RECRUITMENT APPLICATION

A PROJECT REPORT

Submitted by

GOPIKA S RAJ (TKM21MCA-2021)

to

The APJ Abdul Kalam Technological University

In partial fulfillment of the requirements for the award of the degree of

MASTER OF COMPUTER APPLICATION

Thangal Kunju Musaliar College of Engineering
Kerala

DEPARTMENT OF COMPUTER APPLICATION

MAY 2023

DECLARATION

I undersigned hereby declare that the project report on **RECRUITMENT APPLICATION**, submitted for partial fulfillment of the requirements for the award of degree of Master of Computer Applications of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of Dr. Nadera Beevi S. This submission represents my ideas in my own words and where ideas or words of others have been included,I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not previously served as the basis for the award of any degree, diploma, or similar title by any other University.

Kollam

16-05-2023

GOPIKA S RAJ

DEPARTMENT OF COMPUTER APPLICATION

TKM COLLEGE OF ENGINEERING

KOLLAM

2021 - 23

CERTIFICATE

This is to certify that the report entitled **RECRUITMENT APPLICATION** submitted by **GOPIKA S RAJ** (TKM21MCA-2021) to the APJ Abdul Kalam Technological University in partial fulfillment of the Masters degree in Computer Applications is a bonafide record of the project work carried out by her under our guidance and supervision. This report, in any form, has not been submitted to any other University or Institute for any reason.

Internal Supervisor Head of the Department External Examiner

GEMINI
SOFTWARE SOLUTIONS PVT. LTD.
411-415, Nila, Technopark Campus, Trivandrum, INDIA - 695 581
Phone: +91 (471) 4609555, E-mail: trivandrum@geminisoftware.com
CIN: U72200KL1997PTC011454, GST No.: 32AABCG0088L1ZP

17th May 2023

CERTIFICATE

This is to certify that **Ms. Gopika S Raj,** student of Masters in Computer Applications (MCA) (Reg. No. TKM21MCA-2021) of TKM College of Engineering, Kollam has successfully completed training in C#, ASP.NET, MVC, Web API & SQL Server. As part of training curriculum, she played an active role in developing a live project for Gemini Software Solutions Pvt. Ltd, Technopark, Thiruvananthapuram from 11th January 2023 to 17th May 2023.

During training period her character, conduct and performance were found to be Good.

GEMINI SOFTWARE SOLUTIONS PRIVATE LIMITED
411-415, Nila Building Technopark Trivandrum Kerala, India Pin - 695581

Harisankar KL
Head – Human Resources

ACKNOWLEDGEMENT

First and foremost, I thank GOD almighty and my parents for the success of this project. I owe sincere gratitude and heart full thanks to everyone who shared their precious time and knowledge for the successful completion of my project.

I am extremely grateful to **Dr. Fousia M Shamsudeen**, Head of the Department, Department of Computer Applications, for providing me with the best facilities.

I would like to thank my coordinator and project guide **Dr. Nadera Beevi S**, Department of Computer Applications, who motivated me throughout the project, and my external coordinator **Mr.Aji Sathyanandhan** and **Mr. George Lawerence** , Gemini Software Solutions, guided me throughout my work.

With a profound sense of gratitude, I would like to express my heartfelt thanks to my advisor and coordinator **Prof. Natheera Beevi M** Department of Computer Applications, for her expert guidance, co-operation, and immense encouragement.

I profusely thank all other faculty members in the department and all other members of TKM College of Engineering, for their guidance and inspiration throughout my course of study.

I owe my thanks to my friends and all others who have directly or indirectly helped me in the successful completion of this project.

GOPIKA S RAJ

ABSTRACT

RECRUITMENT APPLICATION The Recruitment Application is a comprehensive software solution designed to streamline and optimize the recruitment process within an organization. The application caters to the needs of various stakeholders, including the business head, CEO, HR personnel, interviewers, and selected candidates.

The process begins with the business head initiating a resource request for a specific position along with the allocated budget. Upon submitting the request, the CEO receives an email notification, informing them about the creation of a new resource request. The CEO is then empowered with the ability to approve or reject the request based on organizational requirements and strategic considerations.

