be used in conjunction with HTML. Finally, JavaScript will be also used to cache data at the client-side for improved performance, responsiveness, and integration with third-party services.

11. Development

High-fidelity prototypes, the breakdown of timeboxes, and all the new system modules will be covered in this segment of the documentation. To conclude, some alternate strategies for developing this project will be discussed.

11.1 New Modules of the System

The following modules were developed for the new SkirmisherAI application system:

Users Module:

- Users can sign up to the system.
- Users can login to the system.
- Users can update profile.
- Users Roles can be updated.

Find Work Module:

- Users can search for different type of jobs.
- Users can view full in-depth details of job.

Job Module:

- Employer can publish job for hiring.
- Employer can amend posted job for changes.

Application Module:

- Candidates can apply to jobs.
- Employer can view job application.
- Employer can view candidate suitability.
- Employer can read skill match score.
- Employer can shortlist, invite for interview, or reject application.

Interview Module:

- Users can join in Live Video interview.
- User can schedule and amend interview info.

Report Module:

- System will continuously scrap related data for analysis.
- User can Generate relevant report.
- User can export or download reports.

Community Module:

- Users can publish content on the community.
- Users can amend posted content for changes.
- Users can remove their own content.

Help Module:

- Anyone can view essential Help info.
- For further assistance, anyone can contact admin.

Newsletter Module:

- User can subscribe for newsletter.
- User can confirm subscription through email.
- User will periodically receive newsletters after subscription.

Admin Module:

- Admins can manage other modules.
- Admins can alter user roles.
- Admins can see reports.
- Admins can monitor site performance.

11.2 High-Fidelity Prototypes for New Modules

From the project's front-end application, a few of the high-fidelity prototypes are featured below.

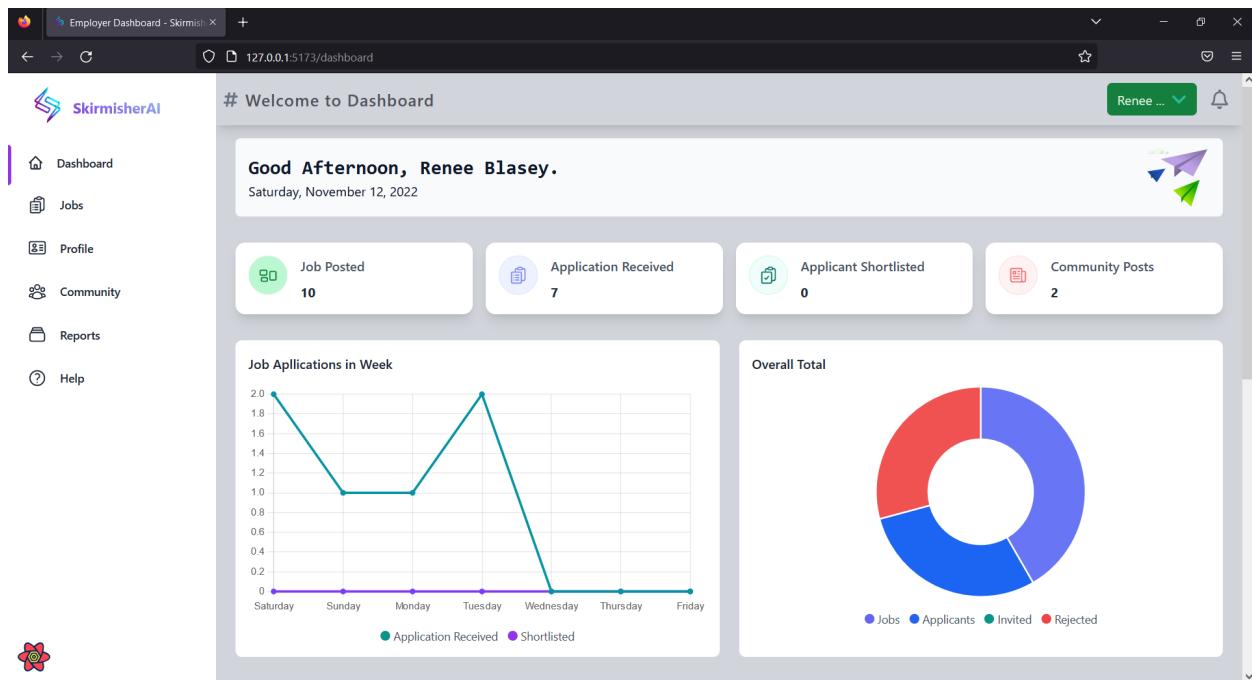


Figure 57: Dashboard for Report Module

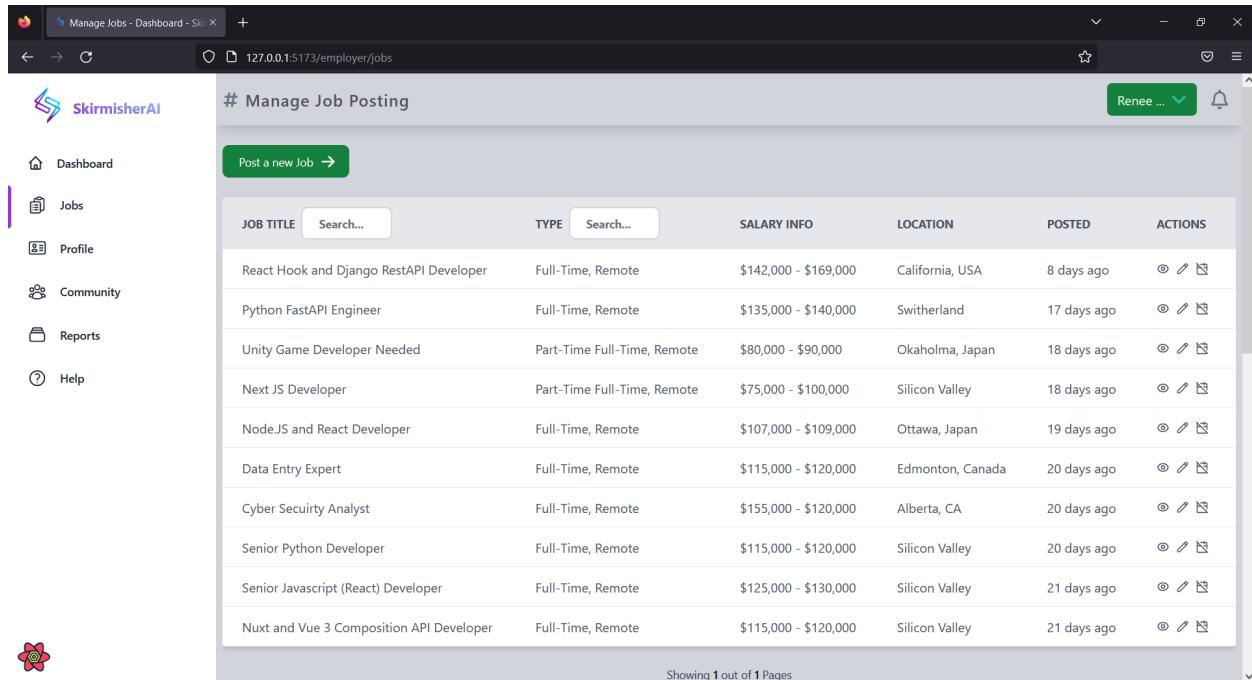


Figure 58: Job Module

The screenshot shows a web application interface for managing job applications. The title bar reads "Job Details - SkirmisherAI" and the URL is "127.0.0.1:5173/employer/jobs/1/view". The main content area is titled "# View Job Details - Applications" and displays a list of candidates for a "React Hook and Django RestAPI Developer" position. The candidates are listed in descending order of applied date. Each candidate entry includes their name, email, skill match percentage (represented by a circular gauge), suitability percentage, applied date, and a "Shortlist" button.

| # | Candidate Name | Email | Skill Match | Suitability | Applied | Action |
|----|-----------------|--------------------|-------------|-------------|---------------------------|-------------|
| #1 | Geralt of Rivia | gerate@mail.com | 25.6% | 30% | 3 days ago 08 Nov 2022 | Shortlist > |
| #2 | Trevor Philips | trevor@gmail.com | 90.1% | 75.77% | 4 days ago 07 Nov 2022 | Shortlist > |
| #3 | Aiden Pearce | aiden@gmail.com | 100% | 70.2% | 5 days ago 06 Nov 2022 | Shortlist > |
| #4 | Elliot Alderson | elliot@gmail.com | 85% | 60.98% | 6 days ago 05 Nov 2022 | Shortlist > |
| #5 | TAKINUR I MAHIM | takinurm@gmail.com | 100% | 92.15% | 7 days ago 04 Nov 2022 | Shortlist > |

Figure 59: Job Application Module

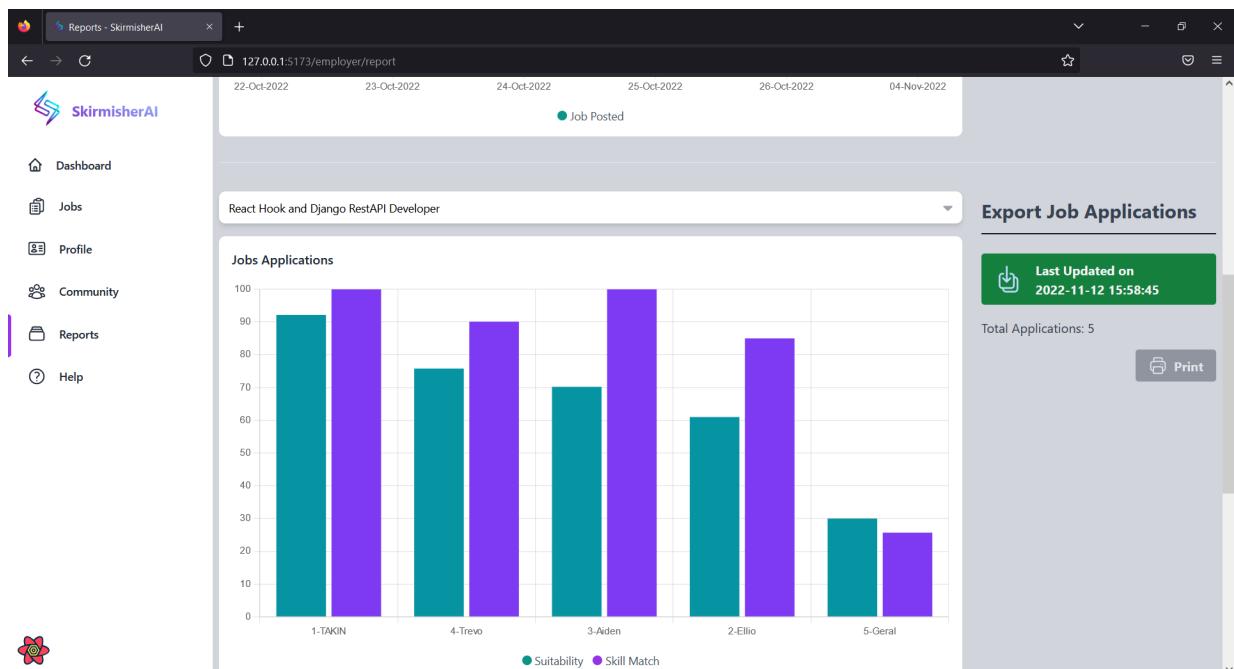


Figure 60: Report Module

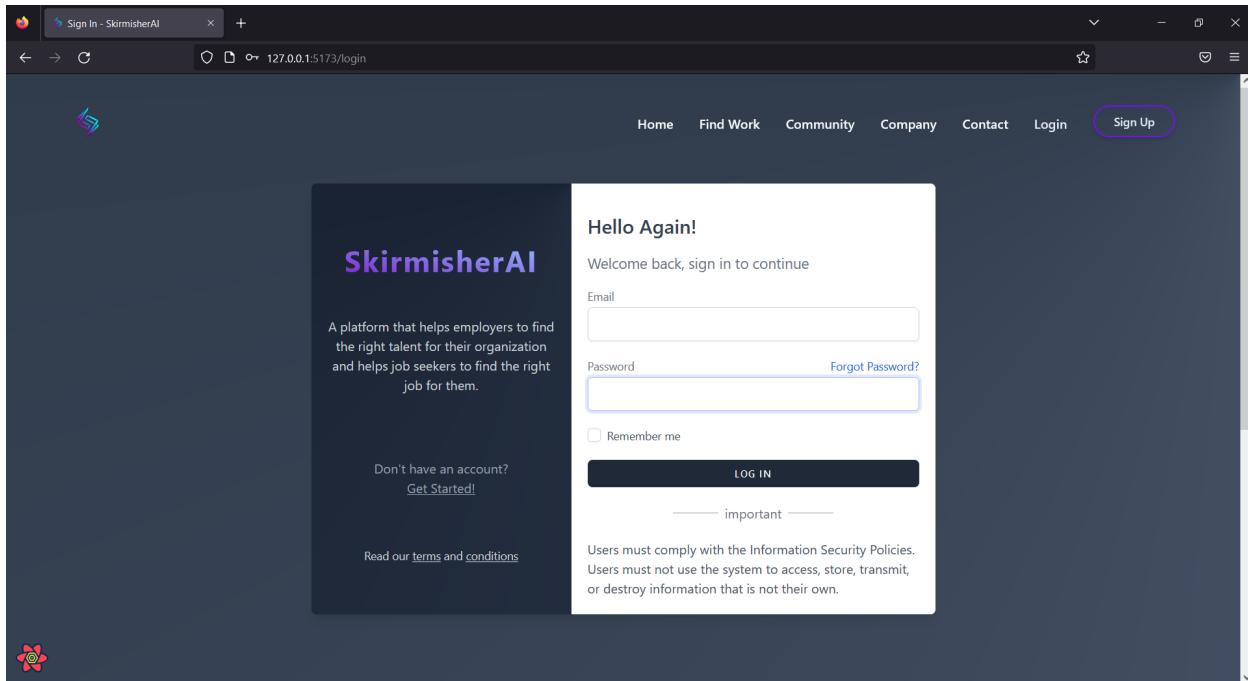


Figure 61: Login Module

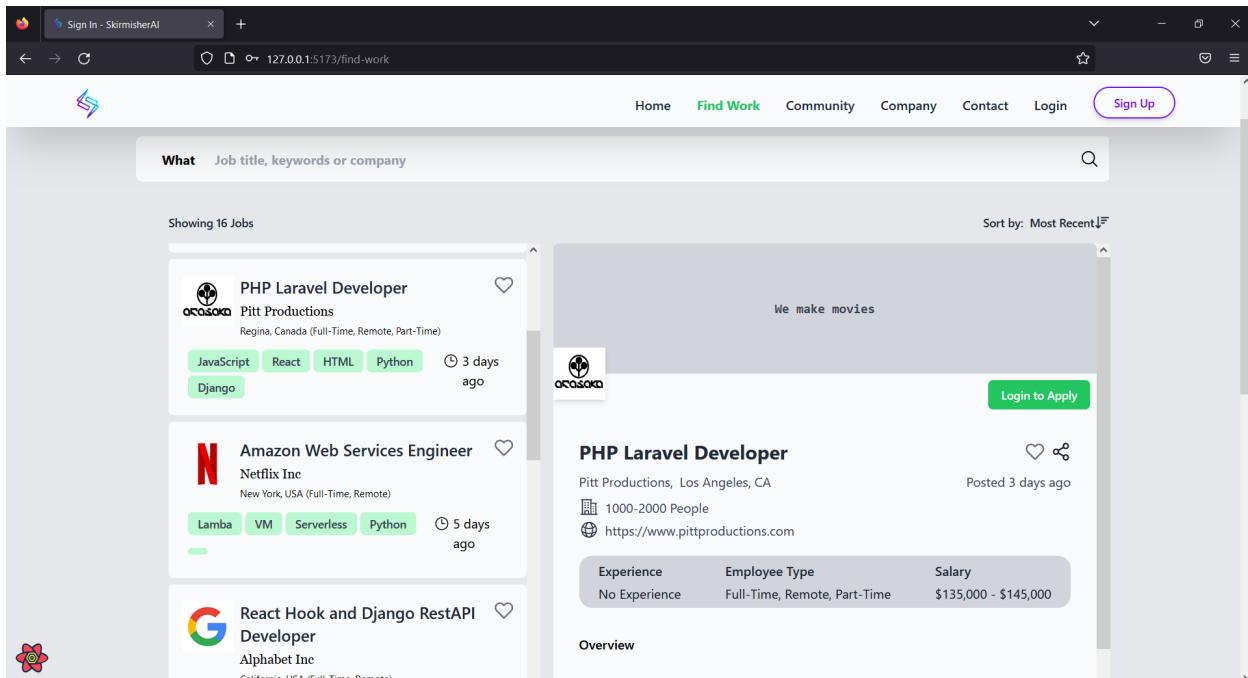


Figure 62: Find Work Module

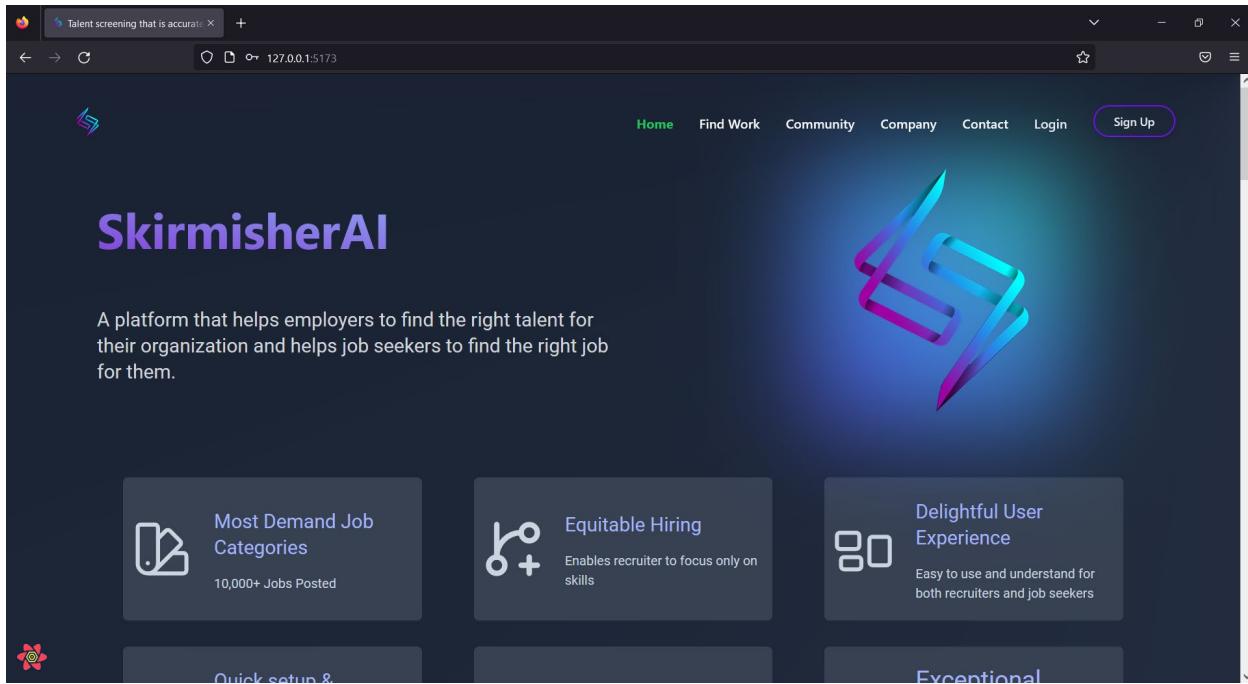


Figure 63: Web Application Landing Page

11.3 Modular breakdown of the timebox

The development of large-scale projects takes a lot of time, and it must be ensured that they are completed on schedule while maintaining a high level of quality. As a result, any project can be divided into various components, which we can refer to as timeboxes, to facilitate a smooth and effective development process. Nevertheless, SkirmisherAI project development process will be divided into **Seven timeboxes** where each timebox will ensure specific deliverables. Furthermore, an adequate list of requirements served as the groundwork for the development of features for the timeboxes. Additionally, it will follow an iterative development approach and constantly incorporate feedback until it reaches a desirable level. Moreover, the features listed below are those that were developed in various timeboxes.

| Timebox | Module |
|-----------|--|
| Timebox 1 | User Module (Admin, Employer, Candidate) |
| Timebox 2 | Find Work, Job Module |
| Timebox 3 | Application Module (Suitability) |
| Timebox 4 | Interview Module (Live Video) |
| Timebox 5 | Report Module (Charts, analysis) |
| Timebox 6 | Community Module |
| Timebox 7 | Help Module, Newsletter Module |

11.4 Breakdown of a potential issue in a complex module \w code

Since the working procedure was so intricately linked to one another, it was not possible to develop the entire feature at once, so most of the features had to be produced iteratively during the development of the solution. **Timebox 3**, which underwent multiple versions and was a very difficult feature to develop, will be addressed in the following section.

11.4.1 Iteration 1:

- Basic requirements for predicting and representing candidate suitability from resume was analyzed.
- Training and testing data for resume screening was generated.
- Multiple models were created for better outcome.
- Model was downloaded to utilize with web server.

```
[ ] # Function to clean resume text
def clean_text(resume_text):
    resume_text = re.sub('http\S+\s*', ' ', resume_text) # remove URLs
    resume_text = re.sub('RT|cc', ' ', resume_text) # remove RT and cc
    resume_text = re.sub('#\S+', '', resume_text) # remove hashtags
    resume_text = re.sub('@\S+', ' ', resume_text) # remove mentions
    resume_text = re.sub('[%s]' % re.escape("""!"#$%&()*,-./;=>?@[\\]^`{|}~"""), ' ', resume_text) # remove punctuations
    resume_text = re.sub(r'[\x00-\x7f]',r' ', resume_text)
    resume_text = re.sub('\s+', ' ', resume_text) # remove extra whitespace
    resume_text = resume_text.lower() # convert to lowercase
    resume_text_tokens = word_tokenize(resume_text) # tokenize
    filtered_text = [w for w in resume_text_tokens if not w in stopwords_set] # remove stopwords
    return ' '.join(filtered_text)

❶ # Print a sample original resume from dataset
print('--- Original resume ---')
print(data_set['Resume'][5])
```

Figure 64: Cleaning Data for Training

```
❶ #creating the neural network model with keras
embedding_dim = 64

model = tf.keras.Sequential([
    # Add an Embedding layer expecting input vocab of size 6000, and output embedding dimension of size 64 we set at the top
    tf.keras.layers.Embedding(vocab_size, embedding_dim, input_length=1),
    tf.keras.layers.Bidirectional(tf.keras.layers.LSTM(embedding_dim)),

    # use ReLU in place of tanh function since they are very good alternatives of each other.
    tf.keras.layers.Dense(embedding_dim, activation='relu'),

    # Add a Dense layer with 25 units and softmax activation for probability distribution
    tf.keras.layers.Dense(25, activation='softmax')
])

model.summary()
```

| Layer (type) | Output Shape | Param # |
|---------------------------------|---------------|---------|
| embedding_1 (Embedding) | (None, 1, 64) | 384000 |
| bidirectional_1 (Bidirectional) | (None, 128) | 66048 |

Figure 65: Developing ML Model

```

# Alternative model
embedding_dim = 64

model = tf.keras.Sequential([
    # Add an Embedding layer expecting input vocab of size 6000, and output embedding dimension of size 64 we set at the top
    tf.keras.layers.Embedding(input_dim=vocab_size, output_dim=embedding_dim, input_length=1),
    #tf.keras.layers.Bidirectional(tf.keras.layers.LSTM(embedding_dim)),
    #tf.keras.layers.Flatten(),
    #tf.keras.layers.GlobalAveragePooling1D(),
    tf.keras.layers.GlobalMaxPooling1D(),

    # use ReLU in place of tanh function since they are very good alternatives of each other.
    tf.keras.layers.Dense(128, activation='relu'),
    # Add a Dense layer with 25 units and softmax activation for probability distribution
    tf.keras.layers.Dense(25, activation='softmax'),
    #tf.keras.layers.Dense(1, activation='sigmoid'),
    #tf.keras.layers.Dense(1)

])
model.summary()

```

| Layer (type) | Output Shape | Param # |
|-------------------------|---------------|---------|
| embedding_4 (Embedding) | (None, 1, 64) | 384000 |

Figure 66: Alternative ML Model

```

# Train the neural network
num_epochs = 12 #Define Blocks for batch file

history = model.fit(train_feature_padded, train_label_sequences, epochs=num_epochs, validation_data=(test_feature_padded, test_label_sequences), verbose=2)

Epoch 1/12
WARNING:tensorflow:Model was constructed with shape (None, 1) for input KerasTensor(type_spec=TensorSpec(shape=(None, 1), dtype=tf.float32, name='embedding_1_input'))
WARNING:tensorflow:Model was constructed with shape (None, 1) for input KerasTensor(type_spec=TensorSpec(shape=(None, 1), dtype=tf.float32, name='embedding_1_input'))
WARNING:tensorflow:Model was constructed with shape (None, 1) for input KerasTensor(type_spec=TensorSpec(shape=(None, 1), dtype=tf.float32, name='embedding_1_input'))
23/23 - 12s - loss: 3.1910 - accuracy: 0.1501 - val_loss: 3.1133 - val_accuracy: 0.2346 - 12s/epoch - 524ms/step
Epoch 2/12
23/23 - 7s - loss: 2.9193 - accuracy: 0.1837 - val_loss: 2.6496 - val_accuracy: 0.1564 - 7s/epoch - 306ms/step
Epoch 3/12
23/23 - 7s - loss: 2.3576 - accuracy: 0.2623 - val_loss: 2.1157 - val_accuracy: 0.3464 - 7s/epoch - 297ms/step
Epoch 4/12
23/23 - 7s - loss: 1.8353 - accuracy: 0.4909 - val_loss: 1.6369 - val_accuracy: 0.5419 - 7s/epoch - 303ms/step
Epoch 5/12
23/23 - 7s - loss: 1.3907 - accuracy: 0.6045 - val_loss: 1.3121 - val_accuracy: 0.6536 - 7s/epoch - 291ms/step
Epoch 6/12
23/23 - 7s - loss: 1.0185 - accuracy: 0.7882 - val_loss: 1.0194 - val_accuracy: 0.7486 - 7s/epoch - 302ms/step
Epoch 7/12
23/23 - 8s - loss: 0.6857 - accuracy: 0.8527 - val_loss: 0.7743 - val_accuracy: 0.8603 - 8s/epoch - 365ms/step
Epoch 8/12
23/23 - 7s - loss: 0.5801 - accuracy: 0.8864 - val_loss: 0.4918 - val_accuracy: 0.9385 - 7s/epoch - 297ms/step
Epoch 9/12
23/23 - 7s - loss: 0.3614 - accuracy: 0.9425 - val_loss: 0.3311 - val_accuracy: 0.9497 - 7s/epoch - 292ms/step
Epoch 10/12
23/23 - 7s - loss: 0.6101 - accuracy: 0.8569 - val_loss: 0.4922 - val_accuracy: 0.9385 - 7s/epoch - 300ms/step
Epoch 11/12