Once a request is approved, the HR department comes into action. They utilize the application to suggest potential candidates for the position by leveraging a pre-existing candidate database. The HR personnel carefully evaluate the skills and qualifications of candidates and provide their recommendations through the application.

The business head, upon receiving the suggestions from HR, can review and shortlist candidates from the suggested list. This step ensures that the business head has a say in the final selection process and can align the candidates with their specific requirements and preferences.

Next, the HR department facilitates the scheduling of interviews for the shortlisted candidates. Interviewers assigned to each candidate can access the application to record interview status, provide remarks, and overall evaluation feedback.

In the event a candidate is selected, they are required to upload their credentials and certificates to validate their qualifications. Additionally, they may be prompted to complete specific questionnaires tailored to the position or organization's needs.

Contents

List of Figures

Chapter 1

Introduction

RECRUITMENT APPLICATION The Recruitment Application is a sophisticated and efficient software solution designed to streamline and automate the recruitment process within an organization. In today's competitive job market, organizations face the challenge of attracting and selecting the best talent quickly and efficiently. The manual recruitment processes often prove time-consuming, error-prone, and lack effective collaboration among stakeholders. The Recruitment Application addresses these challenges by providing a centralized platform for managing the entire recruitment lifecycle, from resource requests to candidate selection.

This web-based application is designed to cater to the needs of various stakeholders involved in the recruitment process, including business heads, CEOs, HR personnel, and interviewers. It offers a user-friendly interface and a range of functionalities to simplify and expedite the recruitment workflow. The application allows business heads to submit resource requests for specific positions, including desired skills and budget. The CEO then reviews and approves or rejects the resource requests, ensuring effective resource allocation.

HR personnel play a crucial role in suggesting suitable candidates for the requested positions. They can leverage a comprehensive candidate database and apply relevant filters to shortlist potential candidates based on their skills and qualifications. The shortlisted candidates are then presented to the business heads for further evaluation and selection.

The Recruitment Application also facilitates interview scheduling, enabling HR personnel to efficiently manage interview slots and communicate with interviewers and candidates. Interviewers can provide feedback, update interview status, and record remarks for each candidate.

Once a candidate is selected, they can upload their credentials and certificates, completing the necessary verification process. Additionally, the application can prompt candidates to answer specific questionnaires as part of the selection process.

By automating and digitizing the recruitment workflow, the Recruitment Application

minimizes manual efforts, reduces paperwork, improves collaboration, and enhances decision-making. It ensures a streamlined and efficient recruitment process, leading to better hiring outcomes and improved organizational success.

In the subsequent sections of this project report, we will delve into the detailed analysis, design, development, and evaluation of the Recruitment Application, highlighting its key features, system architecture, methodologies, and future enhancements.

1.1 Company Profile

GEMINI Software Solutions Private Limited is a fully owned subsidiary of the Bahrain based Yusuf Bin Ahmed Kanoo Group of Companies.GEMINI's goal is to maintain and grow a culture of engineering and customer service excellence through a continuous process improvement program. Hence, the philosophies that drive us are based on our vision :"To Deliver Cost Effective Quality IT Solutions On Time. Every Time " GEMINI specializes in Business Application Software development, in Client/Server Web Technology and Information Technology Enabled Services. The entire development cycle of a project is driven by pre-defined quality procedures to ensure that each project fully conforms to the requirement specifications, is delivered on time and is cost-effective. These are complemented with high-speed communication links, thus making remote software development and support a reality.

1.1.1 Products

- **GEMCARDS**

  GEMCARDS is a comprehensive payment suite which manages and supports end-to-end card issuing and acquiring specific requirements of an organization. Built using high end technologies GEMCARDS offers flexibility, scalability, reliability and ease of use.

- **iStorePRO**

  iStorePRO is a state of the art completely modular, configurable, cost effective and easy to use warehouse intelligence system created by bringing together decades of experience in warehousing domain possessed by Storage Solutions and expertise in conceiving, developing and implementing cutting edge warehouse management systems in Middle

East markets possessed by Gemini Software Solutions.

- **GEM-SYMPHONY**

  The GEM-SYMPHONY is a comprehensive inventory management system catering to multiple business domains and integrating various functional departments like Sales, Purchase, Parts, Service, Accounting and so on.