```

Figure 67: Training ML Model

11.4.2 Iteration 2:

- Integrating Model with web application.

```

1 def screenResume(self, text):
2     # Get feature text tokenizer used for model training
3     tokenizer_path = os.path.join(os.path.dirname(
4         __file__), 'assets/tokenizer/feature_tokenizer.pickle')
5     with open(tokenizer_path, 'rb') as handle:
6         feature_tokenizer = pickle.load(handle)
7
8     # Get label encoding dictionary from model training
9     dic_path = os.path.join(os.path.dirname(
10        __file__), 'assets/dictionary/dictionary.pickle')
11    with open(dic_path, 'rb') as handle:
12        encoding_to_label = pickle.load(handle)
13
14    # Handle unknown label case and load original labels
15    encoding_to_label[0] = 'unknown'
16    label_path = os.path.join(os.path.dirname(
17        __file__), 'assets/data/labels.json')
18    with open(label_path, "r") as read_file:
19        original_labels = json.load(read_file)
20
21    cleaned_input = self._clean_resume(text)
22    # Convert user input to padded sequence
23    predict_sequences = feature_tokenizer.texts_to_sequences([
24        cleaned_input])
25    # predict_padded = pad_sequences(predict_sequences, maxlen=self.max_length, padding=self.padding_type, truncating=self.trunc_type)
26    predict_padded = tf.keras.utils.pad_sequences(
27        predict_sequences, maxlen=self.max_length, padding=self.padding_type, truncating=self.trunc_type)
28    predict_padded = np.array(predict_padded)
29
30    # Load model and make prediction
31    model_path = os.path.join(os.path.dirname(__file__), 'assets/model/')
32    model = keras.models.load_model(model_path)
33    prediction = model.predict(predict_padded)
34
35    # Get encodings of top 5 results
36    encodings = np.argpartition(prediction[0], -8)[-8:]
37    encodings = encodings[np.argsort(prediction[0][encodings])]
38    encodings = reversed(encodings)
39
40    data = {}
41    # Send results of top 5 encodings and confidences to output
42    for encoding in encodings:
43        label = encoding_to_label[encoding]
44        probability = prediction[0][encoding] * 100
45        probability = round(probability, 2)
46        data[original_labels[label]] = probability
47
48    return data

```

Figure 68: ML Model Integration

11.4.3 Iteration 3:

- API integration for managing requests to process resume.
- Client application was established to manage user interactions.
- Resume Extraction was deployed for Screening.



```
1 def __extract_text(self, file_path, extension):
2     text = ''
3     if extension == '.pdf':
4         for page in fitz.open(file_path):
5             text = text + str(page.get_text())
6     elif extension == '.docx':
7         try:
8             temp = docx2txt.process(file_path)
9             text = [line.replace('\t', ' ')
10                   for line in temp.split('\n') if line]
11         return '\n'.join(text)
12     except KeyError:
13         return ''
14     elif extension == '.doc':
15         # text = extract_text_from_doc(file_path)
16         text = 'doc file'
17     return text
18
19 def get_extracted_data(self):
20     text = self.__text
21     raw_text = self.__text_raw
22     # print (raw_text)
23     self.__details['name'] = self.__extract_name(text)
24     self.__details['phone'] = self.__extract_mobile_number(text)
25     self.__details['email'] = self.__extract_email(text)
26     self.__details['skills'] = self.__extract_skills(text)
27     self.__details['education'] = self.__extract_education(text)
28     self.__details['social_links'] = self.__extract_social_links(text)
29     # CRUCIAL: Text that is essential for further processing
30     self.__details['text'] = text #EH?:Uncomment this line
31     raw_entity = self.__extract_entity_sections(raw_text)
32     try:
33         self.__details['experience'] = raw_entity['experience']
34         self.__details['projects'] = raw_entity['projects']
35         self.__details['total_experience'] = self.__total_experience_year(
36             raw_entity)
37     except KeyError:
38         pass
39     # if no education section is found, then try to extract education again
40
41
42     return self.__details
```

Figure 69: Resume Extraction Code

```

● ○ ●
1 # Parser Class for resume file
2     ext_data = resumeExtractor.resume_result_wrapper(
3         os.path.join(settings.MEDIA_ROOT, resume))
4 # print(ext_data)
5 try:
6     # Getting data from extracted data
7     text = ext_data['text']
8     name = ext_data['name']
9     email = ext_data['email']
10    phone = ext_data['phone']
11    total_exp = ext_data['total_experience']
12
13    skills = ext_data['skills']
14    edu = set(ext_data['education']) # Convert to unique set
15    experiences = ext_data['experience']
16    social = set(ext_data['social_links'])
17    projects = set(ext_data['projects'])
18
19    # Format Experience
20    exp = {}
21    if experiences is not None:
22        exp['name'] = experiences[0]
23        exp['total'] = total_exp
24
25    # print('SOC', projects)
26    # print('Suppose to be', type(skills), 'But became:', type(socili))
27
28    # Add resume data to serializer data and save
29
30    serializer.save.skills=skills, name=name, email=email, phone=phone,
31             resume_raw_text=text, edu=edu, exp=exp, social=social, projects=projects)

```

Figure 70: API Views for Resume Extraction

11.4.4 Iteration 4:

- Wired-up with API for handling request to resume screening.
- Implemented Async feature to perform task at background.
- Calculate suitability and skill match scores.



```
1 class JobApplicationView(viewsets.ModelViewSet):
2     # permission_classes = [permissions.IsAuthenticated]
3     serializer_class = JobApplicationSerializer
4     queryset = JobApplication.objects.order_by('-created_at')
5
6     def get_object(self, cand_id=None):
7         ...
8             Helper method to get object by id
9             ...
10            try:
11                return JobApplication.objects.filter(candidate_id=cand_id).order_by('-created_at')
12            except JobApplication.DoesNotExist:
13                return None
14
15    def get_queryset(self):
16        cand_id = self.request.query_params.get('cand_id', None)
17
18        applications = self.get_object(cand_id)
19        if applications is not None:
20            return applications
21            # return Response(serializer.data, status=status.HTTP_200_OK)
22
23        return JobApplication.objects.order_by('-created_at')
24
25    def perform_create(self, serializer):
26
27        saved = serializer.save()
28        # Update Suitability Score
29        async_task("base.tasks.update_score", saved.id)
30
31        # Return first then call task
32
33        return saved
```

Figure 71: API view for Resume Screening

```
● ○ ● ●
1  from django_q.tasks import async_task
2
3  from base.models import JobApplication
4
5  from django.utils import timezone
6
7  # Machine Learning Model from
8  from .ml_facade import resumeScreener
9
10
11 def calculate_score(profile, vacancy):
12     """
13         Helper Method to Calculate score
14     ...
15
16     # Required Skills and format
17     req_skills = (vacancy.qualifications or "").split(',')
18     req_skills = [skill.lower().replace(' ', '') for skill in req_skills]
19
20     # Collect Candidate skills and format them
21     cand_skills = profile.skills.all().values_list('name', flat=True)
22     cand_skills = [skill.lower() for skill in cand_skills]
23
24     # Check how many skills match
25     matched_skills = set(req_skills).intersection(cand_skills)
26
27     # Calculate percentage of matched skills
28     skill_score = (len(matched_skills) / len(req_skills)) * 100
29
30     # Raw text and Job Title
31     text = profile.resume_raw_text
32     label = vacancy.title
33     # Call NLP Model to get score
34     nlp_score = resumeScreener.wrapper(text, label)
35
36     # Calculate final score
37     final_score = 0
38
39     # Skill Score weightage 40% of total score
40     final_score += (skill_score * 0.4)
41     # NLP Score weightage 60% of total score
42     final_score += (nlp_score * 0.6)
43
44     # Update score in job application
45
46     return final_score, skill_score, nlp_score
47
```

Figure 72: Suitability and Skill match Asynchronously

11.5 Potential Alternative Approaches

According to the "adequate design upfront" philosophy of the DSDM framework (Tudor, 2010), when developing a complicated feature, it may go through numerous iteration phases. Additionally, by iterating and receiving continual input, this approach starts with a simple design and gradually improves it as it goes. The waterfall method is a potential alternate approach that might be used. In this procedure, before beginning the development phase, the system's comprehensive design would be completed which could have been completed in a single step. As a result, risk of losing the ability to adapt to any change persisted. In conclusion, this is the reason why the agile methodology was used to develop the feature in an iterative manner, starting with a small unit and gradually working up to a larger feature.

12. Testing

Software must be tested to make sure it is functioning properly after development. The results of testing will aid the developers in figuring out what problems and failures the system is presenting. Additionally, software testing is crucial to identifying security flaws and vulnerabilities in the system that can harm the solution. A few of the most significant tests that the application underwent are listed in the parts that follow, together with test results, test scenarios, and test screenshots.

12.1 Test Case

| Test No. | Test Name | Test Criteria |
|-----------------|-------------------------|--|
| 1 | Unit Test | User Registration Form Validation. |
| | | Candidate Profile Form Validation. |
| 2 | Module Test | Job Post Detail Requesting. |
| | | Application Lists with suitability by ML. |
| 3 | Integration Test | Publish new Community Post. |
| | | Contact with administrator attempt. |
| 4 | Acceptance Test | Reports can be generated for specific job. |
| | | Posted jobs report can be exported to CSV. |

| | | |
|---|---------------------------|--|
| 5 | Performance Test | Sending authorization request from client app. |
| | | Home Page Load Speed and Insights. |
| 6 | Security Test | Stored Password should be encrypted. |
| | | Role based access control. |
| 7 | Usability Test | Site navigation bar. |
| | | Action and information messages. |
| 8 | Compatibility Test | Various browser compatibility. |
| | | Cross Platform Support. |

12.2 Test Execution

12.2.1 Unit Testing

| Test Case ID | | UT_01 | | | Test Type | Unit | |
|------------------------------|---|---------------------------------------|-------------------------------|-------------------------------|-------------------------|---------|---|
| Description | | User Registration Process Testcase | | | Test Priority | High | |
| Pre-requisite | | A Valid Email Address | | | Tester | Tm0457m | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Every field of User registration form is empty. | No Inputs | Required fields error Message | First Empty field is Required | Windows (Google Chrome) | Pass | Valid Email and required field must be filled |

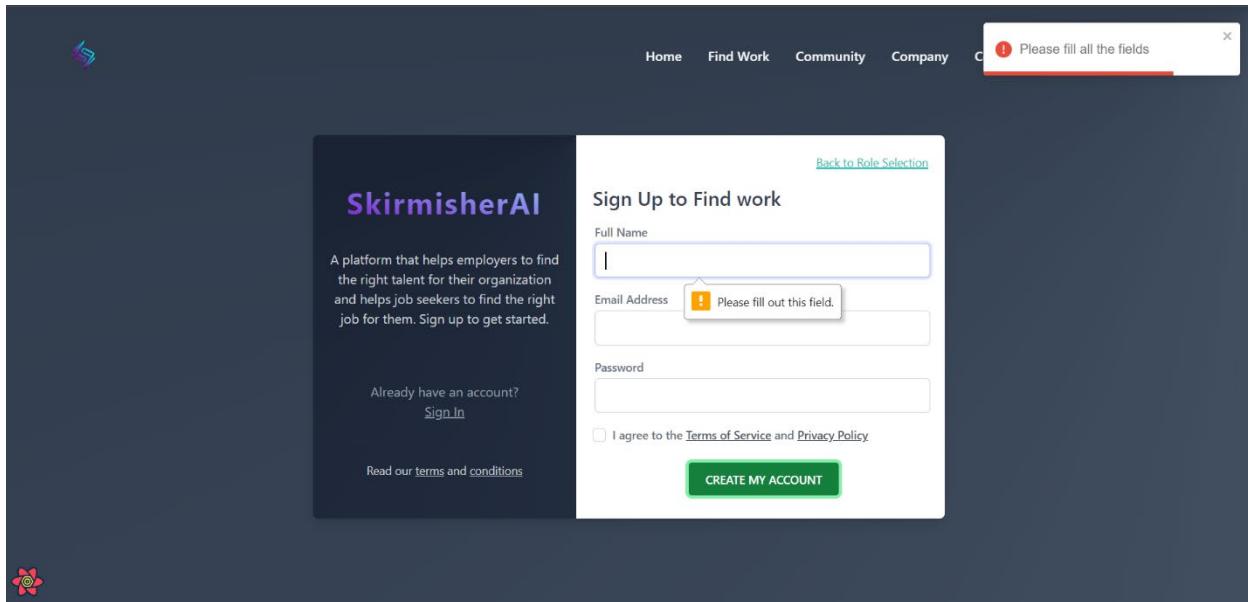


Figure 73: UT-01 Validation Error

| Test Case ID | UT_02 | | | Test Type | Unit | | |
|------------------------------|------------------------------------|-----------------------------|--------------------------------|-----------------------------|-------------------------|--------|---|
| Description | Candidate Profile Setup | | | Test Priority | High | | |
| Pre-requisite | Logged in User | | | Tester | Tm0457m | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Upload resume and submit the form. | Resume file that is not PDF | Only PDF allowed error Message | Please Upload PDF File Only | Windows (Google Chrome) | Pass | PDF formatted resume should be uploaded |

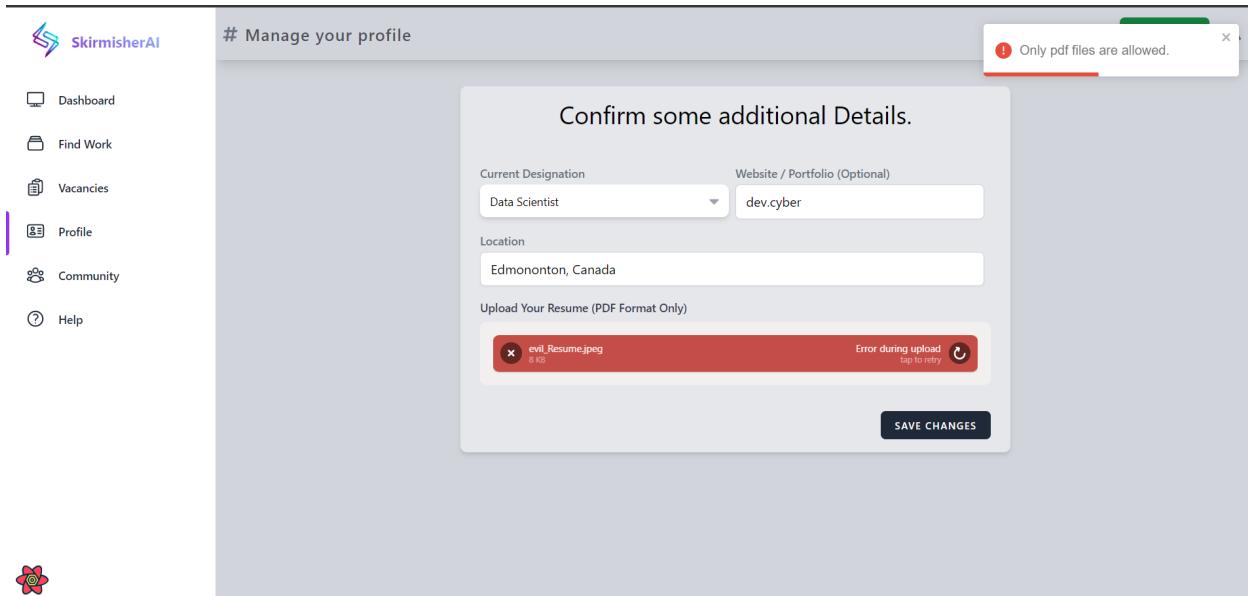


Figure 74: UT02 Resume Format Error

12.2.2 Module Testing

| Test Case ID | | MT_01 | | Test Type | | Module | |
|------------------------------|--|----------------------------|---|----------------------------------|-------------------------|---------|--------------------------------------|
| Description | | Job Post Detail Requesting | | Test Priority | | High | |
| Pre-requisite | | N/A | | Tester | | Tm0457m | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Go to Find Work page from navigation bar | N/A | Available Job List with first Job Details | Jobs List with first job Details | Windows (Google Chrome) | Pass | Successfully retrieved all job list. |

Figure 75: MT01 Available Jobs

| Test Case ID | | MT_02 | | Test Type | | Module | |
|-----------------------|---|-------------------------------------|---|--|-------------------------|---------|--|
| Description | | Job Application List | | Test Priority | | High | |
| Pre-requisite | | Logged in User as Employer or Admin | | Tester | | Tm0457m | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Click on vacancies from left side bar and click view of specific job. | N/A | Job applications with Suitability and Skill match Score | List of job applications with suitability and Skill match percentage | Windows (Google Chrome) | Pass | Successfully retrieved all job application for a specific job. |

The screenshot shows the SkirmisherAI application interface. On the left, there's a sidebar with icons for Dashboard, Jobs, Profile, Community, Reports, and Help. The main area is titled '# View Job Details - Applications' for a 'React Hook and Django RestAPI Developer' job. It lists four candidates:

| # | Candidate Name | Email | Skill Match | Suitability | Applied | Action |
|----|-----------------|--------------------|-------------|-------------|---------------------------|---------------------------|
| #1 | TAKINUR I MAHIM | takinurm@gmail.com | 100% | 92.15% | 7 days ago 04 Nov 2022 | Shortlist |
| #2 | Trevor Philips | trevor@gmail.com | 98.1% | 75.77% | 4 days ago 07 Nov 2022 | Shortlist |
| #3 | Aiden Pearce | aiden@gmail.com | 100% | 70.2% | 5 days ago 06 Nov 2022 | Shortlist |
| #4 | Elliot Alderson | elliot@gmail.com | 85% | 60.98% | 6 days ago 05 Nov 2022 | Shortlist |
| #5 | Geralt of Rivia | gerate@dmall.com | 5% | 30% | 3 days ago | Shortlist |

Figure 76: MT02 Application per Job

12.2.3 Integration Testing

| Test Case ID | | IT_01 | | | Test Type | Integration | |
|------------------------------|-------------------------------------|----------------------------|-----------------|-----------------------------|-------------------------|-------------|--------------------------|
| Description | | Publish New community Post | | | Test Priority | High | |
| Pre-requisite | | Logged in User | | | Tester | Tm0457m | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | ~ Add post title ~ Add post tags | Add readable title | Post published | Post published Successfully | Windows (Google Chrome) | Pass | Community post published |

| | | | | | | | |
|--|------------------------|----------------------|--|--|--|--|--|
| | ~Write Detailed post | Insert relevant rags | | | | | successfully and can be read from community section. |
| | ~Hit the submit button | Add the actual post | | | | | |

The screenshot shows the SkirmisherAI platform's user interface for publishing a new community post. On the left, there is a sidebar with navigation links: Dashboard, Jobs, Profile, Community (which is currently selected and highlighted with a purple vertical bar), Reports, and Help. The main content area has a header '# Publish New Community Post' and a 'GO BACK' button. Below this, there are three input fields: 'General Information' (with placeholder text about adding a title and description), 'Title' (containing 'Meta Planning to Freeze Hiring for their Company'), and 'Tags' (containing 'meta,facebook,recruiting,work'). There is also a 'Description' field containing a paragraph about Meta's hiring freeze. At the bottom right of the form is a 'UPDATE POST' button.

Figure 77: IT01 Publishing New Post

The screenshot shows the SkirmisherAI platform's 'Manage Community Posting' section. On the left is a sidebar with icons and labels: Dashboard, Jobs, Profile, Community (which is selected and highlighted in purple), Reports, and Help. The main area has a purple header bar with the text 'See what's happening in your community!' and a green button 'Publish a new Community Post →'. Below this is a table with three columns: POST TITLE, SUMMARY, and URL. The table contains three rows of data:

| POST TITLE | SUMMARY | URL |
|--|---|--|
| Meta Planning to Freeze Hiring for their Company | Meta Platforms Inc. Chief Executive Officer Mark Z... | meta-planning-to-freeze-hiring-for-their-company |
| Why Tech Jobs are Better than Other Jobs | Tech jobs are better than other jobs. There are ma... | tech-jobs-supremacy |
| Tech companies that are hiring right now | The tech industry is booming and there are many te... | tech-companies-that-are-hiring-right-now |

At the bottom, it says 'Showing 1 out of 1 Pages' with navigation buttons for 'Prev' and 'Next'.

Figure 78: IT01 Published Posts

| Test Case ID | | IT_02 | | Test Type | Integration | | |
|------------------------------|--|---|-----------------------------------|-----------------------------------|-------------------------|--------|--|
| Description | | Contact with administrators | | Test Priority | High | | |
| Pre-requisite | | Valid Email Address | | Tester | Tm0457m | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | ~Go to help page from the navigation. ~Click on contact for further assistance. | Full Name, Email Address, Subject, Message | Contact Message successfully sent | Contact Message successfully sent | Windows (Google Chrome) | Pass | Message is stored to system and can be read from administrator dashboard |

| | | | | | | | |
|--|----------------------------|--|--|--|--|--|--|
| | ~ Fill the form and submit | | | | | | |
|--|----------------------------|--|--|--|--|--|--|

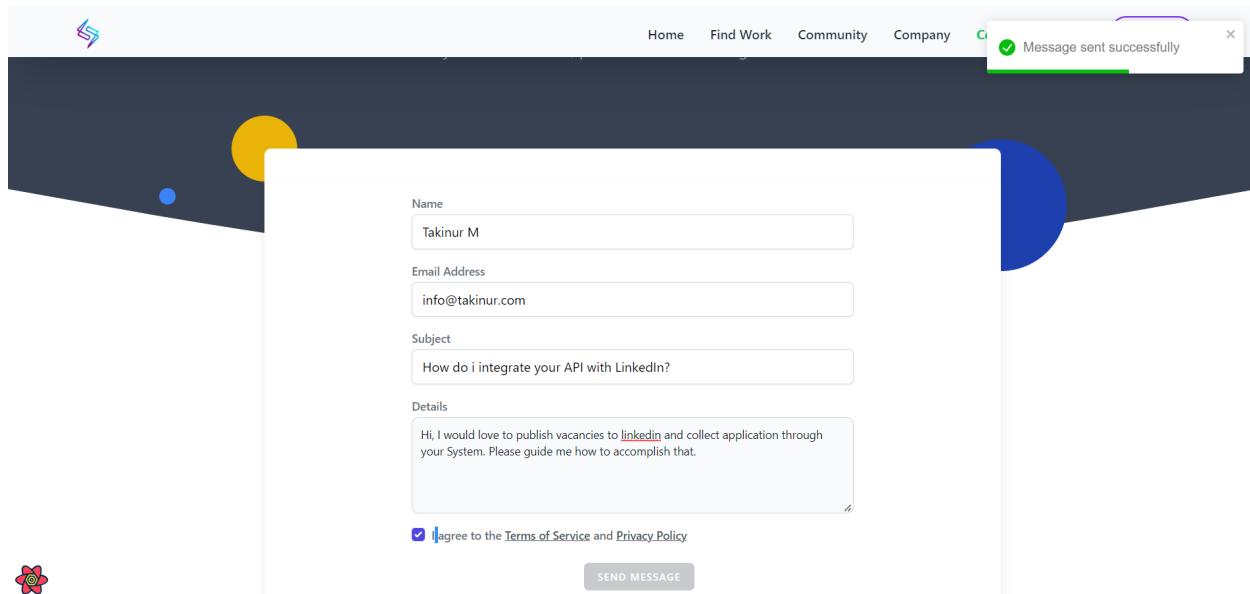


Figure 79: IT02 Sending Contact Message

| Name | Email | Subject | Message | Created at |
|---------------|------------------------|--|--|---------------------------|
| Takinur M | info@takinur.com | How do i integrate your API with LinkedIn? | Hi, I would love to publish vacancies to linkedin and collect application through your System. Please guide me how to accomplish that. | Nov. 12, 2022, 10:55 a.m. |
| Abel Bruce | zima@mailinator.com | Quod ea recusandae | Dolores aut iusto do | Nov. 11, 2022, 1:26 p.m. |
| Sydney Ochoa | fosyz@mailinator.com | Found a Bug | I found a bug on your website. Please fix it. | Oct. 19, 2022, 1:25 p.m. |
| Maile Coleman | gyrejel@mailinator.com | I want to work with you | Hey, I am loooking for a job. Can you help me? | Oct. 15, 2022, 1:23 p.m. |

Figure 80: IT02 Message Received

12.2.4 Acceptance Testing

| Test Case ID | | AT_01 | | | Test Type | Acceptance | |
|------------------------------|---|----------------------------------|--|---|-------------------------|------------|---|
| Description | | Generate Report for Specific Job | | | Test Priority | High | |
| Pre-requisite | | Logged in User as Employer | | | Tester | Tm0457m | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | <ul style="list-style-type: none"> ~ Go to reports page from the left side menu ~ Navigate to Job Applications Report ~ Select a Job from dropdown | N/A | <p>Job application report will be generated in chart</p> | <p>Chart of job applications with download button</p> | Windows (Google Chrome) | Pass | <p>All the applications were added to the report which can be downloaded.</p> |



Figure 81: AT01 Report for Specific Job

| Test Case ID | AT_02 | | | Test Type | Acceptance | | |
|------------------------------|---|--------|--|--|-------------------------|--------|---|
| Description | Export Posted Job Report to CSV | | | Test Priority | High | | |
| Pre-requisite | Logged in User as Employer | | | Tester | Tm0457m | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | ~ Go to reports page from the left side menu ~Navigate to Posted | N/A | Posted Job report will be downloaded in CSV Format | Posted Job report downloaded in CSV Format | Windows (Google Chrome) | Pass | Every posted job is downloaded as CSV format. |

| | | | | | | | | |
|--|---|--|--|--|--|--|--|--|
| | Job Reports ~Click Export or download button on right-side | | | | | | | |
|--|---|--|--|--|--|--|--|--|

| J12 | A | B | C | D | E | F | G | H | I | J | K |
|-----|-------------------------------|-------------------|--------------|-------------|----------|-------------------|-------------------|-------------------|---------------|---|---|
| 1 | Job Title | Candidate Name | Skills Match | Suitability | Applied | Candidate Title | Email | Location | Phone | | |
| 2 | React Hook and Django RestAPI | TAKINUR I MAHIM | 100 | 92.15 | 04-11-22 | Web Developer | takinurm@gmail.co | Greenwich, London | 075 1234 5678 | | |
| 3 | React Hook and Django RestAPI | D Trevor Philips | 90.1 | 75.77 | 07-11-22 | Student | trevor@gmail.com | Edmonton, Canada | 1232 123 123 | | |
| 4 | React Hook and Django RestAPI | D Aiden Pearce | 100 | 70.2 | 06-11-22 | Python Developer | aiden@gmail.com | United Kingdom | | | |
| 5 | React Hook and Django RestAPI | D Elliot Alderson | 85 | 60.98 | 05-11-22 | DevOPS Engineer | elliott@gmail.com | Toronto, Canada | | | |
| 6 | React Hook and Django RestAPI | D Geralt of Rivia | 25.69 | 30 | 08-11-22 | Security Engineer | gerate@dmail.com | Alberta, Canada | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
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| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 17 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 19 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |

Figure 82: AT02 Exported CSV Data

12.2.5 Performance Testing

| | | | | | | | |
|------------------------------|-------------------------------------|---------------|-----------------|---------------|--------|--------|---------|
| Test Case ID | PT_01 | Test Type | Performance | | | | |
| Description | Sending Request from client app. | Test Priority | High | | | | |
| Pre-requisite | Both Server and Client App Running. | Tester | Tm0457m | | | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |

| | | | | | | | |
|---|---------------------------------|-------------------------|--|--|-------------------------|------|--|
| 1 | Send Login request from browser | User Email and Password | User logged in and auth tokens are stored in local storage | User logged in and auth tokens are stored in local storage | Windows (Google Chrome) | Pass | User logged in successfully and essential info stored locally. |
|---|---------------------------------|-------------------------|--|--|-------------------------|------|--|

The screenshot shows a web browser window. At the top, there's a navigation bar with links for Home, Find Work, Community (which is highlighted in green), Company, and Contact. A purple button on the right says "Howdy, Renee". Below the navigation, the date "12 November 2022" is visible. The main content area displays a news article titled "Meta Planning to Freeze Hiring for their Company" with sub-headings "META FACEBOOK RECRUITING WORK". Below the article, a snippet reads: "Meta Platforms Inc. Chief Executive Officer Mark Zuckerberg outlined sweeping plans to reorganize teams and reduce headcount for the first time ever, calling an end to an era of rapid growth at the so...". A "Read more →" link is present. At the bottom of the screenshot, the developer tools' Application tab is open, showing the Local Storage section. It lists items like "Manifest", "Service Workers", and "Storage". Under "Storage", there's an entry for "http://127.0.0.1:5173" which contains two items: "access" and "refresh", both represented by long JSON strings.

Figure 83: PT01 Authentication Tokens at Client-side

| Test Case ID | PT_02 | | | Test Type | Performance | | |
|------------------------------|------------------------------|--------|-----------------|----------------------|-------------|--------|---------|
| Description | Page Insights and Load Speed | | | Test Priority | High | | |
| Pre-requisite | Chrome Browser | | | Tester | Tm0457m | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |

| | | | | | | | |
|---|---|-----|--|--|-------------------------|------|---|
| 1 | Chrome Dev Tool lighthouse feature to check the web application | N/A | Performance, Accessibility, Best practices and SEO Score | Performance, Accessibility, Best practices and SEO Score | Windows (Google Chrome) | Pass | Performance Should be improved upon removing unused JS Codes. |
|---|---|-----|--|--|-------------------------|------|---|

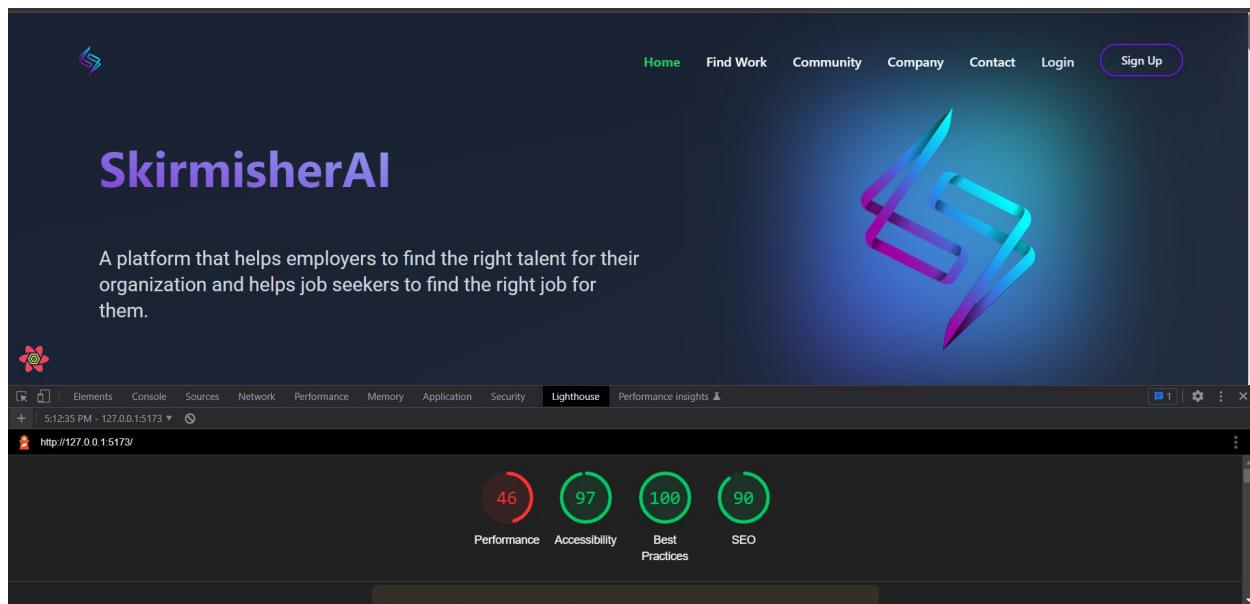


Figure 84: PT02 Performance overview

12.2.6 Security Testing

| | | | |
|------------------------------|---------------------------------|----------------------|----------|
| Test Case ID | ST_01 | Test Type | Security |
| Description | Testing for password encryption | Test Priority | High |
| Pre-requisite | Database Engine | Tester | Tm0457m |
| Test execution Steps: | | | |

| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
|-----|--|-------------------------|--------------------|--------------------|-------------------------|--------|---|
| 1 | Create new user with a strong password | User Email and Password | Encrypted Password | Encrypted Password | Windows (Google Chrome) | Pass | The password stored in system is encrypted. |

Query Query History Scratch Pad

```

1 SELECT * FROM public.base_useraccount
2 ORDER BY id DESC LIMIT 100
3

```

Data output Messages Notifications

| | id [PK] bigint | password character varying (128) | last_login timestamp with time zone |
|----|--------------------------|---|---|
| 1 | 31 | pbkdf2_sha256\$390000\$DgKXKM8aHeNdW6I9qlh45C\$Xtc/2V+Efl1046incJ/6lOs6el/ZHzdqEYGv9ApX... | [null] |
| 2 | 30 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 3 | 29 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 4 | 28 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 5 | 27 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 6 | 26 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 7 | 25 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 8 | 24 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 9 | 23 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 10 | 22 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 11 | 21 | pbkdf2_sha256\$390000\$wYiT7btxiPBBgwDta9EY7U\$ZXM9iLI+F5r4tuhvkEqD4AIMVUFwilmQ00H76wrql... | [null] |
| 12 | 16 | pbkdf2_sha256\$390000\$y5MJ8i4GOnbqS35Poz2ifA\$1jA2yW7RFgh4rrBtB+DOD/KRICMcK68Sz8qGBUk... | [null] |
| 13 | 15 | pbkdf2_sha256\$390000\$y5MJ8i4GOnbqS35Poz2ifA\$1jA2yW7RFgh4rrBtB+DOD/KRICMcK68Sz8qGBUk... | [null] |

Figure 85: ST01 Stored Passwords are Encrypted

| Test Case ID | | ST_02 | | Test Type | Security | | |
|------------------------------|--|--------------------|---|---|-------------------------|---------|--|
| Description | | Role based access. | | | Test Priority | High | |
| Pre-requisite | | Logged In user. | | | Tester | Tm0457m | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Explicitly type different user's dashboard URL | N/A | Error page with message permission denied | Error page with message permission denied | Windows (Google Chrome) | Pass | User cannot access other type of user's pages. |

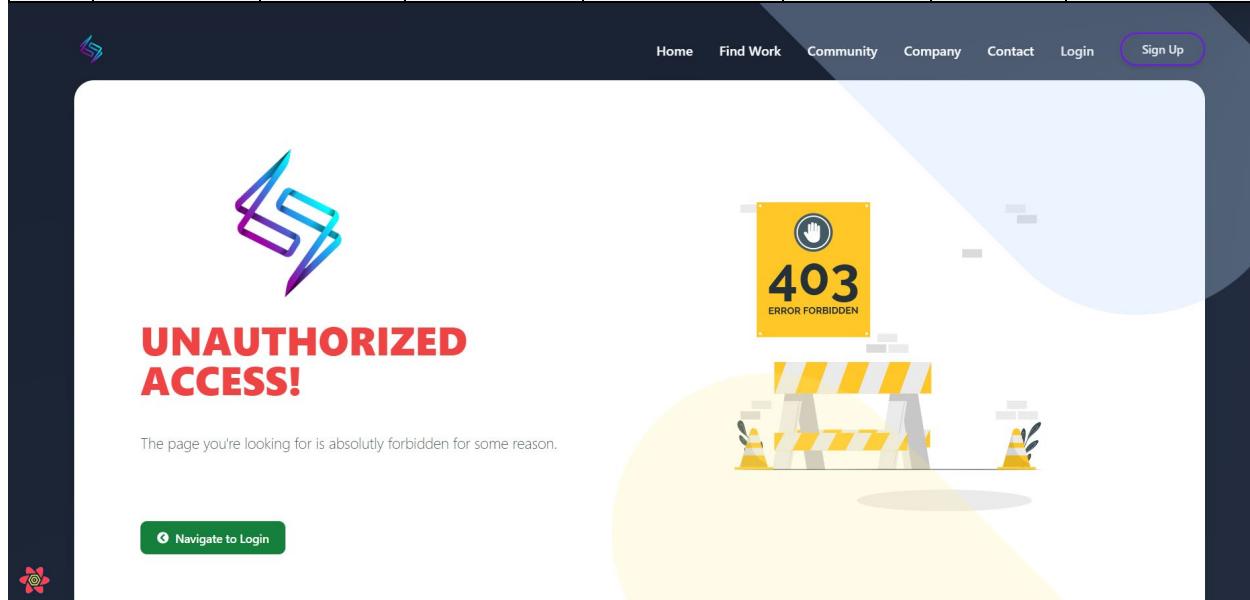


Figure 86: ST02 User Access Denied

12.2.7 Usability Testing

| Test Case ID | | UST_01 | | Test Type | Usability | | |
|------------------------------|-----------------------------------|----------------|---|-----------------------------------|-------------------------|--------|--|
| Description | | Navigation Bar | | Test Priority | High | | |
| Pre-requisite | | N/A | | Tester | Tm0457m | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Navigate to pages clicking labels | N/A | Active Page will be highlighted at navbar | Active Page highlighted at navbar | Windows (Google Chrome) | Pass | Easily navigate throughout pages with current page indicator |

The screenshot shows the top navigation bar of the SkirmisherAI website. The bar is dark blue with white text. From left to right, it includes a logo (a stylized 'S' icon), 'Home', 'Find Work', 'Community' (which is highlighted in green), 'Company', 'Contact', 'Login', and a 'Sign Up' button. Below the main content area, there is a section titled 'Latest Community Posts' with a sub-section 'Engage and Explore our Community'.

Figure 87: UST01 Website Main Navbar

The screenshot shows the left sidebar of the SkirmisherAI dashboard. The sidebar has a light gray background with purple vertical highlights on the 'Profile' and 'Community' items. At the top, there's a 'Manage your profile' header with a dropdown for 'Renee ...' and a bell icon. Below this, there are three summary cards: '2 Job Posted', '5 Community Posts', and '1 Comments'. At the bottom, there's a profile card for 'Renee Blasey' with her name, a small 'ALPHABET INC' logo, and the address 'Mountainview CA 94043'.

Figure 88: UST01 Dashboard Sidebar

| Test Case ID | | UST_02 | | Test Type | | Usability | |
|------------------------------|--|----------------------------------|---|---|-------------------------|-----------|--|
| Description | | Action and information messages. | | Test Priority | | High | |
| Pre-requisite | | Logged In user as Employer | | Tester | | Tm0457m | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Try to post new vacancy without setting up profile | N/A | Action message warning that profile set-up is necessary | Action message warning that profile set-up is necessary | Windows (Google Chrome) | Pass | Employer cannot post job, should set up profile firstly. |

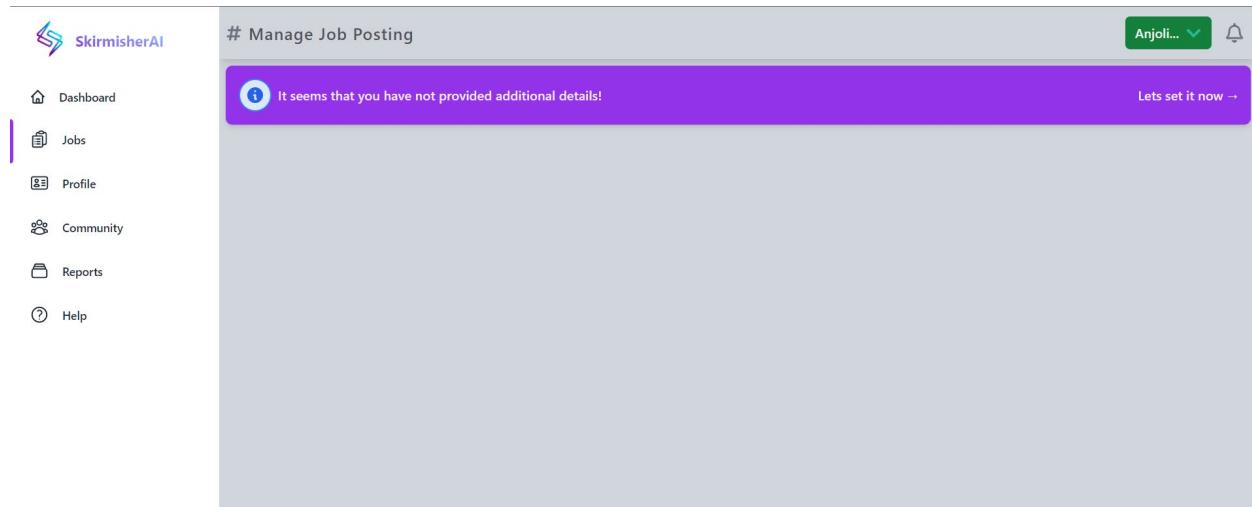


Figure 89: Incomplete Profile Warning

12.2.8 Compatibility Testing

| Test Case ID | | CT_01 | | Test Type | Compatibility | | |
|------------------------------|-----------------------------------|-----------------------|-----------------------------------|---------------|---------------|--------|------------------------------------|
| Description | | Browser Compatibility | | Test Priority | High | | |
| Pre-requisite | | Various Browsers | | Tester | Tm0457m | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Run web app in different browsers | N/A | Should work fine in every browser | As Expected | Windows | Pass | Successfully run on every browser. |

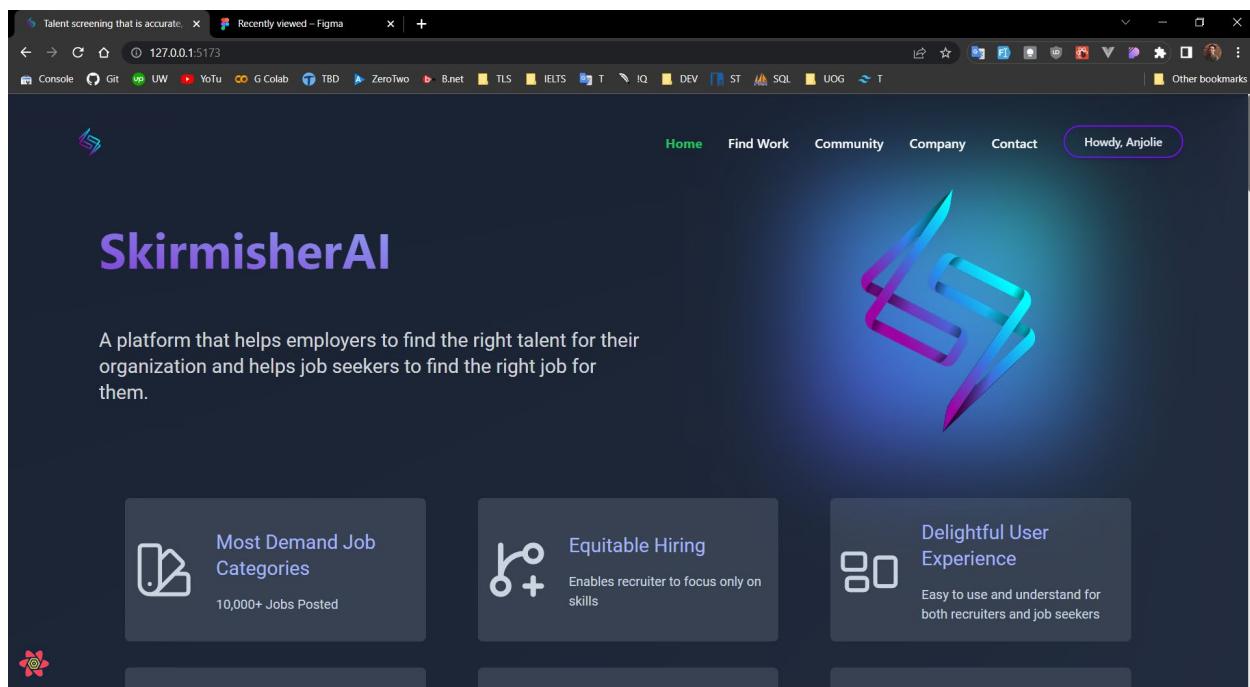


Figure 90: CT01 Google Chrome

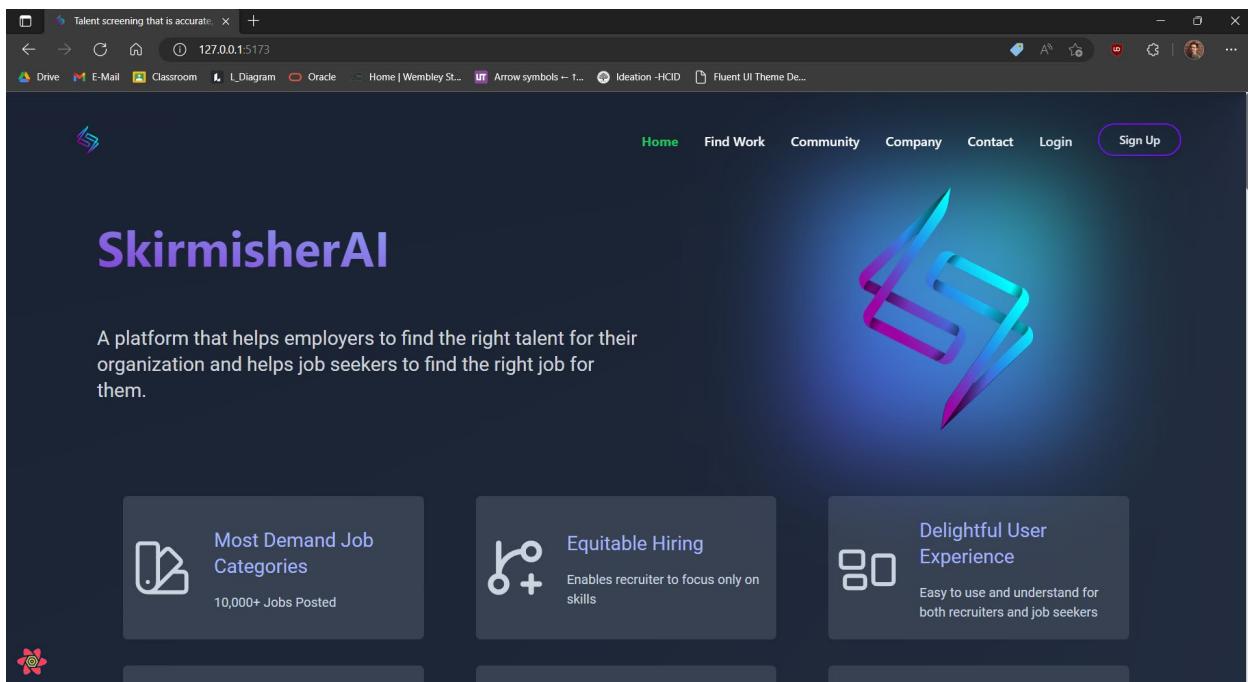


Figure 91: CT01 Microsoft Edge

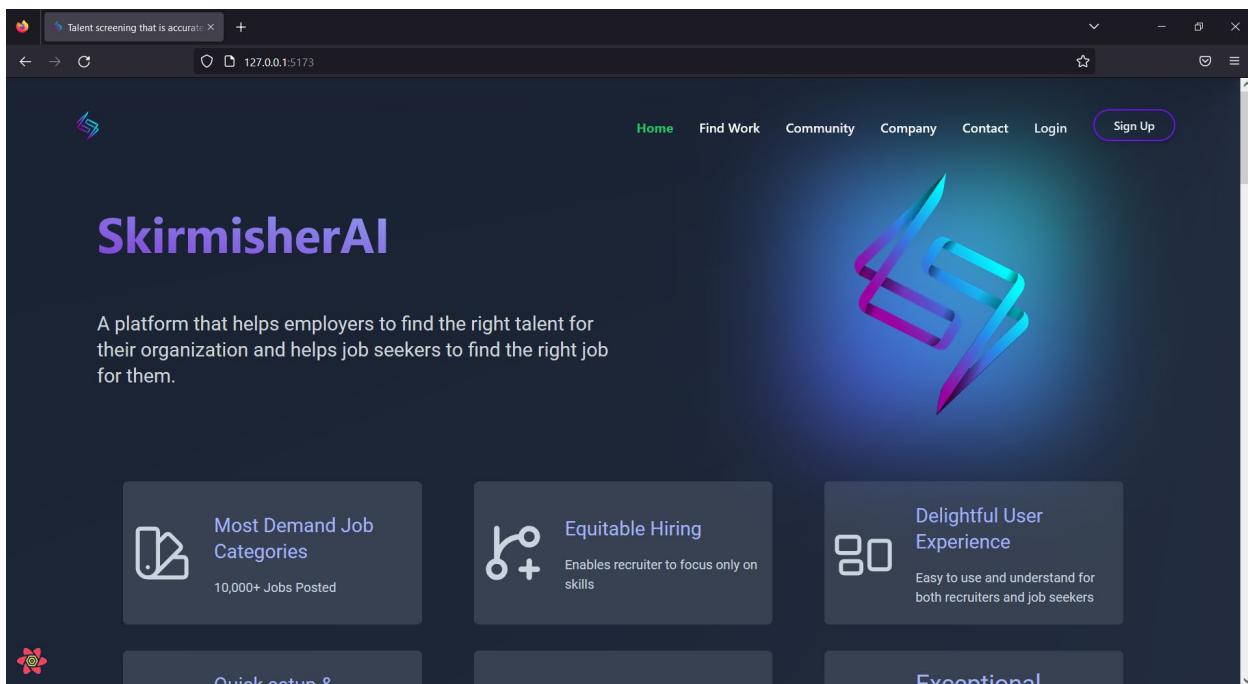


Figure 92: CT01 Mozilla Firefox

| Test Case ID | CT_02 | | | Test Type | Compatibility | | |
|------------------------------|---|--------|------------------------------|----------------------|--|--------|---|
| Description | Cross Platform Support | | | Test Priority | High | | |
| Pre-requisite | Different OS System | | | Tester | Tm0457m | | |
| Test execution Steps: | | | | | | | |
| No. | Action | Inputs | Expected Output | Actual Output | Device | Result | Comment |
| 1 | Run progressive Web app in various operating system | N/A | Should work fine in every OS | As expected | Windows Linux Android IOS Mac OS | Pass | Successfully run on every operating system. |

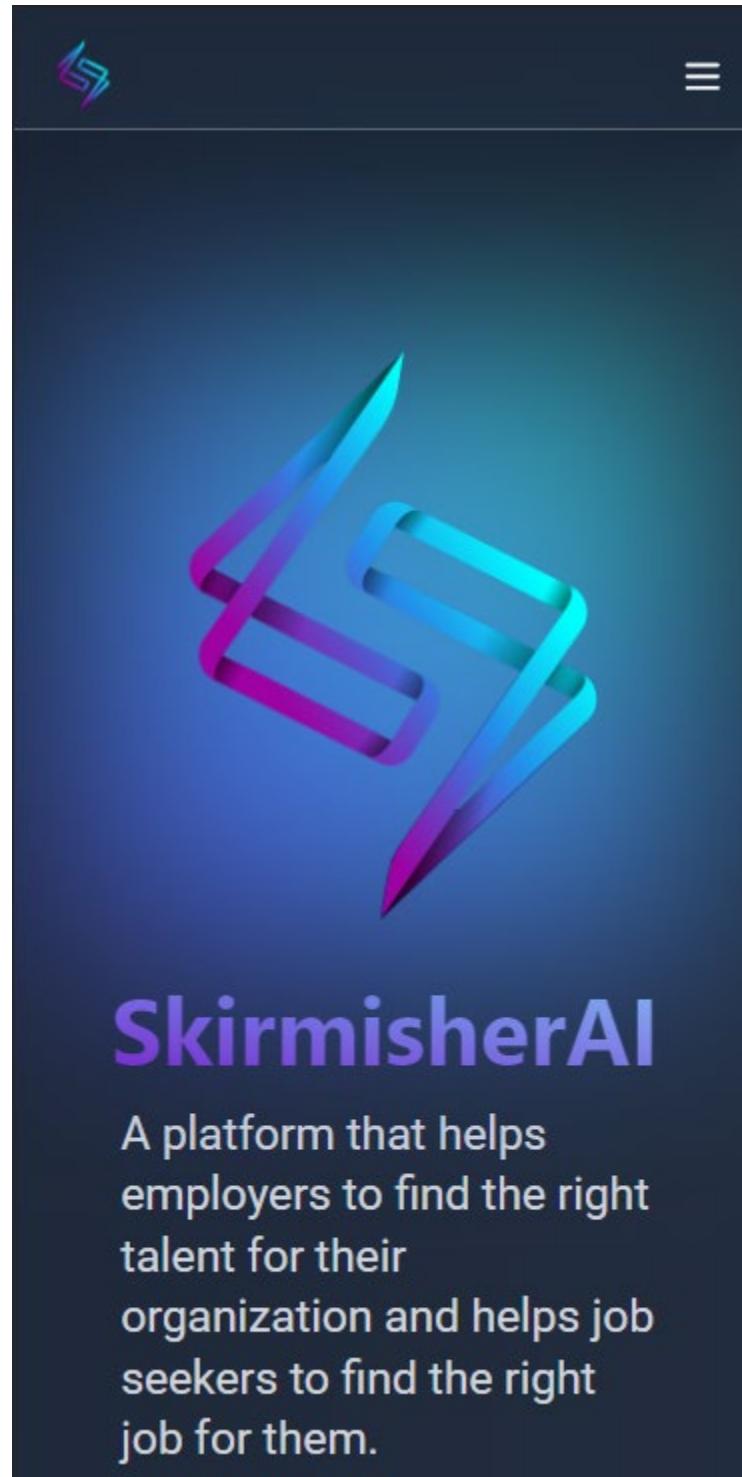


Figure 93: CT02 iPhone 12 Pro

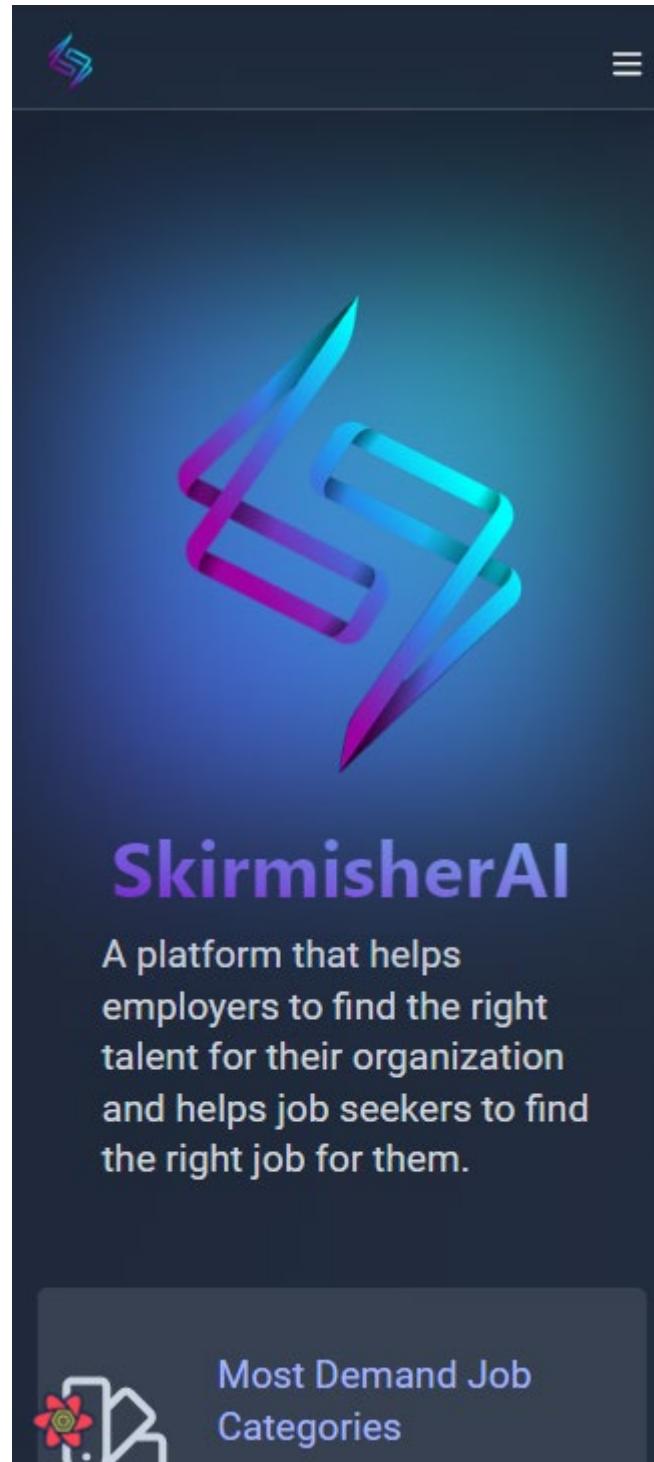


Figure 94: CT02 Samsung S20

13. Deployment

The project's final product is delivered to the appropriate authority during the deployment phase so they can implement the system. Additionally, because the actual owners are receiving the desired outcome, this is one of the most crucial phases of a software project. Hence, the deployment specifications, controls, steps, procedure, scaling, load balancing, training, and data migration for the SkirmisherAI Application will be covered in this part.