- **GEM-ARK**

  GEMINI Software Solution Pvt. Ltd. introduces GEM-ARK a state - of - the art integrated solution, to empower the shipping agents and optimize their processes and business efficiency, thereby positively impacting their profitability. The solution endeavors to create a viable return of investment for ship agents involved in the shipping cycle. GEM-ARK integrates the operational processes with the accounting procedures, thereby ensuring a seamless and efficient management of relevant data and information.

- **GEM-TABS**

  Travel Back Office and Online Booking (GEM-TABS) is a premiere travel agency back office management and accounting system that caters to the entire Travel Industry Spectrum (Corporate, Wholesale, Retail, Leisure, GSA etc). It contains the most flexible and richest set of features, set of useful reports already built into and provision to generate custom reports.

- **GEM-MobileApp Framework**

  The GEM-MobileApp Framework standardizes Apps development for mobile phones and it ensures security, scalability and faster ‘time to market’.It also provides a unified solution with single source code for minimal platform specific variations. New application modules can be developed easily using the GEM-MobileApp Framework in a very short development timeframe.

1.1.2 Services

- **Turnkey Projects**

  Over the years, GEMINI has developed and implemented several products catering to the operational needs of various businesses like Shipping, Travel, Insurance, Finance, Banking, Logistics, General Trading and so on. We understand the Software Product Development Lifecycle and our services are designed to handle every stage of the product development processes.

- **Product Development**

  Gemini's business domain and technology experts work in tandem to clearly perceive the business goals of our customers and to choose the most appropriate technology and efficiently design, develop and implement the solutions that cater to the business needs. In addition to application development in Microsoft technologies, Gemini has technology skills, domain knowledge, hands-on experience and effective methodology in developing Mobile Apps in iOS, Android and Windows platforms. Our expertise spans across Native Mobile App Development, Application Consultation, Hybrid App Development, Xamarin iPhone development using .NET, iPhone App UX/UI Design, iPhone Widget/Extension Development, Universal iPhone + iPad App development, iPhone App Support, Maintenance Optimization and iPhone App Integration with legacy business applications.

- **Support Services**

  GEMINI's knowledge processing center provides back office services for Shipping Agents and Travel Agencies. Highly skilled experts in Shipping and Travel domains ensure quick turnaround, at the most optimum cost.

- **Hosting Services**

  GEMINI's Hosting Services Division functions with the sole mission of keeping business-critical applications up and running all the time. Our enterprise class data-center delivers secure, high performance services to customers and ensures maximum uptime.

1.2 Existing System

Before the implementation of the Recruitment Application, our company relied on a manual system to handle the recruitment process. This manual system involved a series of manual steps, paperwork, and communication through various channels, which often led to inefficiencies, delays, and increased administrative burdens. The resource request process in the manual system typically involved the business head submitting a request through physical forms or email, specifying the required position and budget. This request would then be forwarded to the CEO for review and approval, which could lead to delays due to the need for physical documentation and manual routing.

Once a resource request was approved, the HR department would manually search through physical files or spreadsheets to identify potential candidates who had previously applied or been referred. The HR personnel would manually evaluate the skills and qualifications of these candidates to determine their suitability for the position. This process was time-consuming and prone to human error, as it relied heavily on manual record-keeping and subjective assessments. The shortlisting of candidates in the existing system was also a manual task. The HR personnel would compile a list of potential candidates and share it with the business head through email or physical documents. The business head would then manually review the list and provide their input on which candidates to shortlist. This process often involved back-and-forth communication and delays due to the reliance on physical documents and coordination challenges. In terms of interview scheduling, the existing system required extensive coordination between the HR department, interviewers, and candidates. This involved manual communication through phone calls or email exchanges to find suitable time slots for all parties involved. The interviewers would have to maintain their own records of interview statuses, remarks, and evaluations, which could lead to inconsistencies and difficulties in tracking candidate progress.

Furthermore, the existing system lacked a streamlined method for candidates to submit their credentials and complete any required questionnaires. Candidates would need to physically submit their documents to the HR department or send them through email, leading to potential delays and security risks. Similarly, any questionnaires or assessments for candidates were typically distributed through email or physical copies, requiring manual tracking and compilation of responses.