13.1 Effective Deployment Criteria

The SkirmisherAI system is developed to assist job seekers in locating the best job for them along with employer to find the right talent for their organizations at the lowest possible cost and shortest amount of time. Additionally, this is a social service application that should be running constantly to provide maximum availability for everyone since job platforms provide human resource solutions. The following criteria are some of the necessities for a successful deployment of the SkirmisherAI automated recruiting system.

- Objectives and challenges should be identified.
- Should be aware of the restrictions and scope.
- Analyze all the options.
- If necessary, update the data in accordance with the requirements.
- Resource manager requires to be at its finest.
- Personalization ought to be done.
- Must be cognizant of the transition.

13.2 Steps required for successful deployment

Numerous data requests from the users may come after the deployment of the recruiting system. As a result, the system deployment process should follow the appropriate procedures.

- An adequate implementation strategy.
- Optimal Design.
- Developed in appropriate manner.
- Properly testing and training.

- Final deployment of the project.
- Maintenance of the project.

13.3 Methods of Deployment

To successfully deploy the SkirmisherAI project, The seven-step methodology is being followed. Below an overview of the methods are provided.

Planning

In this phase, a plan for deploying software will be prepared. Additionally, the deployment schedule, budget, team makeup, work package, and responsibilities will be determined.

Analysis

During this phase, working procedure will be studied along with the workflow and business process.

Design

After finalizing analysis, workflow and business criteria of the organization will be evaluated. Furthermore, whole system design will be done in this phase.

Build

During this segment, software will be developed with appropriate coding. The system will be running after the development and will be ready for testing.

Testing

Once the development of system is accomplished, the entire web application will be hosted on server and ensured the configuration is working with everything is operating as anticipated. Followed by this, a competent team will be given the obligation to conduct tests in parallel against various test scenarios to ensure that the system is operating effectively.

Deployment

When all the previous steps are completed effectively, the project will be deployed to the live server so that it can be utilized by users over internet.

Maintenance

After a successful deployment, SkirmisherAI project needs to be maintained properly. As a result, the system should be updated regularly to improve security and preserve system performance.

13.4 Scaling

Over the time, the system usages will grow enormously and to keep the business both operating and profitable, a scaling plan is prepared for the project.

The system is developed by decoupling frontend and backend with the API as middleware where API versioning foundation is already available. This allows for the development of enhanced versions of many server APIs that will not result in any unexpected issues. Additionally, based on request headers, multiple API versions can respond to API requests programmatically, supporting legacy services as well. Furthermore, the application can be transformed into micro-services where each API module might have a separated server application. For instance, various RESTAPI providers can be developed using different languages and technologies which can be deployed to cloud services like EC2 from amazon. As for database, cloud database like DynamoDB from amazon could also utilized to handle the server data. Besides, media or any resources also could be stored in service like S3 Bucket that provide fastest file access with strongest security. Moreover, micro-services API can be developed with multiple contemporary programming languages resulting quickest enterprise application with nearly zero downtime.

13.5 Load Balancing

The application must be capable of handling the load, which is essential to the project's success. Hence, to increase system efficiency, load balancing should be implemented properly. Every user's request can be divided between servers with a load balancer. This will ensure system availability and performance by making the application run smoothly.

Here few steps that can ensure maximum load balancing:

- Asynchronous API call should be available to defer heavy request to backend.
- API call should be cached at both Client and Server Side.
- React components in front-end should have global context to reduce frequent API calls.

13.6 Training

Although the SkirmisherAI project offers guidelines on how to carry out specific actions within the system, occasionally assistance may be needed. Besides, there is no doubting that properly executed training can assist users in making the most of the system.

| ID | User | Module | Duration (Minute) | Comment |
|----|----------------------------|---|-------------------|--|
| 1. | Visitor | General website navigation, finding help and other basic info | 10 | Visitors will learn overview of website Process. |
| 2. | Candidate, Visitor | Find work module, Job extensive details module | 10 | Visitor and candidate both will search for job specifics. |
| 3. | Candidate | Job Application module, uploading Resume module | 20 | Candidate will be able to upload resume and submit job applications. |
| 4. | Employer | Job module, Received job application module | 30 | Employer will be able to publish new vacancy, manage existing and view submitted applications. |
| 5. | Candidate, Employer, Admin | Community Module | 20 | Users will be able to post community blog and manage previously published blogs. |
| 6. | Employer, Admin | Generate reports Module | 30 | Employer and admin will be able to produce wide-ranging reports. |
| 7. | Anyone | Newsletter Module | 10 | Anyone will be able to subscribe to newsletter. |
| 8. | Employer, Candidate | Live Video Interview Module | 20 | Both candidate and employer will be able to join in video interview. |

| | | | | |
|-----|--------|---|----|---|
| 9. | Anyone | Contact Module | 10 | Any visitor or user will be able to submit contact message for additional assistance. |
| 10. | Admin | Manage User Module, Manage Contact Module | 15 | Only admin will be able to use these modules. |

13.7 Data Migration

Prior to the introduction of the SkirmisherAI system, human resource managers had to manually find candidates and deal with tons of paperwork and separate systems. All manual data must be moved to the newly designed system for it to operate efficiently and effectively because SkirmisherAI is an entirely digital system where all data is handled automatically. Hence, Manual entry of paper-based data will be done, and database migrations will be used for digital data. PG ADMIN, a Postgres tool, can be used to migrate massive amounts of data at once rather than requiring each data entry. Moreover, every data will be accumulated at a central database that is associated to the SkirmisherAI application. To sum up, following the data migration procedure, periodic data backups will be made in addition to a normal data backup.

14. Evaluation

To review the solution, the evaluation is carried out that assists in defining characteristics and outcome of the system. At this phase, relevant data from the developed system will be collected and evaluated to make further improvements on reliability and performance.

14.1 Product Evaluation

Product evaluation will assist to identify the developed product excellence and effectiveness. Additionally, project requirements will be considered to comprehend whether the project aim is completed or not. Furthermore, probable system failures and bugs will be discovered along with conversing probable solutions.

14.1.1 Usability

Usability refers to how simple it is for users to operate the system and comprehend how to carry out tasks (Bandi & Heeler, 2013). The optimum user experience is provided by a system whose interface is simple to use and users can carry out any task without encountering any issues. Given its simplicity, usability, adequate navigation, precision, and accessibility, The SkirmisherAI provides an excellent user experience. Additionally, alternative text for image and suitable icons for menu items, eye catching heading as well as decent color contrast was used. Furthermore, to prevent users from being confused, each functionality is arranged in sequential order along with system notification for potential action execution. Moreover, SkimisherAI system easier learnability, understandability, and comprehensive well-structured appropriate user documentation.

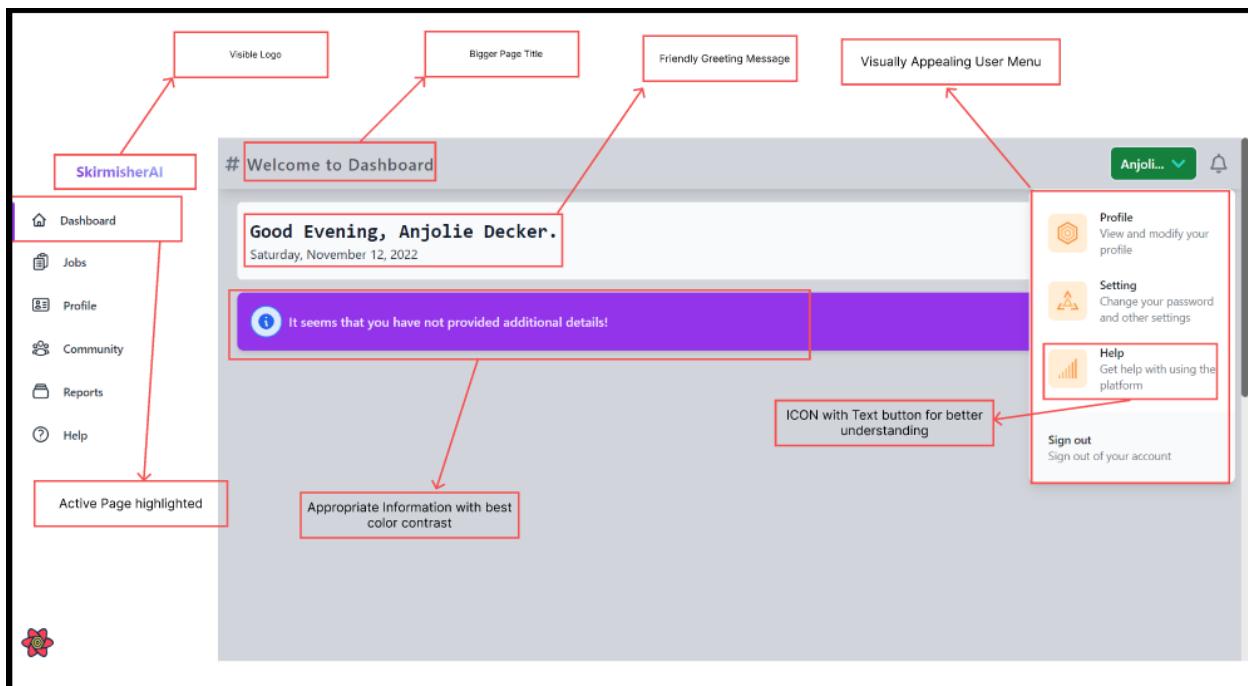


Figure 95: User Experience of SkirmisherAI

14.1.2 Sustainability

For the software sector to survive, there needs to be a sensible business plan. The development of software must also be protected by copyright. When software is developed, a copyright is automatically given to the author (Joyce & Tyler, 2020) whether it is used for either personal or professional purposes. Nevertheless, even though the software is open to all visitors, it must be restricted to those who utilize that system. Multiple role-based authentications for administrators, candidates, and employers are established in the SkirmisherAI system to follow the legislation. The SkirmisherAI will also include a copyright agreement to ensure that the firm stays in the hands of the principal proprietors.

Furthermore, since this is an academic effort, the web application is currently accessible to anyone at all worldwide. In addition, the software is accessible via GitHub repository so that anybody may view the source code, but to use the application, users must adhere to the MIT license agreement that is included with the project on the repository.

14.1.3 Maintainability

Periodic maintenance is important to assure the system's efficient process over the duration of its life. Additionally, database load and upgrade, program dependency upgrade, and server monitoring and upgrading are all routine tasks that must be completed. Furthermore, automatic system backup, system performance monitoring, security patches and feature expansion should be done as well. Moreover, several different sorts of tests are necessary to guarantee that performance is maintained. For the SkirmisherAI application, many forms of testing were covered in Chapter 12 of this report to maintain performance. Along with ensuring the integrity and dependability of the system actions, all those tests will assist in the discovery of system faults, vulnerabilities, errors, and system failures.

15. Critical Appraisal

This section will provide an overview of the SkirmisherAI application and project from the standpoint of how the produced features fulfill the objectives and goals. Every objective will be examined and endorsed during the discussions to evaluate which aspects were handled and which were not, as well as how many of them are succeeding and how many are failing. Furthermore, this segment will provide justification for the developed system's strengths and weaknesses.

15.1 Objectives Met

Since the project was built by one person alone, several goals for this program were initially set, but as development went on, not all of them were accomplished. Apart from a handful, the majority of the application's objectives were developed.

- Study on a relevant issue was conducted to find out solution requirements. The research question was determined during study, and major approaches for proposed solutions were analyzed.
- To determine the best algorithm for natural language processing, machine learning research was carried out. A comprehensive study was also carried out to extract data from resumes.
- Eliminated the necessity for Skilled Individuals to Recognize and Analyze Resume. In place of human evaluation and organization, AI is used to scan resumes for appropriate candidates.
- Decreased time consuming Paperwork required to fill a vacancy by utilizing the system.
- The system is user-friendly because it was developed with UX design principles and heuristic law in mind.
- Priority requirements for the system development were met for all the requirements identified in the study.
- The developed system underwent evaluation and testing to identify bugs, problems, and documented outcomes.
- The system is progressive web application and available for all users for sustenance.
- Automatically review resumes to discover the best applicant for a job that has been posted.
- User authentication and authorization, which let users use many functionalities while preventing unauthorized system access.
- Creation of a personalized user profile for recognition and exposure.
- Posting a new position for employment as well as updating or removing an existing position.
- Comprehensive Searching, filtering, and further job and employer details are developed in the find work feature.
- Job application that includes candidate profiles as well as Skill matching and Suitability predictions.
- Dynamically customized resume for improved readability and data-driven decision making.

- Live video chat for scheduling online interviews and question-and-answer sessions.
- Introducing additional posts, sharing fresh opinions, and editing already published community content.
- Reports for improved hiring decisions, as well as real-time statistics data extraction for overview.

15.2 Objectives Those Were Partially Met

- Limited Datasets for Resume Screening.
- Social Media Integration.

Reason and possible action:

Considering resumes contain personal information, there was limited data available while researching for the project. Despite asking prominent job portals for resumes, some of them either denied the request or made unreasonable demands. On the contrary, users are unable to sign in with their social network accounts even though they can share their posts straight to social media. Given the short timeline of this project, I had to forsake automatic social publishing and social signing because they involve the utilization of numerous API.

Multiple company sites can be used to collect a lot of data, but this may take a long time. Additionally, approaching pre-established job portals with solid agreement could allow for the acquisition of resume information. Moreover, utilizing web automation tools like selenium, resumes can be scraped from dozens of websites. Furthermore, Social Authentication and automatic publishing can be implemented with supplementary timeframe in the solution.

15.3 Objectives Totally Not Met

- Direct Communication between Employer and Candidate.
- Company Reviews.

Reason and possible action:

Before any invitation or application, the employer and applicants should be able to communicate. However, given the time and resource constraints, this goal could not be achieved. Besides, developing live chat module can be complex that often requires exceptional server uptime.

Moreover, the ability to conduct corporate reviews was not implemented because of its difficulty and inconsistent functionality.

However, with some work, we can finish both features. We could pursue more sophisticated studies to expand our skill set and identify the finest resources available. In conclusion, these functionalities may be introduced in a fair amount of time with proper resources to ensure dependable service.

15.4 Features Those Were Touched

The following features were touched to develop the SkirmisherAI application:

- User and Permission management.
- User authentication and authorization.
- Job Publishing Management.
- Job Application Management.
- Finding Job with extensive Details.
- Live Video Interview Management.
- Contact with Administrator.
- Community Post Management.
- Statistical data representation and report export.
- Newsletter subscription.

15.5 Features That Were Partially Touched

- Wish listing Job.
- User Authentication and Authorization.

Reason and possible action:

Candidates can save the positions they want to apply for later, however they cannot view saved positions because this functionality has not been developed. Given the limited time I had to finish other crucial components of the system, I purposefully omitted that. However, this can be built similarly to how standard API development is handled, which might be convenient for applicants.

User registration enables individuals to sign up for the system, however email verification is not yet in effect. This should be implemented in the following development cycle because it might lead to some users losing their accounts and being unable to recover them in the future.

15.6 Features That Were Not Touched

- Employer Reviews.
- Live chat Feature.

Reason and possible action:

Because of the project's time constraints, I was unable to develop the employer or hiring company reviews feature. Additionally, distinguishing between good and bad organizations might demand a higher level of logical development, which I was unable to do while developing the system.

Furthermore, if more time is available, we can concentrate on each of these features in the part devoted to future development but might need to look for extra resources.

15.7 System Strength

The Strengths of the 'SkirmisherAI' system are described below:

- The suitability of a candidate by reviewing a resume for certain job description. The system scans submitted resume and screens those based on predetermined criteria to rank most fitting one. This process undertakes most crucial parts of the resume including work experiences, education, skills, competencies, and knowledge as well as personality and values.
- The system assesses a candidate's resume to determine whether they possess the necessary skills for the position being fulfilled. The system compares competencies using pertinent keywords to produce a matching score that can be used to influence further choices.
- The system enables job seekers to browse and filter through a variety of openings to find their ideal position. Additionally, the system provides comprehensive information about the position and the organization, allowing candidates to feel comfortable and be able to know about the importance.
- Role-based access control mechanisms were used to prohibit system access to certain areas, protect sensitive data, and assure that users could only access information and

take actions that they were authorized to. Depending on their roles and responsibilities, the system user's permissions and privileges were used to grant them varied access levels.

- Through using system, job seekers can discover a specific opening and submit an application with an enriched profile and resume. Additionally, as an employer analyzes job applications with customized resumes, a candidate can track the progress of their application and any responses.
- The system's live video interviewing feature is one of its most important components. After narrowing down the pool of applicants, the employer can arrange a virtual interview and set a specific time for the interview to take place as well as conduct the interview.
- The system has a community platform where a group of candidates, employers or any internet user can share their opinions, discuss any issues or advantages, and write blogs.
- The system gives every user access to modern advice and help-seeking options with each circumstance. Besides, in order to resolve any issues, they encounter while using the system, candidates or employers can get in touch with the system administrator.
- Employers and administrators can generate and export a variety of statistics and reports while using the system. Every user also periodically gets a glimpse of how well they are performing within the system.
- There is a newsletter subscription to explain the background of the organization and system, how it might benefit users, and its core principles as well as to exchange ideas and knowledge over time.
- Since usability is seen as essential to the success of any software, the system was developed to be as user-friendly as achievable. In addition, the system offers clutter-free, efficient navigation, excellent error handling, on-screen message descriptions, and a contrasting color palette.
- The system is compatible with all screen sizes, from the smallest mobile phones to the largest monitors. Moreover, the system is open to all users, has a well-designed information architecture, well-formatted content, and quicker response rates.

15.8 System Weakness

The Weakness of the SkirmisherAI system is highlighted below:

- The system extracts resume information to construct a personalized profile for each candidate, but Name often produces erroneous results. Despite using a variety of machine learning models, the results are still inconsistent given that human naming patterns are immensely unpredictable.
- Job seekers may have sought to research the organization and assess their reputation based on prior reviews while searching for openings. For some circumstances, this feature has not yet been implemented and is therefore not included in the current development cycle.
- For the machine learning model used to screen resumes, an open-source dataset with primarily IT-related job categories was leveraged to train. Hence, the system has limited job categories while publishing a vacancy.
- System security was kept at a moderate level due to time constraints and the fact that this is an academic project. For instance, the system may be resistant to cross-site scripting XSS, sensitive data disclosure, inadequate authentication, and injection vulnerabilities, but it is still vulnerable to brute force attacks.

15.9 Further Development

The Further Development of the SkirmisherAI system is given below:

- Even though the existing dataset was adequate for training the resume screening model, the machine learning model should be retrained using an enormous dataset that has every possible job category. In addition, the model needs to be tweaked by establishing different parameters because it only consistently produces acceptable results for jobs involving technology.

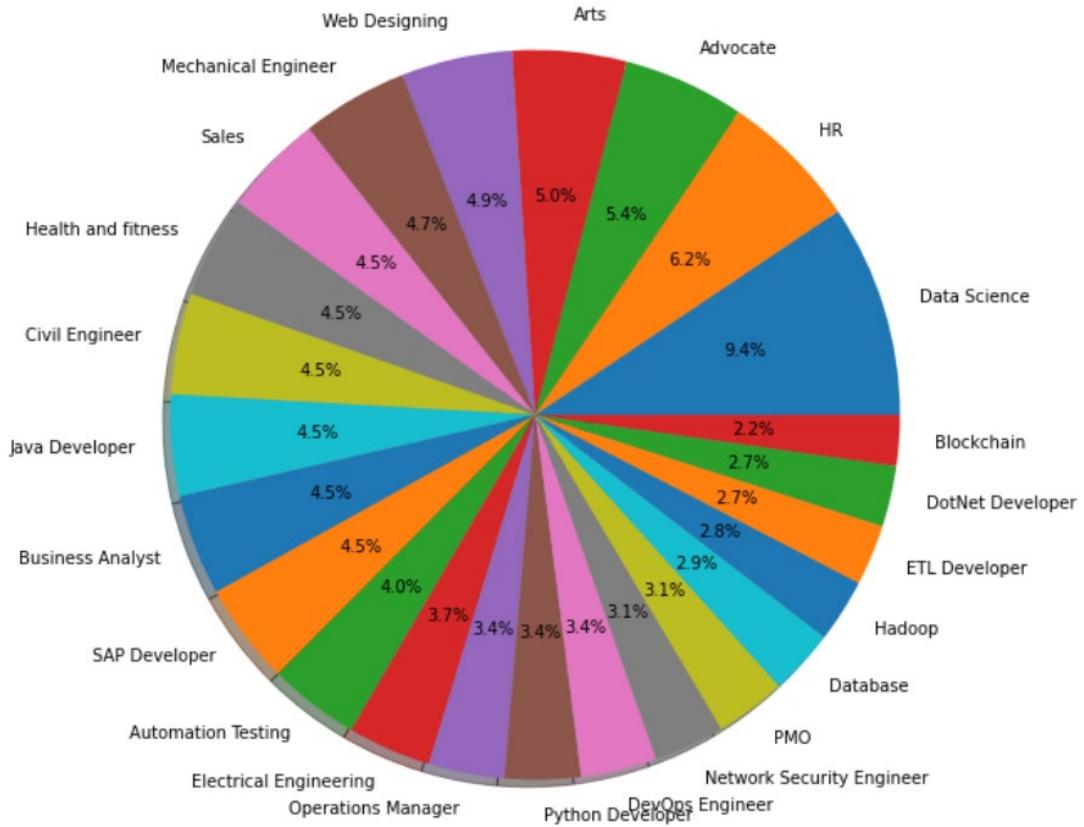


Figure 96: Dataset Category Distribution

- In a similar vein, the keywords database used for skill extraction has certain flaws. Hence, it is important to use a competency database to compare and extract competencies from resumes.
- When looking for openings, job seekers might have tried to research the company and measure their reputation based on earlier reviews. Thus, reviewing company feature should be developed for better Candidate Experience.
- Currently, the system only screens through resumes when a candidate applies for a position, but a feature that lets candidates check their suitability before applying could be introduced.
- It is also possible to determine whether a job applicant has the necessary abilities or to what extent their qualifications are met as well as skill improvement insights can be provided.

- Since most job seekers may possess a variety of certifications and accomplishments, certificate validation has the potential to confirm legitimacy.
- Skill assessment feature can be developed that enables candidate to demonstrate their expertise of the skills added on resume by passing tests specific to those skills.
- An automatic email and message functionality is another potential feature that might inform job seekers of newly posted openings and the progress of submitted applications.
- It is also possible to implement a search algorithm that analyzes previous keyword searches and presents jobs according on those.
- The implementation of a continuous machine learning model that adapts over time based on hiring decisions can be implemented as well.
- The development of automated job sourcing from corporate websites as well as through external job networks is potential feature.
- For smoother, quicker system access, OAuth2 authentication can be integrated with Google, LinkedIn, and Twitter. Implementing two-step authentication and email confirmation is another option for better security.

16. Lessons Learned

The obstacles I faced as the project's sole developer will be covered in this phase, along with how they were resolved. Additionally, my understanding of the course and my solutions to the challenges will be reviewed.

16.1 What did I learn?

This was an academic project that was expected to be finished by one person, thus I did everything on my own. It taught me various matters including, how to ascertain a problem and research around it that require technological advantage, how to carry out product research along with categorizing the constraints and scope of a project. Also, I have learned to characterize business objectives and accomplish those with the project achievement.