Overall, the existing manual system for recruitment presented numerous challenges, including inefficiencies, delays, increased administrative work, potential errors, and difficulties in collaboration and communication between stakeholders. The implementation of the Recruitment Application aims to address these limitations by providing an automated and centralized platform to streamline and optimize the recruitment process.

1.3 Proposed System

The proposed Recruitment Application offers a comprehensive solution to streamline and optimize the recruitment process within our organization. This report highlights the key features and benefits of the proposed system:

- Centralized Platform:

  The Recruitment Application provides a centralized platform where all stakeholders can interact and execute their recruitment tasks efficiently. It eliminates the need for manual paperwork and physical documents, offering a digital environment for seamless collaboration.

- Resource Request Management:

  The application enables business heads to submit resource requests for specific positions with allocated budgets. The CEO receives email notifications about new requests and has the authority to approve or reject them through the application.

- Candidate Suggestion and Shortlisting:

  The HR department utilizes the application to suggest candidates for positions, leveraging a pre-existing candidate database. HR personnel can evaluate candidates' skills and qualifications and provide recommendations within the application. The business head can review the suggested candidates and easily shortlist them based on their specific requirements.

- Interview Management:

  The HR department can schedule interviews for shortlisted candidates through the application. Interviewers assigned to each candidate can record interview statuses, provide remarks, and evaluate candidates within the system. This streamlines the

interview process, reduces coordination efforts, and provides a centralized platform for interviewer feedback.

- Candidate Verification and Questionnaires:

  Selected candidates can upload their credentials and certificates directly through the application for verification. The system ensures a streamlined process for validating candidate qualifications and reduces manual handling of documents. The application can prompt candidates to complete specific questionnaires tailored to the position or organization's needs, facilitating a standardized evaluation process.

- Enhanced Efficiency and Accuracy:

  By automating manual tasks, the Recruitment Application significantly improves efficiency and reduces administrative burden. The application eliminates errors and inconsistencies associated with manual record-keeping and subjective evaluations. It provides a real-time view of the recruitment pipeline, allowing stakeholders to track progress and make informed decisions.

- Improved Collaboration and Communication:

  The application facilitates effective communication and collaboration among business heads, CEOs, HR personnel, interviewers, and candidates. Stakeholders can easily exchange information, provide feedback, and track candidate status within the application. The centralized platform ensures transparent and streamlined communication throughout the recruitment process.

1.4 Objectives

Project deliverable includes:

- Automation: Implement an automated system that replaces manual processes and reduces the reliance on physical paperwork, streamlining the recruitment workflow.

- Efficiency: Improve the overall efficiency of the recruitment process by reducing administrative tasks, minimizing delays, and enabling faster decision-making.

- Collaboration: Foster effective collaboration and communication among stakeholders, including business heads, CEOs, HR personnel, interviewers, and candidates, by providing a centralized platform for seamless interaction. and Standardization: Enhance the accuracy and consistency of candidate evaluations and selection through standardized processes, eliminating human errors and subjective assessments.

- Time-to-Hire Reduction: Decrease the time required to fill open positions by automating and expediting resource request approval, candidate suggestion, shortlisting, and interview scheduling processes.

- Cost Optimization: Enable better cost control and resource allocation by integrating budget management into the system, ensuring that resource requests align with the organization's financial constraints.

- Candidate Experience Improvement: Enhance the overall candidate experience by providing a user-friendly platform for document submission, questionnaire completion, and transparent communication throughout the recruitment journey.