First and foremost, I began researching problems facing our nation using a variety of resources, including news, social media, and forums. Eventually, I concluded about the subject based on the information I had obtained, principally a LinkedIn post where a corporation complained that it was difficult to locate qualified candidates for vacant positions. After that, I started a recruiting-related research phase in which I attempted to speak with human resource managers and job seekers to

learn about their challenges. Additionally, I talked about how an automated method may help them identify talent quickly and affordably. After collecting the data, I read scholarly research publications to avoid duplicating already published work and found what can be researched further. Even though I came across other systems that were comparable, they all had drawbacks, so I studied more to overcome those drawbacks.

Furthermore, I conducted research to find the most recent instruments and technologies that are extremely suitable with system development and can be simple for end users to use and comprehend after all the project's requirements and features were decided upon. Besides, I investigate at machine learning algorithms to discover the best one for text processing and that taught me more about ML techniques.

Before beginning the actual development, the entire process is planned, and this is how I learnt how to plan. Planning also covers testing strategy, quality management, risk management, and many other things. In addition, numerous software techniques, particularly the DSDM and FDD framework, have been studied. It assisted in problem identification and taught me workable solutions. Furthermore, to achieve the highest level of quality and on-time completion, the project is developed via several iterations. Moreover, I have modified the procedure and developed a methodology that works in a personal development context because the DSDM is primarily focused on team development.

After the project's planning was finished, I learned how to gather specifications. To do that, I learned how to create system architecture diagrams using referencing method, UML notation, rich pictures, sequence, use case, and class diagrams.

Once the specifications are finalized, I concluded how to rank them in order of business significance and functionality along with imposing timeframes to prioritized requirements. Additionally, I become proficient in creating user interfaces that is visually appealing and user-friendly. Furthermore, while creating component, operation, and deployment diagram, I learned to organize actual structure of the system.

Later, I learned the iterative feature development process along with how to seek the community for assistance and where to look for potential answers if work is halted to properly comprehend a technical procedure.

Finally, I also learnt how to properly document a technical software and how different testing methodologies are executed as well as how to resolve flaws and mistakes if a test fails.

16.2 Problems I Faced

While working on the project, I ran across a multitude of issues and resource constraints. Since machine learning models need the fastest processors and most GPU cores to be developed effectively, my computer is not powerful enough to do so. Additionally, due of the vast array of technologies and tools accessible, I was unsure which one to select and employ. Moreover, gathering information was difficult for me because human resources is a sensitive area that would put the organization's confidentiality at menace.

I then began reading research articles to better comprehend the problem domain. During my study, I have found that most studies analyze technical information about Jobs but do not really concentrate on recruiting-related issues. As a result, it was challenging to assemble enough information about resume analysis and the hiring procedure overall. Additionally, because I was not proficient enough, I had to go through the learning process for machine learning technology. Hence, developing an Artificial Intelligence web application with Machine Learning was challenging for me. Furthermore, Implementing JSON Web Token authentication was difficult as well since it includes developing multiple API and security measurements from both client and server-side. In addition, it was difficult to keep the project iterating and to save work as a simply determining.

Moreover, while executing test cases, I found multiple issues that was quite difficult and time consuming to resolve. Specifically, one test case failed so badly that I had to change the entire logic for that feature to work properly resulting more time consumption. Which indeed affected my overall project development. Furthermore, I had to write the documentation with highest standard and appropriate guidelines that was troublesome.

16.3 What was the solution?

I focused and utilized on various importance measurements to solve all the issues I have encountered. I utilized Google COLAB, which was a free solution, because I had limited processing and GPU resources to create ML models. I made the effort to choose the appropriate tools for these kinds of applications so that I wouldn't become overwhelmed by the wide variety of technology. I have used open-source datasets and data from companies that allowed under these circumstances for gathering resume and other confidential data. I have used GitHub to store project in several iterations, which has made it easier to track progress and get back on track when something goes wrong.

Regarding study concerns, I questioned job seekers and human resource managers in-depth about their troubles. Additionally, an online survey was carried out to find recruiting issues on organizations. Moreover, I discovered a few products that offer a limited range of services relevant to my project, which is focused on the human resources field. As a result, I examined those products' business objectives features and capabilities to comprehend the problem area more thoroughly.

In terms of learning about artificial intelligence, I have consulted a wide range of resources, including my excellent teacher, websites, blog posts, GitHub repositories, a few classes on YouTube, and Kaggle documentations.

As I was testing the system, I discovered several bugs and failures. I carefully examined each one and tried to determine potential fixes utilizing Google Search Engine. Furthermore, after implementing the solutions, I have discussed those with my project supervisor for overview. Finally, I meticulously followed the instructions for software documentation and properly standardized the solution documentation.

17. Conclusion

17.1 Project Summary

Finally, the project has been completed with the necessary requirements, developments, and other key elements, and it is available to all users. The front-end and back-end of the SkirmisherAI project are complete, enabling hiring managers to locate talented individuals and job candidates to find their ideal positions. Each applicant will be able to locate jobs with a variety of details prior to applying. where Human Resources or Employers can advertise new openings for hiring, forecast applicants' suitability, analyze skill matching, and access other critical information. Besides, to make data-driven recruiting decisions, applicants' customized resumes are also made available. In addition, Employers may shortlist candidates for a further hiring round or invite them to a virtual interview. Furthermore, in the system, the system administrator and the employer can produce statistical data and charts that can be exported as well. Candidates can check the status of their job applications, attend any planned interviews, and actively seek out positions that fit their qualifications. Moreover, any user who needs assistance or is unclear about something relating to the system or recruiting in general can contact the administrator for clarification. Besides, any user can publish community posts, including blogs, reviews, guidelines, contradictions, and threads, among other things. Additionally, every visitor has the option to sign

up for a software newsletter that will give them articles on offers, updates, and community postings on a regular basis. Furthermore, users, job postings, communities, contact messages, and other crucial modules can all be managed by system administrators.

Given that this enormous project was created by a single developer under the strict time constraints of academic coursework, the program undoubtedly contains several shortcomings and limitations. Nevertheless, the project is finished with the finest effort practicable as well as quality development is ensured by making use of every available asset.

17.2 Goals of the Project

This project's main objective is to offer a solution that improves conventional human resource management by assisting both employers in finding the best talent and job seekers in finding the ideal position.

17.2.1 Goals that were fulfilled

- Develop a Recruiting system to source talented candidate easily.
- Develop a resume screening system to filter ideal candidate.
- Develop a Job Finding system to seek superior position.
- Develop a system that eliminates time consuming recruiting procedure.
- Leverage AI to reduce hiring cost and to improve quality of recruitment.
- Enable Live Video Interview within the Application.
- Reduce or eliminate paperwork required to fill a vacancy.
- Make sure the system is available for all customers.
- Develop a community system where users can share their opinions.
- Generate Job publishing and Applications reports.
- Develop help module to seek assistance when in need.
- Establish a method for newsletter subscriptions.

17.2.2 Goals that were not fulfilled

- Company Review System.
- Communication between employer and candidates.
- Automatic resume Sourcing.
- Email Notifications.

17.3 Project Success

When comparing the effort put forth with the results, it is safe to claim that this project was completed successfully and that all major aims and objectives were achieved. We may therefore anticipate that recruiters all over the world will no longer be required to rely on the manual procedure for recruiting in favor of using this system to gain better human resources. In addition, with the aid of technology innovation, the system will also be able to entice job seekers to enter corporate environments and acquire employment.

17.4 What is done in the documentation

The project documentation includes information on business analysis, problem domain analysis, product research, critical diagrams, academic studies, user interface design and implementation as well as maintenance, testing, and other pertinent project-related topics are covered.

- ⇒ In the **literature review**, past studies on a related system are discussed, analyzed, and their shortcomings are assessed to come up with potential solution.
- ⇒ In the **product research** section, five comparable solutions that are currently being used in the human resource field are examined and assessed. The weighted scoring technique is used to perform the evaluation.
- ⇒ In the **LSEP** section, the legal, social, ethical, and professional concerns surrounding the SkirmisherAI project are covered.
- ⇒ In the section on **development tools and methods**, I have examined many development approaches and selected the finest framework for the SkirmisherAI project as well as the methods and tools for gathering requirements.

- ⇒ In the part on **planning**, I discussed every aspect of planning related to the project, including project planning, risk management plans, change management plans, testing plans, and quality management plans.
- ⇒ In the **feasibility study** section, different project feasibilities, such as those related to economic viability, operational viability, and technological viability, are assessed.
- ⇒ In the **requirements analysis** section, the rich picture is created as well as identified project stakeholders along with business and system requirements.
- ⇒ In the **New system Design and Architecture** section, necessary diagrams like class diagram, use case diagram, sequence diagram, Entity relationship Diagram and deployment diagram is provided as well as system prototypes.
- ⇒ In the section titled **Review of Technology**, the technology that was utilized to develop the SkirmisherAI API, Database and client app has been discussed.
- ⇒ In this document's **development** section, I have covered several system modules, requirements, prototypes, timeboxing for the development, and project complexity.
- ⇒ The SkirmisherAI system is put through many sorts of testing, and the findings are provided in the **testing** section.
- ⇒ In the **deployment** section, I have spoken about how to deploy a project successfully and make plans for that.
- ⇒ The project is evaluated in the **evaluation** section regarding sustainability, maintainability, and usability.
- ⇒ The project's goals are all evaluated and discussed in the **critical appraisal** section, together with its strengths and faults and a strategy for future improvement.
- ⇒ In the **lesson learned** section, my learning outcomes, challenges I encountered, and potential remedies are covered.

17.5 My Experience

While working on the project, I had to endure hardship for a variety of reasons, and several times I felt close to giving up. I had to face several obstacles, and as a result, I became quite frustrated and worn out. But my teacher's unwavering encouragement and the hope for a better opportunity kept me inspired to come up with solutions. I have persevered through all the hardship and kept working because of my utterer motive. Not to mention, I occasionally became distracted from my task and perplexed by changing circumstances.

I had to learn contemplative machine learning from a variety of sources available on the internet and from my respective lecturers because the project incorporates artificial intelligence. Even though the learning process was fascinating, applying AI to a project proved challenging. Additionally, I had to learn several emerging technologies for the project that, compared to the current state of technology, are really intriguing. For instance, using Tailwind CSS instead of ordinary CSS or SCSS was a lot of fun while developing elements.

The most significant thing I learnt was how to perform in-depth study on a topic that, as we speak, has me attached thanks to fascinating research papers and strategies. I even subscribed to various research newsletters to stay up to date with those sites. While looking for design tools, I came across several tools that were better than the ones I was already familiar with.

I discovered certain flaws that were nearly impossible to remedy while evaluating and testing the system, but I was able to fix them with the aid of Google. Additionally, I had to go through variety of ideation processes during the design phase in order to come up with a standard design that would optimize the user experience. Furthermore, several usability tests were also conducted to improve the system's user experience, which taught me to think and design with keeping the user perception in mind.

The system was then documented using the proper standards, which include descriptions of the product's architecture, functionality, interface, and capacity to complete a task. I occasionally lost track of guidelines, but my supervisor's encouragement helped me get beyond those difficulties in my journey, which was only slightly confusing.

To sum up, I learned how to understand the dynamic systematic approach to thoughtful and solving a challenge by working alone to finish this project. I will always look back on this project's experience as a remarkable adventure.

17.6 Future Implications

The project is accomplishing its intentions, but there are still many improvements that can be made. For instance, the system can be expanded to include certification and candidate technical skill evaluation. Besides, Recruiters may import openings or applications from the major job platform, like LinkedIn, making it even more valuable. This will enable them to stay interconnected thought out the web applications. Further research for supplementary system requirements can be conducted that could transform this robust system to an enterprise level software. Moreover, study to evaluate candidate personality based on resume should be conducted as well. In addition, the system can be utilized for profit by implementing software as a service business principle. For instance, an annual membership plan will progressively benefit the company and keep customers for a very long time.

Even though the system works perfectly fine in all screen sized devices, native application for mobile phone should be developed. Additionally, native applications frequently have more advanced features, performance, and usefulness, all of which contribute to improved user experiences.

Artificial intelligence can be increasingly used in recruitment to conduct automated pre-virtual interviews in addition to merely evaluating resumes. AI powered resume review and feedback as well as job recommendation to candidates should be implemented as a pertinent feature. Moreover, using an algorithm that suggests individuals with the skills that are in demand for open positions is another possible feature.

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19. Appendices

19.1 Appendix A – Project Proposal.

Introduction

Choosing the finest employee is a difficult undertaking for any company. During the retention, employers became accustomed to getting hundreds of applications for each job opportunity because of the huge increase in online job boards and a matching increase in job adverts. Recruiting becomes extremely tough due to a lack of availability compared to demand. Hiring the best people from the outset ensures that new hires can get up to speed quickly and contribute effectively (Smith, 2006). As a result, resume screening, which is a procedure for determining whether if an applicant qualifies for a job by comparing the job requirements to the information on their resumes, is beneficial. Manual resume screening is difficult to assess for quality and selecting the most appropriate candidates from a large pool of applicants takes a long time.

I aspire to develop a system that will use Artificial Intelligence to make the recruiting screening process more effective and time efficient. AI for recruiting is a different sort of HR technology that will minimize or even eliminate time-consuming operations while smoothly integrating with the present recruiting stack (Mhatre, 2020). Recruiters may rapidly filter through a huge number of applicants using the system, dismissing unqualified candidates, and identifying their ideal candidate.

Objectives and aim of research

Aim

The aim is to utilize artificial intelligence to automate and quicken the resume skimming process by screening resumes for pre-determined criteria, which will make recruitment easier.

Objectives

- **1st initiative:** To do a literature review on a related problem discussion board.
- **2nd initiative:** To research and evaluate the proposed solution's major requirements and approaches.
- **3rd initiative:** To provide an application interface that is user-friendly.
- **4th initiative:** To develop a system that fulfills all the requirements and functions.
- **5th initiative:** To evaluate and test the proposed system.
- **6th initiative:** To set up the system and prepare for its sustenance.

| Objective | Method | Deliverable | Period |
|----------------------------|--|---|---------|
| 1 st initiative | Review of Literature, Process evaluation | <ul style="list-style-type: none"> • Researched Report | 7 Days |
| 2 nd initiative | Brain Storming, Analyzing Information Systems using a soft approach (SSM) | <ul style="list-style-type: none"> • Rich Picture • Root Definition • Conceptual Model | 8 Days |
| 3 rd initiative | Wireframing, User- focused Design | <ul style="list-style-type: none"> • Conceptual Design • Prototyping • User Friendly UI | 17 Days |
| 4 th initiative | Dynamic System Design Model Derived from Features | <ul style="list-style-type: none"> • ERD Database • Query Script • API • Client Application | 56 Days |
| 5 th initiative | White box Testing | <ul style="list-style-type: none"> • Test Plan • Test Scenario • Test Circumstances • Test Statements | 10 Days |

Table 1: The solution's objectives, methodologies, milestones, and timeframe are all listed here

Research Approach

To accomplish the specified goal, I will perform the following steps:

First and foremost, I will prepare a well-researched report in which I will identify literature gaps based on a comprehensive study of relevant literature and existing recruitment method.

Secondly, I will use SSM method to build a rich picture of the system, as well as conceptual representations of system functionality and root definitions of processes for requirement and process analysis will be prepared. In addition, i will apply cognitive design principles to construct a user-friendly interface, ensuring that users have a positive user experience while using the system.

Eventually, since this is an academic endeavor, I will develop the system utilizing the Feature Driven Dynamic System Development Model, or FDDSDM for short, which is a customized development technique (Adila Firdaus, 2014).

Finally, advanced software testing approaches, including unit test and integration test, will be used to test and assess the developed solutions. Testing and test reports will help to eliminate software faults and errors that occurred during development.

Planning

Without planning, no concept ever achieves its full potential, so I began by looking up existing studies and projects to compile a literature review for the proposed solution. I'll also gather project requirements and draft a development strategy, risk management plan, modification management plan, and implementation plan. Afterward, I'll utilize the DSDMS MoSCoW prioritizing technique to prioritize the criteria that have been defined and set up timeframes following the DSDM time-box technique (Stapleton, 1999). Furthermore, inside each timeframe, I will continuously evaluate, design, develop, implement, and test the system. Later, as part of an incremental procedure, I'll enhance it alongside the main project.

Gantt-Chart

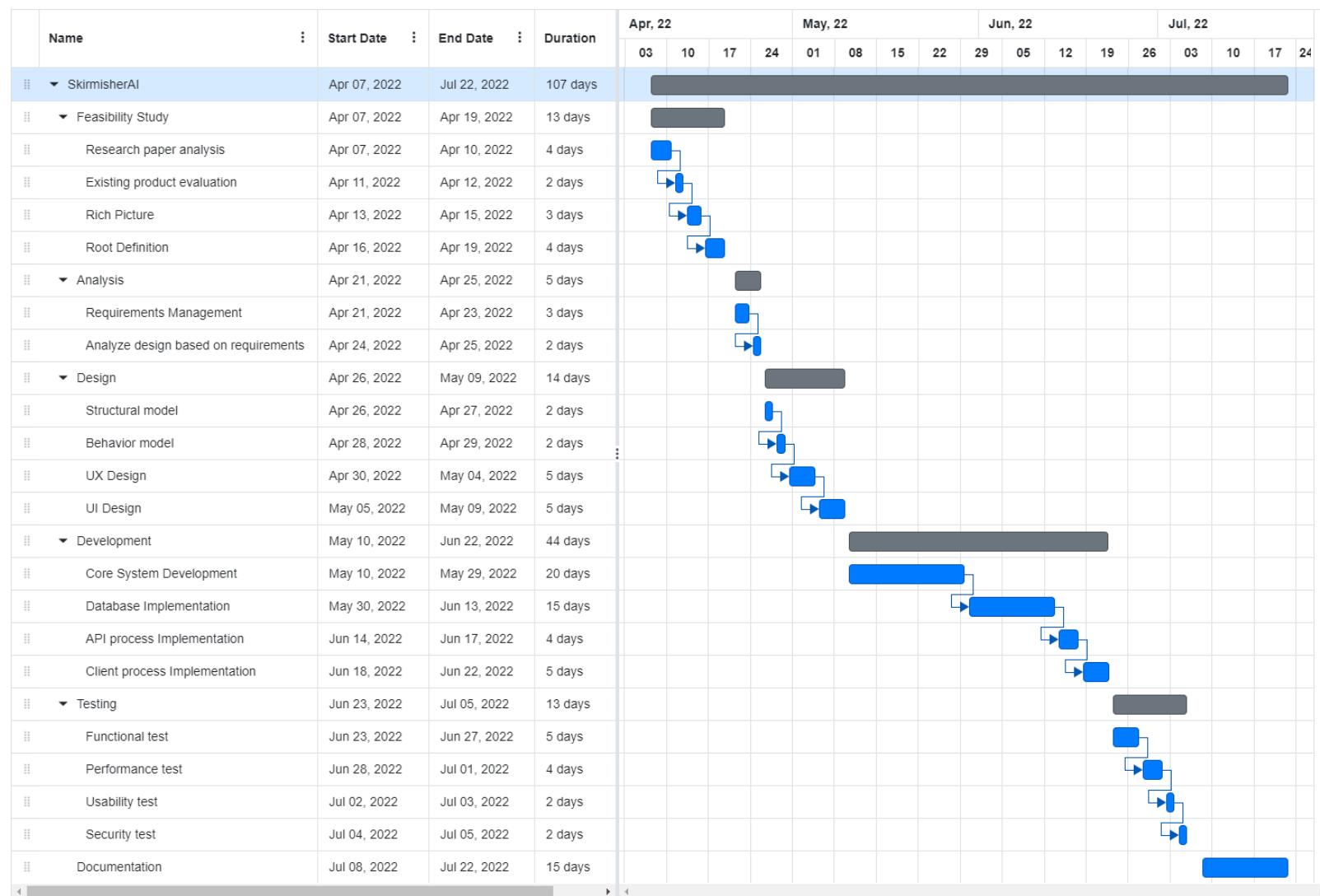


Figure 97: Proposed Gantt Chart for an approximate timeframe

Legal, Social, Ethical and Professional Issues

While developing any system, there will be several complications regarding law, socialization, ethics, and profession and these are all crucial aspects of any system's development (Bott, 2015). As a result, I'd think about any potential legal, social, ethical, or professional concerns that the proposed solution might face as the system evolves, as well as how to address them. Additionally, as a developer, I will utilize the BCS code of conduct to assure interests of the public, professionalism, and ethics in my project, and to ensure quality standards (British Computer Society, 2021). Correspondingly, I will conduct in a way that does not affect or contradict any social, ethical, or legal concerns within the IT profession, and I will be devoted enough to acknowledge and enhance my skills inside my field of expertise.

19.2 Appendix B: Full Description of Each Interview

Interview Session:

| SL. | Question | Participant | Answer |
|------------|---|--------------------|---|
| 1 | Are you in charge of human resources? | Participant 1 | Yes, I have been managing employees for over two years now. |
| 2 | How frequently do you bring on new personnel for your business? | | Employee retention occurs frequently, and as a growing business, we continually hire new employees. |
| 3 | How do you source candidates? | | Normally we publish open positions at various online platforms in addition to our website. |
| 4 | How many applications you receive against a position? | | Since we offer fair salary and work-life balance, I believe more than 6 thousand applications in average. |

| | | | |
|----|---|----------------|---|
| 5 | How do you select ideal candidate from huge applications? | | To be honest, most of the time we do not evaluate every applicant from the huge pool of resumes. Even though it takes a long time, we have a committed team who qualify such applicants. |
| 6 | How do you think the hiring process can be faster and superlative? | | Well, I suppose we could save a lot of time and money if we could review resumes using software in a more legible way. Besides, we could organize and keep track of applications within software rather than writing on paper. |
| 7 | Hi, do you work or study? | | I recently received my degree and am looking for work in the software development industry. |
| 8 | Where do you look for open positions? | | Newspapers and online websites both typically offer information about jobs, but websites do so better. |
| 9 | How do you think these websites can improve while looking for job? | Participant 2 | Well, as a job seeker, I believe more transparency would be better for us since not all companies have same reputation. I frequently look for a specific kind of job in a specific company that matches my professional skills. |
| 10 | What if you could measure your qualifications for a job before you applied? | | Wow, what a fantastic question, yes, I would want to know where I stand before striving for a position that was beyond my reach. |
| 11 | Does your company require talented employee? | | Of course, it does for every business, but as an IT business, we require it the most. |
| 12 | How challenging is it to find suitable candidate? | Participants 3 | For our company, finding the proper talent has always been the most challenging task. Even if we train our staff, unfit individuals cannot receive the same level of training. |

| | | | |
|----|---|-------------------|--|
| 13 | How do you hire talents for your company? | Participants 4 | We post job openings on numerous websites, and after receiving applications, we shortlist candidates by reviewing their resumes with the help of our devoted HR Team. |
| 14 | How do you think the process could be faster? | | Well, I think it would speed up the process if we could post the opening in one place, shortlist candidates, and conduct interviews there. |
| 15 | What is your company's biggest asset? | | The most valuable resource in my company is its human resources, or so-called employees. |
| 16 | How do you gather human resources for your company? | | I appoint people based on a variety of factors, including their outstanding social skills. As a result, prior to hiring, evaluate their resume and invite them for an interview. |
| 17 | How do you feel about the process? | | Most of the time, I rely on my knowledgeable employers who can find and assess candidates after an expanded procedure. |
| 18 | What could be improved in the hiring process? | | Technically, I think it is possible to choose the best candidate if we can narrow down the most qualified applicants automatically from a pool of applications. |

Observation Session:

| SL. | Observation Object | Findings |
|-----|--------------------|---|
| 1 | Job Seekers | Job seekers are fervently searching for opportunities that will confirm their employment after graduation or being laid off. When looking for work, they occasionally browse various websites and social media platforms. Hence, most of the time, they are either misinformed or unable to discover suitable opportunities online. |

| | | |
|---|-------------------------|--|
| | | In addition, they even seek for jobs with employers who have a poor reputation or are out of reach. |
| 2 | Human Resource Managers | In general, HR posts job openings online and then gathers resumes for evaluation. Frequently, their postings do not however reach qualified job seekers or talented individuals. On the other side, they narrow down their list of candidates by reviewing resumes, supporting documents, and any necessary calling with the help of diverse software's. To save time and money, they frequently had to reject numerous resumes. |

Questionnaire Session:

| ID | Question | Choice | Answer Rate |
|----|---|---|---|
| 1 | Is Finding Appropriate job easy? | A. Strongly Agree. B. Strongly Disagree. C. Neither agree nor disagree | A- 60 Response B- 170 Response C- 22 Response |
| 2 | I look for open Positions in _____. | A. Job Platforms B. Social Media C. Company Sites D. All Above | A. 100 Response B. 27 Response C. 14 Response D. 60 Response |
| 3 | What job specifics is most important for you? | A. Company Reputation B. Salary Information C. Job Facilities D. All Above | A. 33 Response B. 91 Response C. 46 Response D. 105 Response |
| 4 | Do you support automated recruiting system / application tracking software? | A. Yes. B. No. C. Neutral. | A. 55 Response B. 64 Response C. 112 Response |
| 5 | Do companies discover apposite candidates effortlessly? | A. Agree B. Disagree C. Not Applicable | A. 34 Response B. 67 Response C. 78 Response |

19.3 Appendix C: Use Case Description

| | |
|------------------|--|
| Use Case ID: | UC_6 |
| Use Case Name | Manage Job Application |
| Actors | Employer, Candidate |
| Pre-conditions | The user must be an authorized user of the system. |
| Normal Flow | <ul style="list-style-type: none">I. User requires to be signed into the system.II. User needs to provide accurate user information to system.III. User needs to navigate to dashboard.IV. User needs to select Jobs from navigation Menu.V. User can view all the job applications/ Applied jobs Presented. |
| Alternative Path | N/A |
| Post-Conditions | Table or Card with Job Applications will be present if enough data. |

| | |
|----------------|--|
| Use Case ID: | UC_7 |
| Use Case Name | Predict Suitability Score |
| Actors | Employer |
| Pre-conditions | The user must be an authorized user of the system. |

| | |
|------------------|---|
| Normal Flow | <ul style="list-style-type: none"> I. User requires to be signed into the system. II. User needs to provide accurate user information to system. III. User needs to navigate to dashboard. IV. User needs to select Jobs from navigation Menu. V. User needs to click view of Specific Job applications. |
| Alternative Path | N/A |
| Post-Conditions | If any application available, their Suitability Score will be present. |

| | |
|------------------|---|
| Use Case ID: | UC_8 |
| Use Case Name | Evaluate Skill Match |
| Actors | Employer |
| Pre-conditions | The user must be an authorized user of the system. |
| Normal Flow | <ul style="list-style-type: none"> I. User requires to be signed into the system. II. User needs to provide accurate user information to system. III. User needs to navigate to dashboard. IV. User needs to select Jobs from navigation Menu. V. User needs to click view of Specific Job applications. |
| Alternative Path | N/A |
| Post-Conditions | If any application available, their Skill Match Percentage will be present. |

| | |
|------------------|--|
| Use Case ID: | UC_9 |
| Use Case Name | Personalized Resume |
| Actors | Candidate, Employer |
| Pre-conditions | The user must be an authorized user of the system. |
| Normal Flow | <ul style="list-style-type: none"> I. User requires to be signed into the system. II. User needs to provide accurate user information to system. III. User needs to navigate to Profile and Upload their resume. IV. Employers can view personalized resume from job applications. |
| Alternative Path | <ul style="list-style-type: none"> I. User can navigate to profile from Dropdown User Menu. II. User needs to upload resume. |
| Post-Conditions | Personalized user profile will be created and can be viewed in instant. |

| | |
|----------------|---|
| Use Case ID: | UC_10 |
| Use Case Name | Report Generation |
| Actors | Super User, Employer |
| Pre-conditions | The user must be an authorized user of the system. |
| Normal Flow | <ul style="list-style-type: none"> I. User requires to be signed into the system. II. User needs to provide accurate user information to system. III. User needs to navigate to Dashboard and select reports from left menu. IV. User should select a specific Job for Reports. |

| | |
|------------------|---|
| | |
| Alternative Path | N/A |
| Post-Conditions | Report will be generated with Chart and Export to CSV function. |