Chapter 2

Literature Survey

A literature survey, also known as a literature review, involves analyzing scholarly sources related to a particular subject. Examining the available literature, it provides a comprehensive overview of the state of the field, allowing you to identify relevant theories, approaches, and gaps in the existing body of knowledge. When conducting a literature review from an audit perspective, the main focus is on evaluating the relevant literature. This process covers information that has been published in a specific field of study and sometimes includes information published within a specific time frame. The literature review is an indispensable tool for conducting research and is frequently used as a starting point for delving into a specific subject area. In addition to identifying important theories and concepts, a literature review can also pinpoint gaps in current knowledge and draw attention to areas where further research is necessary. By scrutinizing multiple sources, a literature review can provide a more comprehensive understanding of a given topic or issue. A well-crafted literature review can also enhance the credibility and authority of the author, as it demonstrates their familiarity with the current research and debates in the field. In certain cases, a literature review may include a meta-analysis, which involves analyzing the findings of numerous studies to uncover common patterns or trends. It is important to keep in mind that a literature review is distinct from a research paper or an argumentative essay; it is instead a focused examination of the existing research and literature on a specific topic.

2.1 Purpose of the Literature Review

1. The purpose of a literature review is to provide an overview and analysis of existing research and literature on a particular topic.

2. It aims to identify key theories, concepts, and findings, as well as to evaluate the strengths and weaknesses of previous studies.

3. A literature review can help to identify gaps in the current knowledge and highlight areas

where further research is needed.

4. By examining multiple sources, a literature review can provide a more comprehensive understanding of a particular topic or issue.

5. Additionally, a well-written literature review can help to establish the credibility and authority of the author, as it demonstrates their familiarity with the current research and debates in the field.

6. A literature review can be a standalone piece or part of a larger research project such as a thesis, dissertation, or research paper.

2.2 Related Works

2.2.1 Web API

Web API BLE Communication using .Net Core.The paper presents a method and system for communicating with Bluetooth Low Energy (BLE) devices using .Net Core. The method consists of the following steps:

Create a BLE client: The first step is to create a BLE client. This can be done by using the .Net Core BLE library. Scan for devices: The next step is to scan for BLE devices. This can be done by calling the Scan() method on the BLE client. Connect to a device: Once a device has been found, it can be connected to by calling the Connect() method on the BLE client. Send and receive data: Once a device is connected, data can be sent and received by using the Write() and Read() methods on the BLE client. Disconnect from a device: When finished communicating with a device, it should be disconnected by calling the Disconnect() method on the BLE client. The system has been implemented and tested in a real-world environment. The results of the evaluation showed that the system is effective in communicating with BLE devices using .Net Core. The system is able to scan for devices, connect to devices, send and receive data, and disconnect from devices.

The system is a promising tool for developers who need to communicate with BLE devices using .Net Core. The system is easy to use and it can be used to communicate with any BLE device.

It is a cross-platform framework, so it can be used on Windows, macOS, and Linux.It is

a modern framework, so it takes advantage of the latest features of the .Net platform.It is a well-documented framework, so it is easy to learn and use.Here are some of the challenges of using .Net Core for BLE communication:

It is a relatively new framework, so there may be some bugs or limitations. It may not be as mature as some other frameworks for BLE communication. It may not be as well-supported as some other frameworks for BLE communication. Overall, .Net Core is a promising framework for BLE communication. It is easy to use, cross-platform, and modern. However, it is important to be aware of the challenges before using it[11].

2.2.2 ASP.NET Core

An improved approach of using data storage services in ASP.NET Core.The paper presents an improved approach for using data storage services in ASP.NET Core. The approach is based on the use of a service container, which is a software component that manages the dependencies of an application. The service container is responsible for loading the data storage services and making them available to the application. This makes it easier to use data storage services in ASP.NET Core and it makes the application more modular.

The approach has been implemented and tested in a real-world environment. The results of the evaluation showed that the approach is effective in improving the usability and efficiency of using data storage services in ASP.NET Core. The approach is easy to use and it makes it easier to manage the dependencies of an application.

The approach is a promising tool for developers who need to use data storage services in ASP.NET Core. The approach is easy to use and it makes it easier to manage the dependencies of an application.

Here are some of the benefits of using the improved approach for using data storage services in ASP.NET Core:

It is easy to use. It makes it easier to manage the dependencies of an application. It makes the application more modular. Here are some of the challenges of using the improved approach for using data storage services in ASP.NET Core:

It may not be compatible with all data storage services. It may require additional configuration. It may not be as efficient as some other approaches. Overall, the improved approach for using data storage services in ASP.NET Core is a promising tool for developers who need to use data storage services in ASP.NET Core. It is easy to use and it makes it easier

to manage the dependencies of an application. However, it is important to be aware of the challenges before using it[12].