19.4 Appendix D: Data Dictionary

UserAccount Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|--------------|-----------|--------------|-------------|----------------|
| id | bigint | | Primary Key | Auto Increment |
| password | varchar | 128 | | |
| name | varchar | 70 | | |
| email | Varchar | 80 | Unique | |
| Is_superuser | Boolean | | | |
| Is_active | Boolean | | | |
| Role | Smallint | | | |

EmployerProfile Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|--------------|-----------|--------------|-------------|----------------|
| id | bigint | | Primary Key | Auto Increment |
| Company Name | varchar | 70 | | |
| Slogan | varchar | 120 | | |
| Website | Varchar | 80 | | |
| Phone | Varchar | 20 | | |

| | | | | |
|------------|----------|-----|-------------|------------------------|
| Location | Varchar | 100 | | |
| About | text | 300 | | |
| Logo | varchar | 80 | | |
| Size | Varchar | 100 | | |
| Timestamps | DateTime | | | |
| User ID | Int | | Foreign Key | UserAccount Table (PK) |

CandidateProfile Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|-------------|-----------|--------------|-------------|------------------------|
| id | bigint | | Primary Key | Auto Increment |
| Designation | varchar | 70 | | |
| Resume File | varchar | 120 | | |
| Website | Varchar | 80 | | |
| Phone | Varchar | 20 | | |
| Location | Varchar | 100 | | |
| Name | Varchar | 80 | | |
| Email | varchar | 80 | | |
| Resume Text | Text | 2500 | | |
| Timestamps | DateTime | | | |
| User ID | Int | | Foreign Key | UserAccount Table (PK) |

Vacancy Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|----------------|-----------|--------------|-------------|----------------|
| id | bigint | | Primary Key | Auto Increment |
| Job Title | varchar | 120 | | |
| Type | varchar | 50 | | |
| Qualifications | text | 300 | | |

| | | | | |
|---------------|----------|-----|-------------|-----------------------------|
| Work Location | Varchar | 90 | | |
| Salary | Varchar | 100 | | |
| Description | Text | 500 | | |
| Benefits | varchar | 150 | | |
| Level | Varchar | 120 | | |
| Timestamps | DateTime | | | |
| Employer ID | Int | | Foreign Key | Employer Profile Table (PK) |

Job Application Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|----------------|-----------|--------------|-------------|------------------------------|
| id | bigint | | Primary Key | Auto Increment |
| Total Score | Decimal | 10 | | 2 Decimal Point |
| Skill Score | Decimal | 10 | | 2 Decimal Point |
| Qualifications | Decimal | 10 | | 2 Decimal Point |
| Status | Varchar | 50 | | |
| Timestamps | DateTime | | | |
| Candidate ID | Int | | Foreign Key | Candidate Profile Table (PK) |
| Vacancy ID | Int | | Foreign Key | Vacancy Table (PK) |

Job Invitation Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|------------|-----------|--------------|-------------|----------------|
| id | bigint | | Primary Key | Auto Increment |
| Meet URL | Varchar | 100 | | |
| Schedule | DateTime | | | |
| Remarks | Varchar | 70 | | |
| Timestamps | DateTime | | | |

| | | | | |
|--------------------|-----|--|-------------|----------------------------|
| Job Application ID | Int | | Foreign Key | Job Application Table (PK) |
|--------------------|-----|--|-------------|----------------------------|

Education Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|--------------|-----------|--------------|-------------|------------------------------|
| id | bigint | | Primary Key | Auto Increment |
| Name | Varchar | 100 | | |
| Details | Text | 300 | | |
| Timestamps | DateTime | | | |
| Candidate ID | Int | | Foreign Key | Candidate Profile Table (PK) |

Experience Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|--------------|-----------|--------------|-------------|------------------------------|
| id | bigint | | Primary Key | Auto Increment |
| Name | Varchar | 100 | | |
| Details | Text | 300 | | |
| Timestamps | DateTime | | | |
| Candidate ID | Int | | Foreign Key | Candidate Profile Table (PK) |

Skill Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|------------|-----------|--------------|-------------|----------------|
| id | bigint | | Primary Key | Auto Increment |
| Name | Varchar | 100 | | |

| | | | | |
|--------------|----------|--|-------------|------------------------------|
| Timestamps | DateTime | | | |
| Candidate ID | Int | | Foreign Key | Candidate Profile Table (PK) |

Social Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|--------------|-----------|--------------|-------------|------------------------------|
| id | bigint | | Primary Key | Auto Increment |
| Name | Varchar | 100 | | |
| Details | Text | 300 | | |
| Timestamps | DateTime | | | |
| Candidate ID | Int | | Foreign Key | Candidate Profile Table (PK) |

Project Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|--------------|-----------|--------------|-------------|------------------------------|
| id | bigint | | Primary Key | Auto Increment |
| Name | Varchar | 100 | | |
| Details | Text | 300 | | |
| Timestamps | DateTime | | | |
| Candidate ID | Int | | Foreign Key | Candidate Profile Table (PK) |

Contact Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|------------|-----------|--------------|-------------|----------------|
| id | bigint | | Primary Key | Auto Increment |
| Name | Varchar | 100 | | |

| | | | | |
|------------|----------|-----|--|--|
| Email | Varchar | 70 | | |
| Message | Text | 300 | | |
| Timestamps | DateTime | | | |

Blog Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|-------------|-----------|--------------|-------------|------------------------|
| id | bigint | | Primary Key | Auto Increment |
| Title | Varchar | 100 | | |
| Tags | Varchar | 150 | | |
| Description | Text | 1200 | | |
| Slug | Varchar | 200 | unique | |
| Timestamps | DateTime | | | |
| Author ID | Int | | Foreign Key | UserAccount Table (PK) |

Newsletter Table:

| Attributes | Data Type | Field Length | Constraint | Remarks |
|------------|-----------|--------------|-------------|----------------|
| id | bigint | | Primary Key | Auto Increment |
| Email | Varchar | 70 | | |
| Timestamps | DateTime | | | |

19.5 Appendix E: Final Product Screenshots

Dashboard Module:

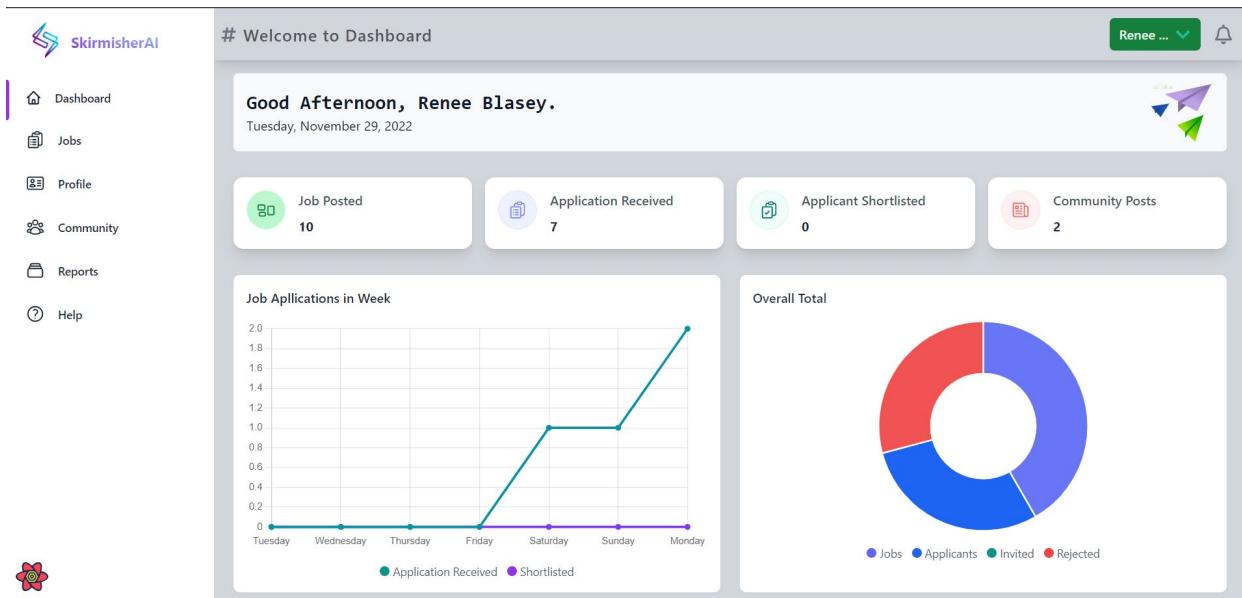


Figure 98: Employer Dashboard Module

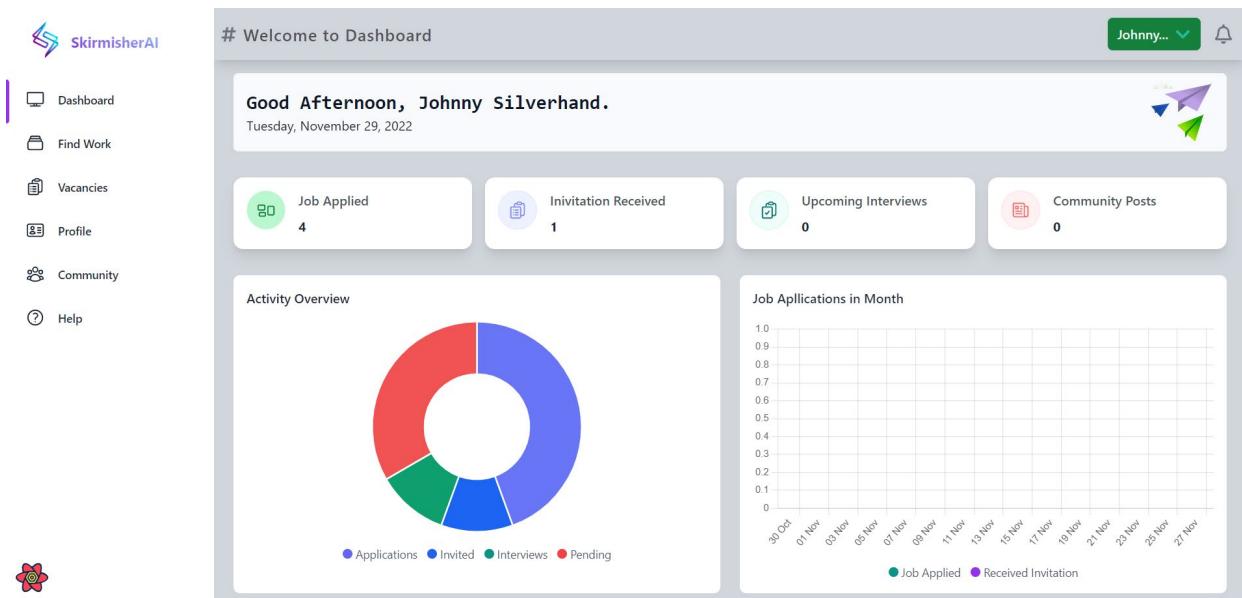


Figure 99: Candidate Dashboard

The screenshot shows the SkirmisherAI administrator dashboard. On the left is a sidebar with a user profile for 'Takinur M' and a navigation menu including 'Dashboard', 'Base' (Manage Users, Employer Profiles, Candidate Profiles, Manage Vacancies, Job Applications, Interview Invitations, Community Posts, Contact Messages, Newsletter Subscribers), 'Django Q' (Failed tasks, Queued tasks), and a 'Recent actions' section.

The main area has two sections: 'Base' and 'Token Blacklist'. The 'Base' section contains links for Manage Users, Employer Profiles, Candidate Profiles, Manage Vacancies, Job Applications, Interview Invitations, Community Posts, Contact Messages, and Newsletter Subscribers, each with 'Add' and 'Change' buttons. The 'Token Blacklist' section shows 'Blacklisted tokens' and 'Outstanding tokens' with similar 'Add' and 'Change' buttons.

Figure 100: Administrator Dashboard

Manage Job Module:

The screenshot shows the 'Manage Job Posting' page. The top navigation bar includes the SkirmisherAI logo, a user dropdown for 'Renee ...', and a bell icon. The sidebar on the left has links for 'Dashboard', 'Jobs' (selected), 'Profile', 'Community', 'Reports', and 'Help'.

The main content area features a 'POST A NEW JOB →' button. Below it is a table with columns: JOB TITLE, TYPE, SALARY INFO, LOCATION, POSTED, and ACTIONS. The table lists several job postings:

| JOB TITLE | TYPE | SALARY INFO | LOCATION | POSTED | ACTIONS |
|--|-----------------------------|-----------------------|------------------|---------------------|---------|
| React Hook and Django RestAPI Developer | Full-Time, Remote | \$142,000 - \$169,000 | California, USA | Less than a min ago | |
| Nuxt and Vue 3 Composition API Developer | Full-Time, Remote | \$115,000 - \$120,000 | Silicon Valley | 1 days ago | |
| Senior Python Developer | Full-Time, Remote | \$115,000 - \$120,000 | Silicon Valley | 3 days ago | |
| Data Entry Expert | Full-Time, Remote | \$115,000 - \$120,000 | Edmonton, Canada | 3 days ago | |
| Cyber Security Analyst | Full-Time, Remote | \$155,000 - \$120,000 | Alberta, CA | 3 days ago | |
| NodeJS and React Developer | Full-Time, Remote | \$107,000 - \$109,000 | Ottawa, Japan | 4 days ago | |
| Next JS Developer | Part-Time Full-Time, Remote | \$75,000 - \$100,000 | Silicon Valley | 5 days ago | |
| Unity Game Developer Needed | Part-Time Full-Time, Remote | \$80,000 - \$90,000 | Okaholma, Japan | 5 days ago | |
| Python FastAPI Engineer | Full-Time, Remote | \$135,000 - \$140,000 | Switzerland | 6 days ago | |

At the bottom, it says 'Showing 1 out of 1 Pages'.

Figure 101: Manage Jobs – Employer

Post new job for talent hiring

General Information

Add a interesting title to your post. This will help candidates to find your post easily. Also add what type of job you are offering. You can also add the location of the job and the expected salary range.

Enter the name of your Job post
Example: MERN Stack Developer

What type of Job you offer
Example: Full-Time / Remote / Part-Time

Salary (Optional) Location
Example: \$60000 - \$80000 / Year Add regions or Cities

CONTINUE

Additional Information

Benefits are the perks that you offer to your employees. You can add multiple benefits to your post. Experience level is the level of experience that you are looking for in your candidates. Qualifications are the skills that you are looking for in your candidates.

Benefits Experience
Example: 401K, Health Insurance

Figure 102: Publishing New Job

Salary (Optional) Location
\$142,000 - \$169,000 California, USA
Example: \$60000 - \$80000 / Year Add regions or Cities

CONTINUE

Additional Information

Benefits Experience
Flexible Working Hours Freshers are encouraged
Example: 401K, Health Insurance

Qualifications for Job
Select From dropdown

Other details about the job
We are searching for an experienced full stack software engineer to help us build and support various APIs, front-ends, and tools at STEM Sims. The ideal candidate should be capable of engineering at all levels of the stack, communicating with customers, and building scalable/robust applications. Required Qualifications Bachelor's degree in computer science, engineering, or other scientific degrees or 4+ years of experience building software 1+ years of experience in a full stack environment Excellent communication and interpersonal skills Experience with JavaScript

UPDATE JOB

Figure 103: Updating Published Job

The screenshot shows the SkirmisherAI platform's job listing interface. A modal dialog box is centered over the list of jobs, asking "Unpublishing Job, Are you sure?". It includes a trash can icon, a "Cancel" button, and a prominent red "Unpublish" button. Below the modal, the main table has a row for a "Senior Javascript (React) Developer" job.

| JOB TITLE | TYPE | SALARY INFO | LOCATION | UNPUBLISHED | ACTIONS |
|-------------------------------------|-------------------|-----------------------|----------------|-------------|---------|
| Senior Javascript (React) Developer | Full-Time, Remote | \$125,000 - \$130,000 | Silicon Valley | 1 hours ago | |

Figure 104: Unpublishing Job

The screenshot shows the "Manage Vacancies" section of the SkirmisherAI platform. On the left, a sidebar menu is open, showing options like Dashboard, Manage Users, Employer Profiles, Candidate Profiles, and Manage Vacancies (which is currently selected). The main content area displays a table of vacancies with columns for Title, Type, Level, Salary, Benefits, Qualifications, Work location, Employer, and Created at. Three vacancies are listed: "Node JS Developer", "PHP Laravel Developer", and "Unity Game Developer Needed".

| Title | Type | Level | Salary | Benefits | Qualifications | Work location | Employer | Created at |
|-----------------------------|------------------------------|---------------------------------|-----------------------|---------------------------------------|---|-----------------|---------------------------|--------------------------|
| Node JS Developer | Full-Time | Nice to have 1 Years | \$68000-\$140000 | Paid Leave | JavaScript, React, Node | Toronto, CA | Respawn Entertainment LTD | Nov. 29, 2022, 6:38 a.m. |
| PHP Laravel Developer | Full-Time, Remote, Part-Time | 1+ Years of Experience Required | \$135,000 - \$145,000 | Health Insurance, 401K | JavaScript, React, HTML, Python, Django | Regina, Canada | Pitt Productions | Nov. 27, 2022, 9:36 a.m. |
| Unity Game Developer Needed | Part-Time, Full-Time, Remote | No Experience Required | \$80,000 - \$90,000 | Paid Vacation, Health Insurance, 401K | NextJS, Git, Postgres | Okaholma, Japan | Alphabet Inc | Nov. 23, 2022, 9:36 a.m. |

Figure 105: Manage Jobs – Admin

Find work and Job Application Module:

The screenshot shows a web application interface for finding work. At the top, there is a navigation bar with links for Home, Find Work, Community, Company, Contact, and a user profile "Howdy, Johnny". Below the navigation is a search bar with the placeholder "What Job title, keywords or company" and a magnifying glass icon.

Under the search bar, it says "Showing 15 Jobs" and "Sort by: Most Recent". There are three job listings on the left:

- Python Full-stack Developer** at Apple Inc. (Clagary, Canada) posted 23 hours ago. Tags: JavaScript, React, HTML, Python, Django.
- Senior Frontend Developer** at Amazon.com (Tokyo, Japan) posted 23 hours ago. Tags: JavaScript, React, HTML, Python, Django.
- Nuxt and Vue 3 Composition API Developer** at Alphabet Inc. (Silicon Valley) posted 1 day ago. Tags: JavaScript, React, HTML, Python, Django.

On the right, there is a detailed view of a job listing for an **Amazon Web Services Engineer** at Netflix Inc. (Los Gatos, CA) posted 3 days ago. The job requires 1000-2000 people and includes a link to https://www.netflix.com. It specifies "No Experience" required, "Full-Time, Remote" employee type, and a salary range of "\$85,000 - \$95,000".

Figure 106: Find Work Module

The screenshot shows a detailed view of a job listing for an **Amazon Web Services Engineer** at Netflix Inc. (Los Gatos, CA) posted 3 days ago. The job requires 1000-2000 people and includes a link to https://www.netflix.com. It specifies "No Experience" required, "Full-Time, Remote" employee type, and a salary range of "\$85,000 - \$95,000".

The "Overview" section contains the following text:

We are searching for an experienced full stack software engineer to help us build and support various APIs, front-ends, and tools at STEM Sims. The ideal candidate should be capable of engineering at all levels of the stack, communicating with customers, and building scalable/robust applications. Required Qualifications Bachelor's degree in computer science, engineering, or other scientific degrees or 4+ years of experience building software 1+ years of experience in a full stack environment Excellent communication and interpersonal skills Experience with JavaScript

The "Qualifications" section lists the following tags: Lambda, VM, Serverless, Python, etc.

Figure 107: Job Details

The screenshot shows the SkirmisherAI interface. On the left is a sidebar with icons and text for Dashboard, Find Work, Vacancies, Profile, Community, Help, and a user icon. The main area has a header "# Jobs that you applied" and a sub-header "Applied Jobs". It displays four job applications:

- React Hook and Django RestAPI Developer** at Alphabet Inc. Status: Invited. Applied Less than a min ago. Interview at: 2022-11-29. Buttons: Join (green), Applied (disabled).
- Cyber Security Analyst** at Alphabet Inc. Status: Applied. Applied Less than a min ago. Buttons: Invited (disabled), Applied (red).
- Nuxt and Vue 3 Composition API Developer** at Alphabet Inc. Status: Applied. Applied 1 minutes ago. Buttons: Invited (disabled), Applied (red).
- Amazon Web Services Engineer** at Netflix Inc. Status: Applied. Applied 1 minutes ago. Buttons: Invited (disabled), Applied (red).

Figure 108: Applied Jobs with Status

The screenshot shows the SkirmisherAI interface for the "React Hook and Django RestAPI Developer" job. The sidebar is identical to Figure 108. The main area has a header "React Hook and Django RestAPI Developer" and a "Sort by: Most Suitable" dropdown. It displays five application entries:

| # | Candidate Name | Email | Skill Match | Suitability | Applied | Action |
|----|-----------------|--------------------|-------------|-------------|------------------------------------|-----------|
| #1 | TAKINUR I MAHIM | takinurm@gmail.com | 100% | 92.15% | Less than a min ago 29 Nov 2022 | Shortlist |
| #2 | Aiden Pearce | aiden@gmail.com | 100% | 70.2% | 17 hours ago 28 Nov 2022 | Shortlist |
| #3 | Elliot Alderson | elliot@gmail.com | 85% | 60.98% | 17 hours ago 28 Nov 2022 | Shortlist |
| #4 | Trevor Philips | trevor@gmail.com | 10.1% | 30.47% | 1 days ago 27 Nov 2022 | Shortlist |
| #5 | Geralt of Rivia | gerate@dmail.com | 25.69% | 30% | 2 days ago 26 Nov 2022 | Shortlist |

Figure 109: Received Application

The screenshot shows the SkirmisherAI application details page. On the left is a sidebar with navigation links: Dashboard, Jobs, Profile, Community, Reports, and Help. The main area displays two candidates:

- #1 TAKINUR I MAHIM**: Email: takinurm@gmail.com, Skill Match: 100%, Suitability: 92.15%, Last updated: Less than a min ago (29 Nov 2022). Status: Shortlist.
- #2 Aiden Pearce**: Email: aiden@gmail.com, Skill Match: 100%, Suitability: 70.2%, Last updated: 17 hours ago (28 Nov 2022). Status: Shortlist.

Below the candidates is a section titled "Personal Information" with fields: Name (Aiden Pearce), Email (aiden@gmail.com), Phone (Not Provided), Title (Python Developer), Portfolio (Not Provided), and Location (United Kingdom). There is a "VIEW ORIGINAL RESUME" button and an "INVITE" button.

Under "Professional Skills", there is a grid of skill tags: product quality, Docker, JavaScript, PHP, analyze, Administration, servers, reports, Oracle, system, coding, API, SQL, Programming, Database, Django, SEO, Testing, MySQL, Python, Matplotlib, HTML, UX, Website, Agile, English, AWS, process, troubleshooting, PostgreSQL, Tensorflow, Pandas, testing, UI, Design, workflow, TensorFlow, website, Linux, research, CSS.

At the bottom is a section titled "Work Experience".

Figure 110: Application Details

The screenshot shows the SkirmisherAI job details page for a position titled "React Hook and Django RestAPI Developer". The sidebar on the left is identical to Figure 110. The main area shows a single candidate:

- #1 TAKINUR I MAHIM**: Email: takinurm@gmail.com, Skill Match: 100%, Suitability: 92.15%, Last updated: Less than a min ago (29 Nov 2022). Status: Shortlisted.

Below the candidate is a section titled "Personal Information" with fields: Name (TAKINUR I MAHIM), Email (takinurm@gmail.com), Phone (075 1234 5678), Title (Web Developer), Portfolio (www.takinur.com), and Location (Greenwich, London). There is a "VIEW ORIGINAL RESUME" button and an "Interview Info: 2022-11-29 Join" button.

Under "Professional Skills", there is a grid of skill tags: AWS, Tensorflow, SEO, React, Python, RestAPI, Django, NextJS, Database, PostgreSQL, MySQL, Git, Docker, Shell, OOP, PHP, Python, API, SCSS, SQL, HTML5, CSS3, Figma, Vue, Tailwind, Bootstrap, English, Matplotlib, Nginx, Apache, Testing, Agile, DRY, C#, Java.

Figure 111: Shortlisted Candidate

The screenshot shows the SkirmisherAI application management interface. On the left is a dark sidebar with user information (Takinur M) and a navigation menu including Dashboard, Manage Users, Employer Profiles, Candidate Profiles, Manage Vacancies, Job Applications (which is selected and highlighted in blue), Interview Invitations, Community Posts, Contact Messages, Newsletter Subscribers, Django Q, Failed tasks, and Queued tasks.

The main content area is titled "Job Applications". It features a search bar with dropdowns for "vacancy", "status", and "created at", and a "Search" button. Below the search bar is a dropdown menu set to "-----" with a "Go" button and a message "0 of 9 selected". To the right is a green "Add job application" button.

A table lists 9 job applications:

| Vacancy | Candidate | Status | Skill score | Total score | Created at |
|---|-------------------|---------|-------------|-------------|--------------------------|
| Node JS Developer | Farrah McGuire | Invited | 33.33 | 64.31 | Nov. 29, 2022, 6:39 a.m. |
| Senior Frontend Developer | Charissa Marshall | Applied | 80.00 | 82.98 | Nov. 29, 2022, 6:03 a.m. |
| Senior Javascript (React) Developer | Upton Elliott | Applied | 25.69 | 30.00 | Nov. 8, 2022, 2:51 p.m. |
| Senior Javascript (React) Developer | Bryar Lewis | Applied | 25.69 | 30.00 | Nov. 5, 2022, 2:51 p.m. |
| React Hook and Django RestAPI Developer | Bryar Lewis | Applied | 25.69 | 30.00 | Nov. 26, 2022, 2:51 p.m. |
| React Hook and Django RestAPI Developer | Stephen Cooley | Applied | 10.10 | 30.47 | Nov. 27, 2022, 2:51 p.m. |
| React Hook and Django RestAPI Developer | Gretchen Tillman | Applied | 100.00 | 70.20 | Nov. 28, 2022, 2:51 p.m. |
| React Hook and Django RestAPI Developer | Upton Elliott | Applied | 85.00 | 60.98 | Nov. 28, 2022, 2:51 p.m. |

Figure 112: Application Management by Admin

Interview Module:

The screenshot shows the SkirmisherAI interview scheduling interface. The sidebar includes links for Dashboard, Jobs, Profile, Community, Reports, Help, and a red flower icon.

The main view shows a candidate profile for #1 TAKINUR I MAHIM. The profile includes sections for Personal Information, Professional Experience, and Work Experience. A modal window is open, asking "Are you sure to invite?" with a "November 2022" calendar showing the 29th circled. The modal also has a "Remarks (Optional)" field with "If any remarks" and a "Confirm" button.

On the right, the candidate's details are shown: Name (TAKINUR I MAHIM), Title (Web Developer), Skill Match (92.15%), Suitability (Less than a min ago, 29 Nov 2022), Applied (Shortlist), and Action (VIEW ORIGINAL RESUME, INVITE). Below this, Phone (075 1234 5678) and Location (Greenwich, London) are listed, along with a list of skills: AWS, Tensorflow, Git, Docker, Tailwind, Bootstrap, product quality, MongoDB, NextJS, Database, PostgreSQL, MySQL, CSS, SQL, HTML5, CSS3, Figma, Vue, Testing, Agile, DRY, C#, Java.

Figure 113: Scheduling Interview

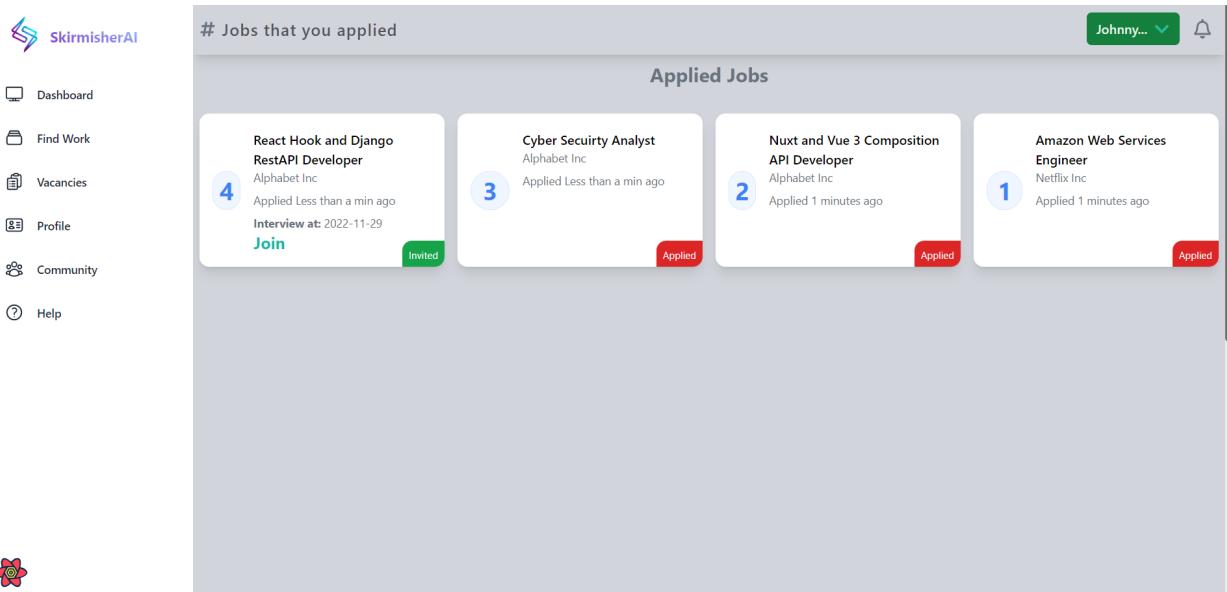


Figure 114: Interview Invitation

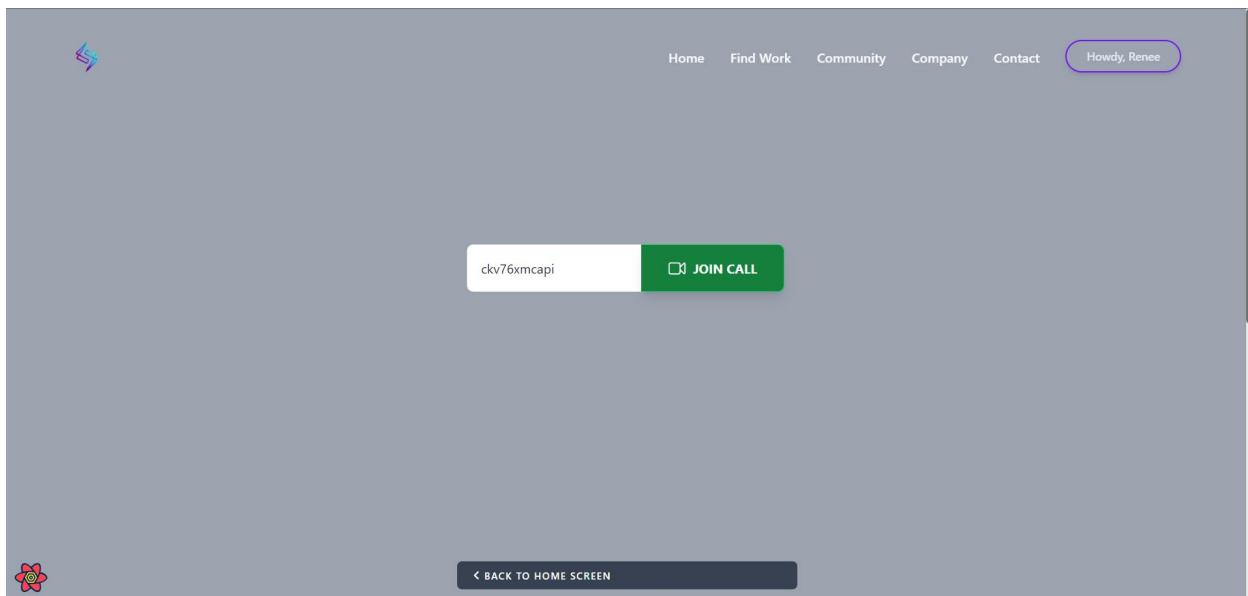


Figure 115: Joining interview session

Figure 116: Conducting Live Interview

Figure 117: Interview Management

User Profile Module:

Figure 118: Employer profile Creation

The screenshot shows the SkirmisherAI platform interface. On the left is a sidebar with navigation links: Dashboard, Jobs, Profile (which is selected and highlighted with a purple vertical bar), Community, Reports, and Help. The main content area has a header "# Manage your profile" and a green button "Renee ...". Below the header are three summary statistics: 2 Job Posted, 5 Community Posts, and 1 Comments. A user profile card for "Renee Blasey" is displayed, showing her name, company (ALPHABET INC), location (Mountainview CA 94043), and a bio: "On the Shoulder of Giants". It also includes links to her website (<https://www.google.com>), follower count (More than 10000 People), and phone number (+1 (127) 819-8212). A sidebar on the right provides options: Profile (View and modify your profile), Setting (Change your password and other settings), Help (Get help with using the platform), and Sign out (Sign out of your account). The URL in the browser address bar is 127.0.0.1:5173/user/profile.

Figure 119: Employer Profile

The screenshot shows the SkirmisherAI platform interface. On the left is a sidebar with navigation links: Dashboard, Find Work, Vacancies, Profile (selected and highlighted with a purple vertical bar), Community, and Help. The main content area has a header "# Manage your profile" and a green button "Plato ...". A modal window titled "Confirm some additional Details." is open, containing fields for "Current Designation" (set to "Student"), "Website / Portfolio (Optional)" (empty), "Location" (e.g. Greenwich, London), and a "Upload Your Resume (PDF Format Only)" section with a placeholder "Drag & Drop your resume or Browse". A "SAVE CHANGES" button is at the bottom of the modal. The URL in the browser address bar is 127.0.0.1:5173/user/profile.

Figure 120: Candidate Profile Creation

The screenshot shows a user profile page for 'Johnny Silverhand' (Candidate@GMAIL.COM). The profile is for a 'WEB DEVELOPER' located in Greenwich, London, with contact info 075 1234 5678. The page includes sections for 'Personal Information' (Name: TAKINUR I MAHIM, Title: Web Developer, Email: takinur@gmail.com, Portfolio: www.takinur.com) and 'Your Skills*' (AWS, Tensorflow, SEO, React, Python, RestAPI, Django, NextJS, Database, PostgreSQL, MySQL, Git). A sidebar on the left lists navigation options: Dashboard, Find Work, Vacancies, Profile, Community, and Help.

Figure 121: Candidate Profile

The screenshot shows the 'Employer Profiles' section of the platform. It features a search bar for 'company name', 'location', and 'phone', with a 'Search' button and an 'Add employer profile' button. Below is a table listing employer profiles:

| User | Company name | Website | Phone | Location | Created at |
|-----------------|---------------------------|--|-------------------|-------------------|--------------------------|
| Gibraltar Betty | Respwan Entertainment LTD | Good to know the World https://www.respwan.com | +63214444444444 | Munich, Germany | Nov. 29, 2022, 7:07 a.m. |
| Charde Cantu | Respwan Entertainment | Connect with friends and the world around you on Facebook. https://www.facebook.com | +66666665444 | Paris, France | Nov. 29, 2022, 6:08 a.m. |
| Mark Zuckerberg | Facebook | Don't be evil https://www.google.com | +1 (472) 583-6182 | Menlo Park, CA | Nov. 7, 2022, 1:58 p.m. |
| Steve Jobs | Google LLC | | +1 (472) 583-6182 | Mountain View, CA | Nov. 7, 2022, 1:58 p.m. |

The left sidebar shows a navigation menu with 'Employer Profiles' selected.

Figure 122: Management of Employer Profile

Figure 123: Management of Candidate Profile

Figure 124: Administrator Profile

Report Module:

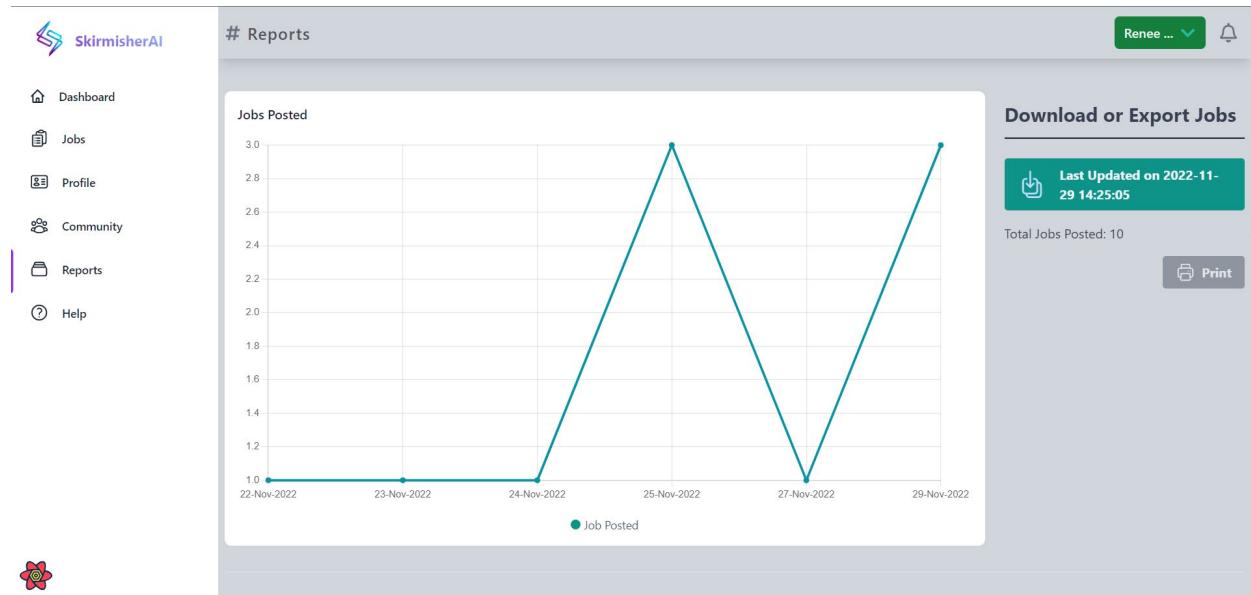


Figure 125: Job Publishing Report

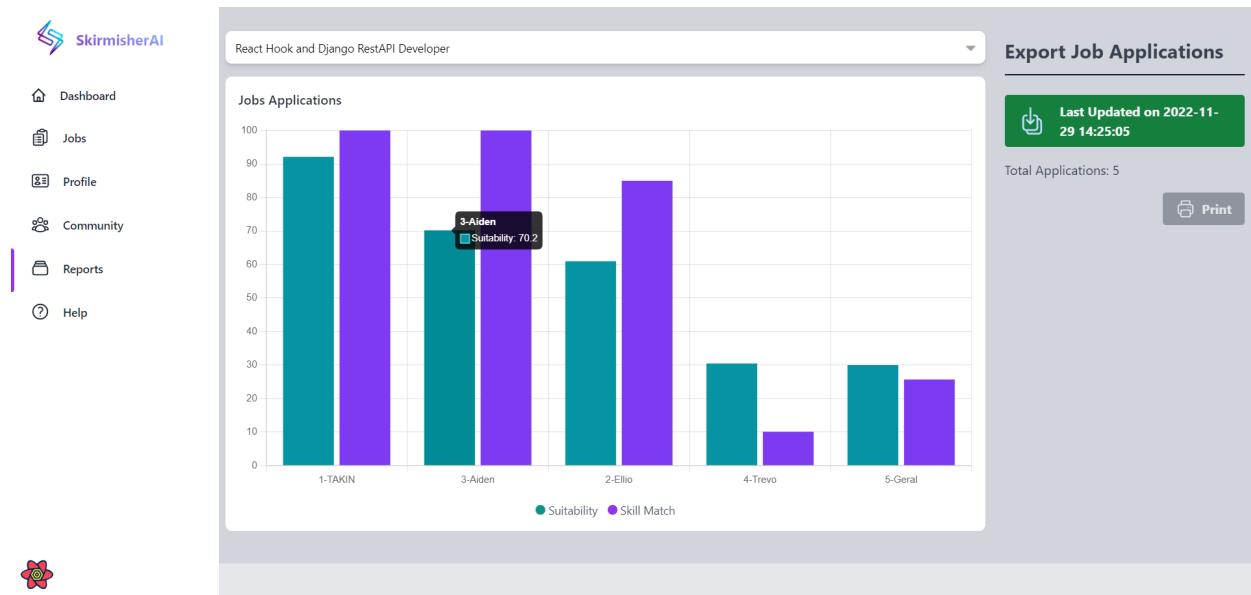


Figure 126: Job Applications Report

| Job Title | Candidate Name | Skills Match | Suitability | Applied | Candidate Title | Email | Location | Phone |
|---|-----------------|--------------|-------------|----------|-------------------|--------------------|-------------------|---------------|
| React Hook and Django RestAPI Developer | TAKINUR I MAHIM | 100 | 92.15 | 29-11-22 | Web Developer | takinurm@gmail.com | Greenwich, London | 075 1234 5678 |
| React Hook and Django RestAPI Developer | Aiden Pearce | 100 | 70.2 | 28-11-22 | Python Developer | aiden@gmail.com | United Kingdom | |
| React Hook and Django RestAPI Developer | Elliot Alderson | 85 | 60.98 | 28-11-22 | DevOPS Engineer | elliot@gmail.com | Toronto, Canada | |
| React Hook and Django RestAPI Developer | Trevor Philips | 10.1 | 30.47 | 27-11-22 | Student | trevor@gmail.com | Edmonton, Canada | 1232 123 123 |
| React Hook and Django RestAPI Developer | Gerald of Rivia | 25.69 | 30 | 26-11-22 | Security Engineer | gerate@gmail.com | Alberta, Canada | |

Figure 127: Exported Report Data

| Name | Func | Started | Stopped | Time taken | Group |
|-----------------------------|-------------------------|--------------------------|--------------------------|------------|-------|
| michigan-alabama-mango-ohio | base.tasks.update_score | Nov. 29, 2022, 6:39 a.m. | Nov. 29, 2022, 6:39 a.m. | 17.0563 | - |
| virginia-happy-oven-london | base.tasks.update_score | Nov. 29, 2022, 6:03 a.m. | Nov. 29, 2022, 6:03 a.m. | 20.854947 | - |

Figure 128: Applications Report from admin

Community Module:

The screenshot shows the Upwork website's community page. At the top, there is a dark header with the Upwork logo, navigation links for Home, Find Work, Community (which is highlighted in green), Company, Contact, and a user profile for 'Howdy, Renee'. Below the header, a large section title 'Latest Community Posts' is displayed in bold black font, with a subtitle 'Engage and Explore our Community' underneath. Two recent posts are listed:

- Say hello to my light weight post** (Light Weight)
29 November 2022
Something to remember by for 5th November...
[Read more →](#)
- Need help with resume Layout** (Help)
29 November 2022
Please Help ME...
[Read more →](#)

Figure 129: Recent Community Contents

The screenshot shows a single community post titled 'React or Vue which JavaScript Framework to choose'. The post is dated October 29, 2022. The author is Thompson Richard. The post content discusses the choice between React and Vue, mentioning that there are many JavaScript frameworks to choose from and providing reasons why one might choose React or Vue. Below the post, there are sharing options: 'Discuss on Twitter' and 'Share on other platforms', and a link to 'Hide Discussions'. A discussion section is shown below, with input fields for 'Name' and 'Write your opinion here'. The Upwork logo is visible in the bottom right corner.

Figure 130: Single Community Post with discussion part – 1

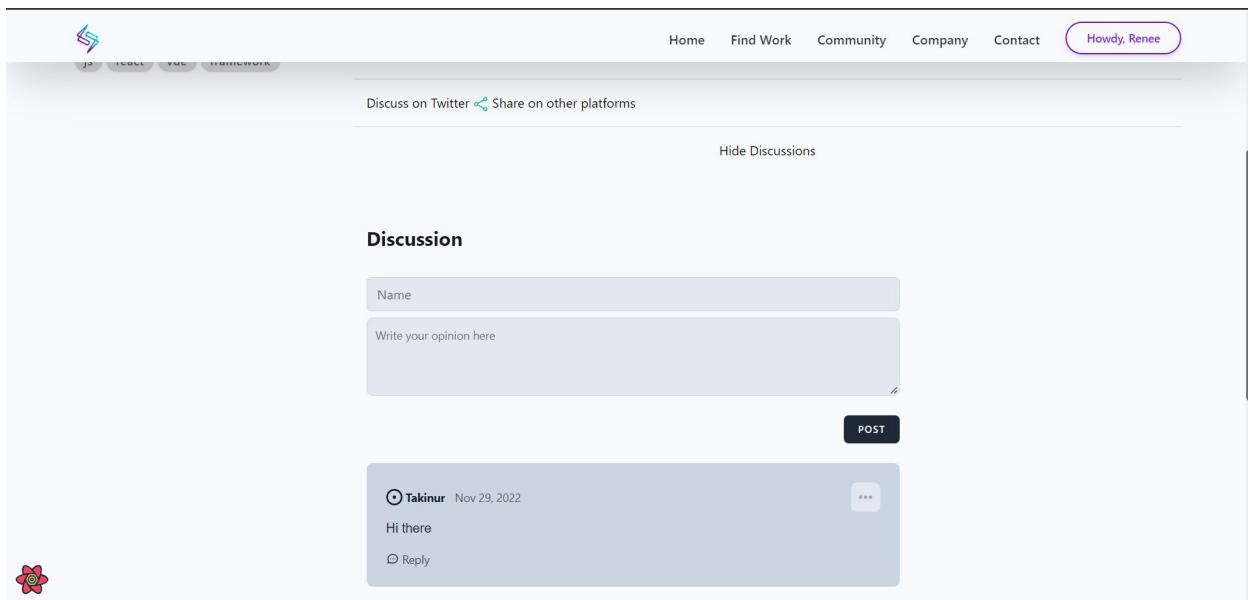


Figure 131: Community Post with discussion Part - 2

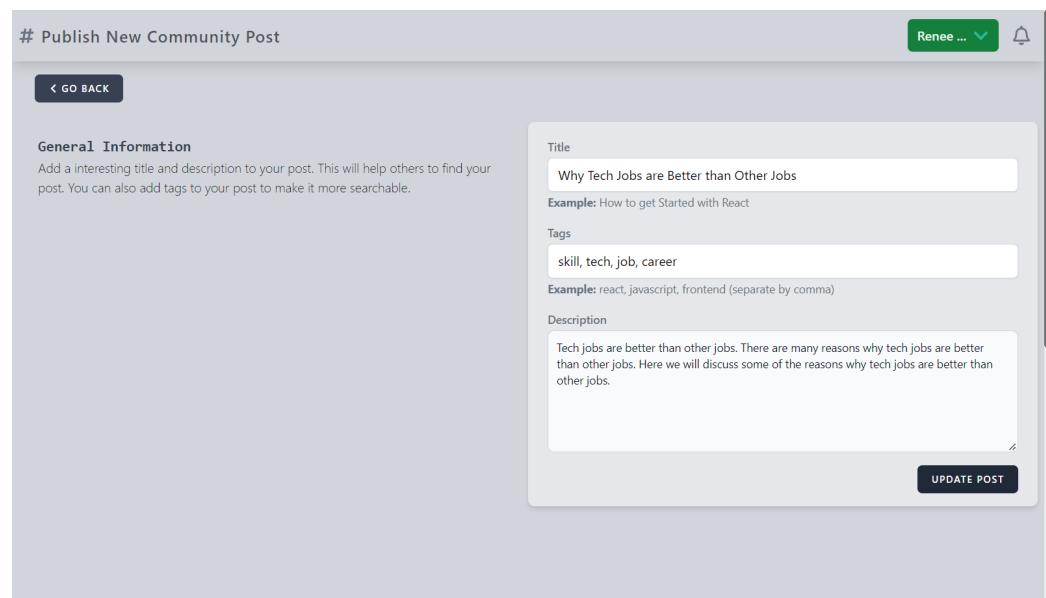


Figure 132: Updating existing community Blog

The screenshot shows the SkirmisherAI platform's interface for managing community posting. On the left, there is a sidebar with various navigation options: Dashboard, Jobs, Profile, Community (which is currently selected and highlighted in purple), Reports, and Help. The main content area has a header "# Manage Community Posting" and a purple banner with the text "See what's happening in your community!" and a "Visit →" button. Below this is a green button labeled "PUBLISH A NEW COMMUNITY POST →". The main content area displays a table of published posts:

| POST TITLE | SUMMARY | URL | POSTED |
|--|---|--|--------------|
| Why Tech Jobs are Better than Other Jobs | Tech jobs are better than other jobs. There are ma... | tech-jobs-supremacy | 1 months ago |
| Tech companies that are hiring right now | The tech industry is booming and there are many te... | tech-companies-that-are-hiring-right-now | 2 months ago |

At the bottom, it says "Showing 1 out of 1 Pages" with "Prev" and "Next" buttons.

Figure 133: Published Community Posts

The screenshot shows the SkirmisherAI platform's interface for managing community posts as an administrator. On the left, there is a sidebar with various navigation options: Dashboard, Base (selected and highlighted in blue), Manage Users, Employer Profiles, Candidate Profiles, Manage Vacancies, Job Applications, Interview Invitations, Community Posts (selected and highlighted in blue), Contact Messages, Newsletter Subscribers, Django Q, Failed tasks, and Queued tasks. The main content area has a header "Community Posts" and a breadcrumb "Home / Base / Community Posts". It includes search filters for "tags", "author", "created at", and a "Search" button. Below this is a table of community posts:

| <input checked="" type="checkbox"/> | Title | Tags | Author | Slug | Description | Created at |
|-------------------------------------|-----------------------------------|-----------------------|-------------------|-----------------------------------|---|--------------------------|
| <input checked="" type="checkbox"/> | Say hello to my light weight post | light,,weight | Farrah McGuire | say-hello-to-my-light-weight-post | Something to remember by for 5th November | Nov. 29, 2022, 6:23 a.m. |
| <input checked="" type="checkbox"/> | Need help with resume Layout | HELP | Charissa Marshall | need-help-with-resume-layout | Please Help ME | Nov. 29, 2022, 6:04 a.m. |
| <input checked="" type="checkbox"/> | Wat a min who are you? | career, resume, skill | Takinur M | wat-a-min-who-are-you | Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, | Oct. 22, 2022, 3:39 p.m. |

There is a "Delete selected Community Posts" button at the top of the table. A "Go" button and a message "8 of 8 selected" are also present. A "Add blog" button is located at the top right of the table area.

Figure 134: Managing Community as Admin

Authentication Module:

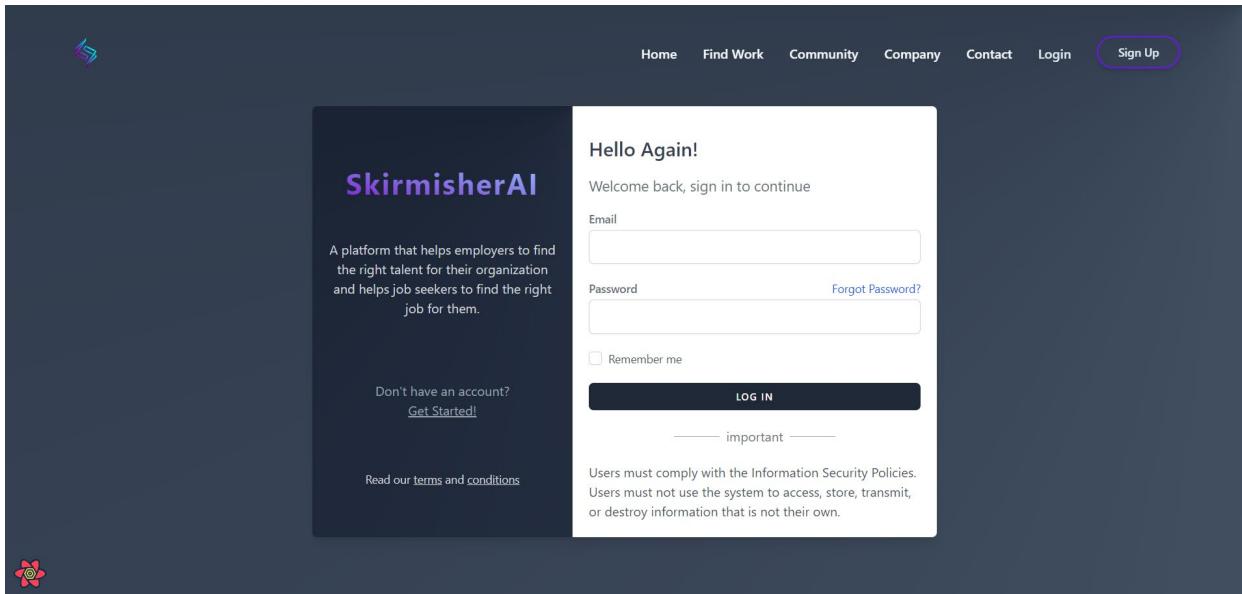


Figure 135: Login Screen

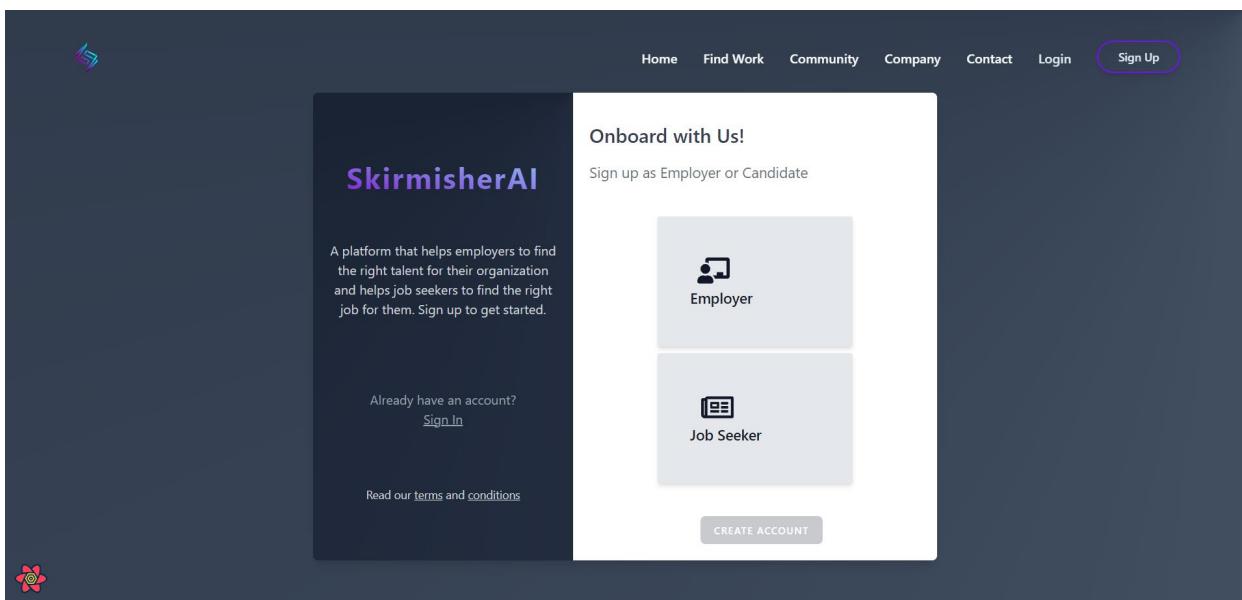


Figure 136: Registration Screen Part-1

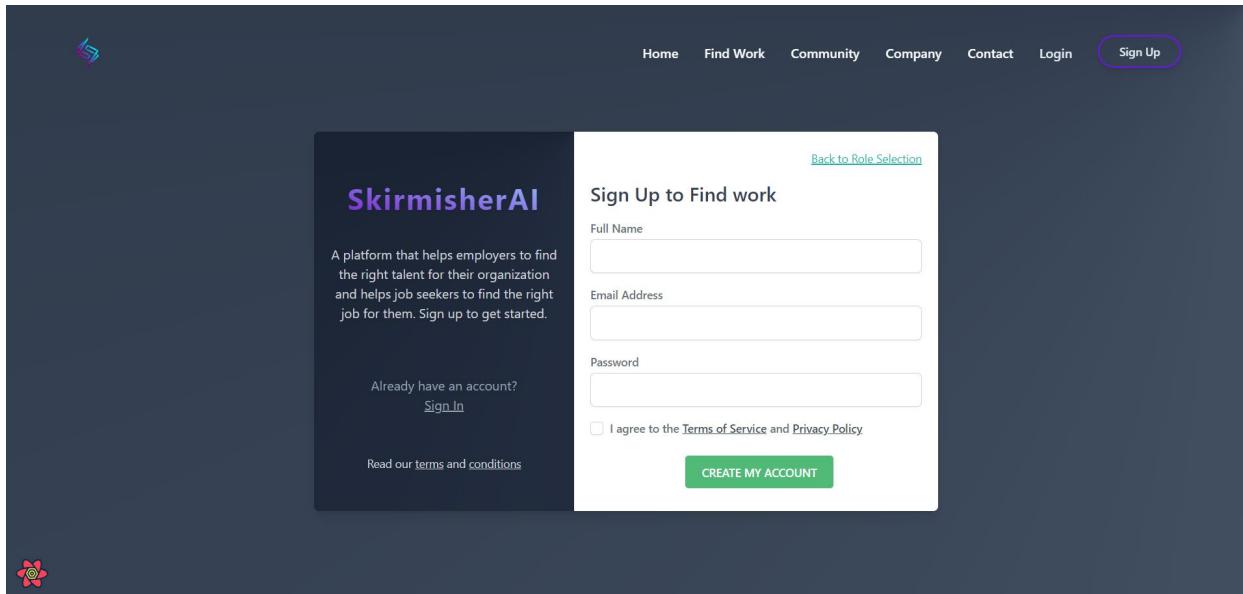


Figure 137: Registration Screen Part-2

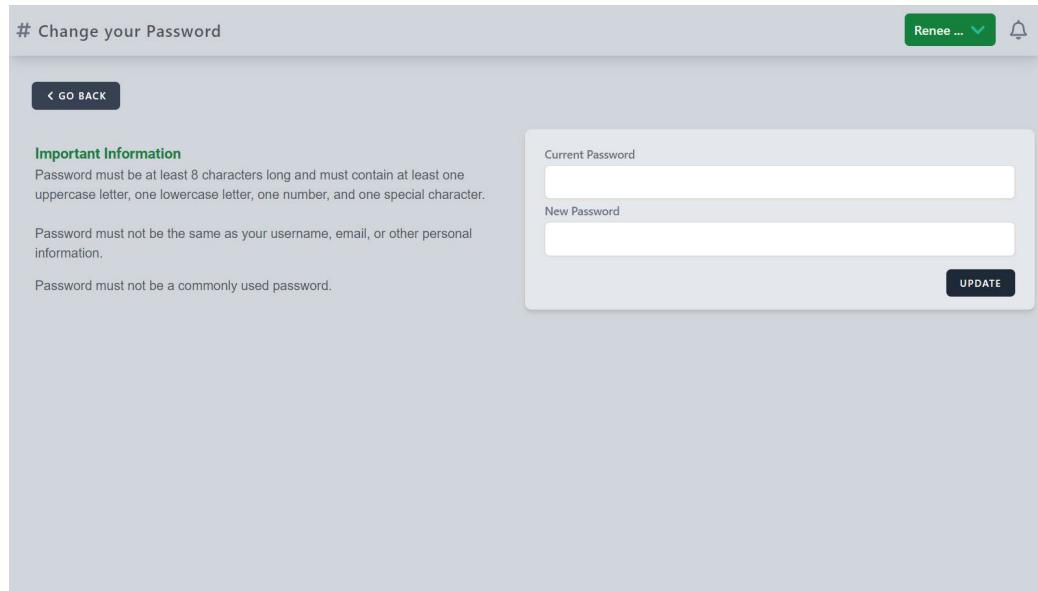


Figure 138: Updating User Password

Old password * [Text input field]

New password * [Text input field]

- Your password can't be too similar to your other personal information.
- Your password must contain at least 8 characters.
- Your password can't be a commonly used password.
- Your password can't be entirely numeric.

New password confirmation *

Change password

Figure 139: Update Password – Admin

Management of User:

Select user account to change

| | Name | Email | Is superuser | Is staff | Role |
|--------------------------|-------------------|--------------------------|-------------------------------------|-------------------------------------|-----------|
| <input type="checkbox"/> | Emerald Kennedy | hovryruxy@mailinator.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | EMPLOYER |
| <input type="checkbox"/> | Plato Joseph | qezod@mailinator.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CANDIDATE |
| <input type="checkbox"/> | Ferris Martin | buzajiby@mailinator.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | ADMIN |
| <input type="checkbox"/> | Gibraltar Betty | gibby@mail.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | EMPLOYER |
| <input type="checkbox"/> | Farrah McGuire | qofa@mailinator.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CANDIDATE |
| <input type="checkbox"/> | T Silva | tsilva@info.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CANDIDATE |
| <input type="checkbox"/> | Charde Cantu | wereve@mailinator.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | EMPLOYER |
| <input type="checkbox"/> | Charissa Marshall | fina@mailinator.com | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | CANDIDATE |

Figure 140: Registered Users

SkirmisherAI

Takinur M

Dashboard

Base

Manage Users

- Employer Profiles
- Candidate Profiles
- Manage Vacancies
- Job Applications
- Interview Invitations
- Community Posts
- Contact Messages
- Newsletter Subscribers
- Django Q
- Failed tasks
- Queued tasks

Manage Users

Change user account

General

| | |
|--------------|--|
| Name * | Emerald Kennedy |
| Email * | hovryuxy@mailinator.com |
| Password * | pbkdf2_sha256\$390000\$oc2Z7UjluwPzb9lrlEBGw\$1uw0TukfokdLaTdKgOihw5c846NLRy |
| Role * | EMPLOYER |
| Is superuser | <input type="checkbox"/> |
| | EMPLOYER |
| | CANDIDATE |
| | ADMIN |

Additional Options

Actions

- Save
- Delete
- Save and add another
- Save and continue editing

History

Figure 141: Updating User Role

SkirmisherAI

Takinur M

Dashboard

Base

Manage Users

- Employer Profiles
- Candidate Profiles
- Manage Vacancies
- Job Applications
- Interview Invitations
- Community Posts
- Contact Messages
- Newsletter Subscribers
- Django Q
- Failed tasks
- Queued tasks

Manage Users

Change user account

General

Additional Options

| | |
|-----------|-------------------------------------|
| Is staff | <input type="checkbox"/> |
| Is active | <input checked="" type="checkbox"/> |

Actions

- Save
- Delete
- Save and add another
- Save and continue editing

History

Figure 142: Restricting User Account

Contact Module:

We are here to help you with
any questions or concerns
you may have.

Before contacting us, please check our [FAQ](#) to see if your question is already answered. If not, please contact us using the form below.

Name

Email Address

Subject

Details

Figure 143: Contact Form

Contact Messages

Select contact to change

| <input type="checkbox"/> | Name | Email | Subject | Message | Created at |
|--------------------------|---------------|------------------------|-------------------------|--|--------------------------|
| <input type="checkbox"/> | Abel Bruce | zima@mailinator.com | Quod ea recusandae | Dolores aut iusto do | Nov. 11, 2022, 1:26 p.m. |
| <input type="checkbox"/> | Sydney Ochoa | fosyz@mailinator.com | Found a Bug | I found a bug on your website. Please fix it. | Oct. 19, 2022, 1:25 p.m. |
| <input type="checkbox"/> | Maile Coleman | gyrejel@mailinator.com | I want to work with you | Hey, I am loooking for a job. Can you help me? | Oct. 15, 2022, 1:23 p.m. |

3 Contact Messages

Figure 144: Management of Contact Messages

Newsletter Module:

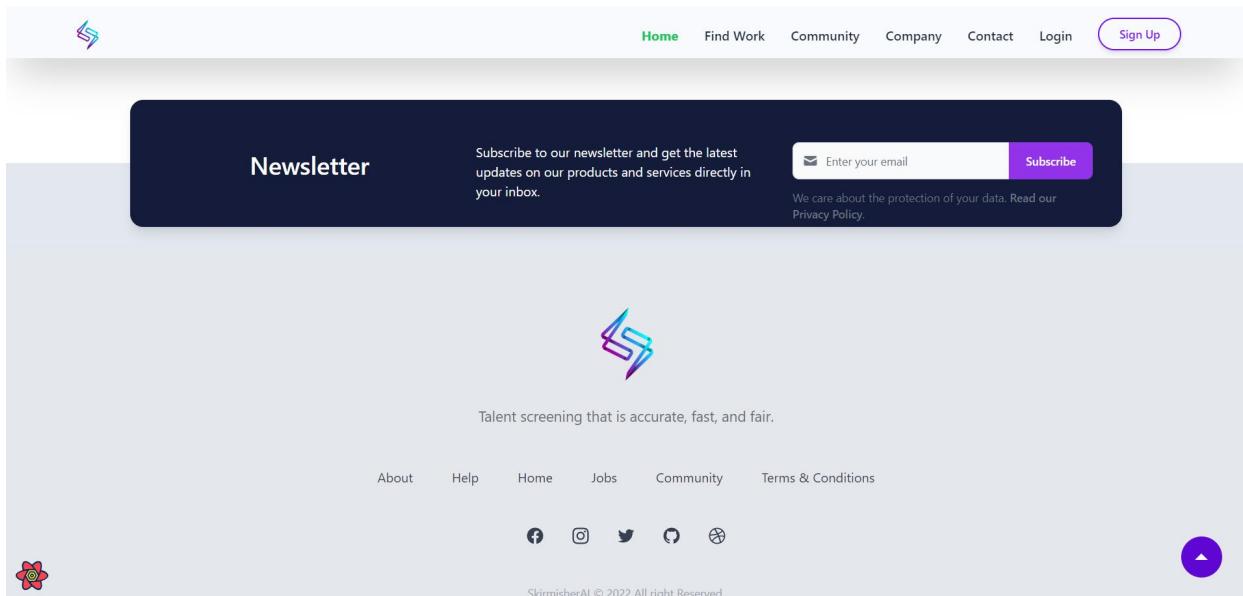


Figure 145: Subscription Form

This screenshot shows the "Newsletter Subscribers" management page. On the left, a sidebar lists various user roles: Takinur M (Dashboard, Manage Users, Employer Profiles, Candidate Profiles, Manage Vacancies, Job Applications, Interview Invitations, Community Posts, Contact Messages, Newsletter Subscribers), Django Q (Failed tasks, Queued tasks). The main area is titled "Newsletter Subscribers" and shows a table with two entries. The table has columns for "Email" and "Created at". The first entry is "takinurm@gmail.com" created on Nov. 29, 2022, 5:51 a.m. The second entry is "newsletter@tailwind.com" created on Oct. 25, 2022, 1:25 p.m. There are buttons for "Add newsletter" and "Search". The top navigation bar includes "Home", "Platform Home", and a user profile icon.

Figure 146: Newsletter Management

Static Pages:

The screenshot shows the SkirmisherAI landing page. At the top right, there is a navigation bar with links for Home, Find Work, Community, Company, Contact, Login, and Sign Up. A large, stylized logo consisting of interlocking blue and pink geometric shapes is positioned in the upper right corner. Below the navigation, the main heading "SkirmisherAI" is displayed in a large, bold, purple font. A subtext below the heading reads: "A platform that helps employers to find the right talent for their organization and helps job seekers to find the right job for them." To the right of this text is a large, glowing blue and pink graphic of the same interlocking shapes. The central part of the page features six dark grey rectangular boxes arranged in a 2x3 grid, each containing an icon and text: "Most Demand Job Categories" (10,000+ Jobs Posted), "Equitable Hiring" (Enables recruiter to focus only on skills), "Delightful User Experience" (Easy to use and understand for both recruiters and job seekers); "Quick setup & onboarding" (Fast, tidy, and efficient onboarding process), "Predictive Analytics" (Get hiring process insights for data-driven decisions), and "Exceptional customer support" (Our outstanding customer support team is always ready to help). Below this grid, a section titled "Used By 100+ Companies From Startups To Large Enterprises" lists logos for Spotify, Counter Strike, Google, Tailwind CSS, Netflix, and Microsoft. At the bottom, three testimonial cards are shown, each featuring a user's name, title, and company, along with a quote and a small profile icon.

Used By 100+ Companies From Startups To Large Enterprises

Spotify COUNTER STRIKE Google Tailwind CSS NETFLIX Microsoft

Sunam Dikenson
CEO, MILITECH INCLUSION

I love the way it's so easy to use and the customer support is outstanding. I would recommend it to anyone.

Edwardo Silverhand
HR, AXIE SOLUTIONS LLC

SkirmisherAI has helped us to organize and streamline our recruitment process. It has various intelligent features that helps in hiring. Sourcing resumes from platforms like GitHub really helped. Resume screening feature helps in ranking the candidate profiles which helps in effective hiring.

Aiden Pearce
RECRUITMENT LEAD, ARASAKA CORPORATION

Figure 147: Web application Landing Page

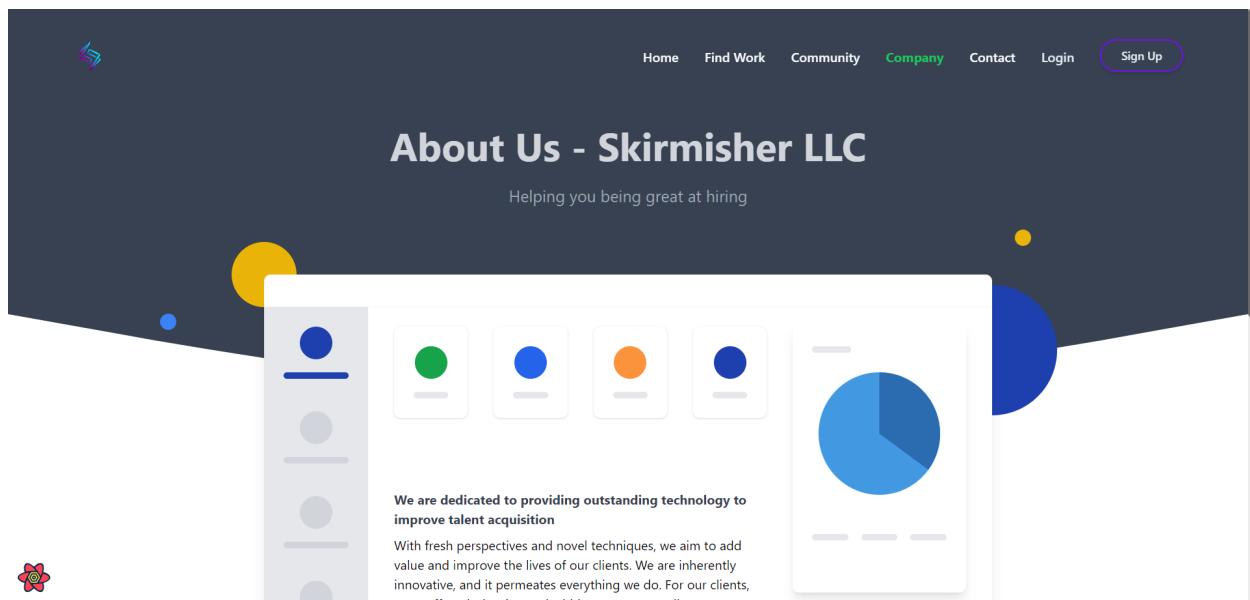


Figure 148: About Company



[Home](#) [Find Work](#) [Community](#) [Company](#) [Contact](#) [Login](#)

[Sign Up](#)

TERMS & CONDITIONS

WELCOME TO SKIRMISHERAI

These terms and conditions outline the rules and regulations for the use of Skirmisher LLC's Website, located at SkirmisherAI.com.

By accessing this website we assume you accept these terms and conditions. Do not continue to use SkirmisherAI if you do not agree to take all of the terms and conditions stated on this page.

The following terminology applies to these Terms and Conditions, Privacy Statement and Disclaimer Notice and all Agreements: "Client", "You" and "Your" refers to you, the person log on this website and compliant to the Company's terms and conditions. "The Company", "Ourselves", "We", "Our" and "Us", refers to our Company. "Party", "Parties", or "Us", refers to both the Client and ourselves. All terms refer to the offer, acceptance and consideration of payment necessary to undertake the process of our assistance to the Client in the most appropriate manner for the express purpose of meeting the Client's needs in respect of provision of the Company's stated services, in accordance with and subject to, prevailing law of Netherlands. Any use of the above terminology or other words in the singular, plural, capitalization and/or he/she or they, are taken as interchangeable and therefore as referring to same.

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Most interactive websites use cookies to let us retrieve the user's details for each visit. Cookies are used by our website to enable the functionality of certain areas to make it easier for people visiting our website.

Some of our affiliate/advertising partners may also use cookies.

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Sell, rent or sub-license material from SkirmisherAI

Reproduce, duplicate or copy material from SkirmisherAI

Redistribute content from SkirmisherAI

This Agreement shall begin on the date hereof. Our Terms and Conditions were created with the help of the Well-known Law-Firm .

Parts of this website offer an opportunity for users to post and exchange opinions and information in certain areas of the website. Skirmisher LLC does not filter, edit, publish or review Comments prior to their presence on the website. Comments do not reflect the views and opinions of Skirmisher LLC, its agents and/or affiliates. Comments reflect the views and opinions of the person who post their views and opinions. To the extent permitted by applicable laws, Skirmisher LLC shall not be liable for the Comments or for any liability, damages or expenses caused and/or suffered as a result of any use of and/or posting of and/or appearance of the Comments on this website.

Skirmisher LLC reserves the right to monitor all Comments and to remove any Comments which can be considered inappropriate, offensive or causes breach of these Terms and Conditions.

You warrant and represent that:

You are entitled to post the Comments on our website and have all necessary licenses and consents to do so;

The Comments do not invade any intellectual property right, including without limitation copyright, patent or trademark of any third party;

The Comments do not contain any defamatory, libelous, offensive, indecent or otherwise unlawful material which is an invasion of privacy

The Comments will not be used to solicit or promote business or custom or present commercial activities or unlawful activity.

Figure 149: Terms and Privacy Policy

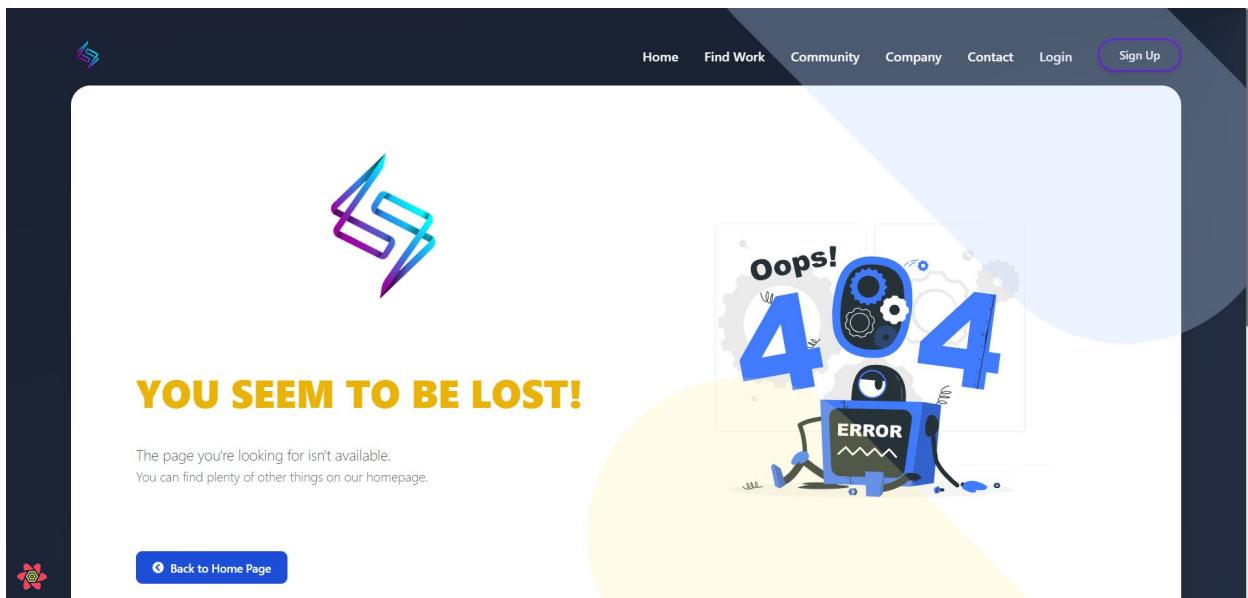


Figure 150: 404 Error Page

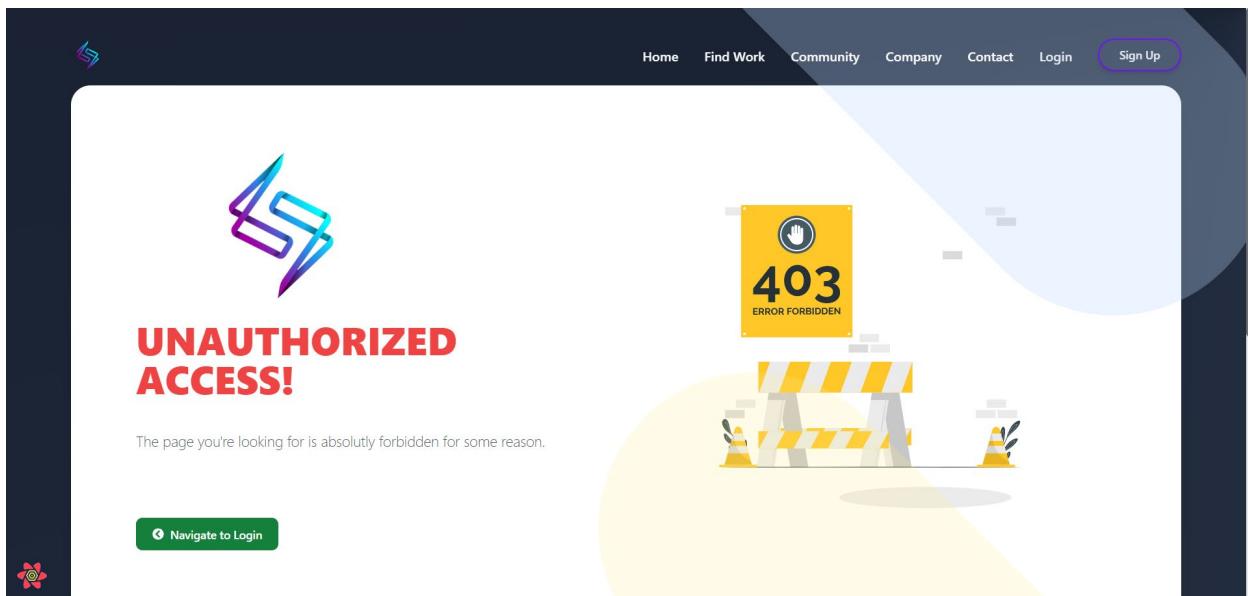


Figure 151: Unauthorized Error Page

END