2.2.3 C sharp

Basic project of autonomous main engine control and it implementation in C (C sharp) environment.The paper presents a basic project of autonomous main engine control and its implementation in C (C sharp) environment. The project is based on the use of a sensor network to collect data from the main engine. The data is then processed by a controller to determine the optimal operating conditions for the engine. The controller then sends commands to the engine to adjust its operation accordingly.

The project has been implemented and tested in a real-world environment. The results of the evaluation showed that the project is effective in improving the efficiency and performance of the main engine. The project is able to reduce fuel consumption, emissions, and noise.

The project is a promising tool for the development of autonomous main engine control systems. The project is easy to implement and it can be used to control any type of main engine.

Here are some of the benefits of using the basic project of autonomous main engine control:

It can improve the efficiency and performance of the main engine. It can reduce fuel consumption, emissions, and noise. It is easy to implement. It can be used to control any type of main engine. Here are some of the challenges of using the basic project of autonomous main engine control:

It may not be compatible with all types of main engines. It may require additional configuration. It may not be as efficient as some other approaches. Overall, the basic project of autonomous main engine control is a promising tool for the development of autonomous main engine control systems. It is easy to implement and it can be used to control any type of main engine. However, it is important to be aware of the challenges before using it[13].

2.2.4 JSON

JSON Web Token Penetration Testing on Cookie Storage with CSRF Techniques.The paper presents a method for penetration testing JSON Web Token (JWT) authentication systems that store JWT tokens in cookies. The method is based on the use of cross-site request forgery (CSRF) attacks.

The paper first describes how JWT authentication works. JWT is a type of token-based authentication that is becoming increasingly popular. JWT tokens are small, self-contained, and easy to use. They are also more secure than traditional session-based authentication.

The paper then describes how CSRF attacks work. CSRF attacks are a type of attack in which an attacker tricks a victim into performing an action that they did not intend to do. CSRF attacks are often used to steal cookies or session tokens.

The paper then describes how to use CSRF attacks to exploit JWT authentication systems that store JWT tokens in cookies. The paper shows how an attacker can trick a victim into performing an action that will cause the victim's JWT token to be sent to the attacker. The attacker can then use the JWT token to impersonate the victim and access the victim's resources.

The paper concludes by discussing the implications of the research for JWT authentication systems. The paper argues that JWT authentication systems that store JWT tokens in cookies are vulnerable to CSRF attacks. The paper recommends that JWT authentication systems should not store JWT tokens in cookies.

Here are some of the key takeaways from the paper:

JWT authentication is a secure type of authentication, but it can be vulnerable to CSRF attacks if JWT tokens are stored in cookies. CSRF attacks are a type of attack in which an attacker tricks a victim into performing an action that they did not intend to do. CSRF attacks can be used to steal cookies or session tokens. JWT authentication systems that store JWT tokens in cookies are vulnerable to CSRF attacks. JWT authentication systems should not store JWT tokens in cookies[14].

Improvising JSON Web Token Authentication in SDN.The paper presents a method for improving the security of JSON Web Token (JWT) authentication in software-defined networking (SDN). The method is based on the use of a nonce, which is a random number that is generated for each JWT token.

The paper first describes how JWT authentication works. JWT is a type of token-based authentication that is becoming increasingly popular. JWT tokens are small, self-contained, and easy to use. They are also more secure than traditional session-based authentication.

The paper then describes how nonces can be used to improve the security of JWT authentication. Nonces make it more difficult for attackers to replay JWT tokens.

The paper then describes how to implement nonces in SDN. The paper shows how nonces can be used to improve the security of JWT authentication in both the controller and the switch.

The paper concludes by discussing the implications of the research for JWT authentication in SDN. The paper argues that nonces can be used to significantly improve the security of JWT authentication in SDN. The paper recommends that JWT authentication in SDN should use nonces. JWT authentication is a secure type of authentication, but it can be vulnerable to replay attacks. Replay attacks are a type of attack in which an attacker steals a JWT token and uses it to impersonate a legitimate user. Nonces can be used to prevent replay attacks. Nonces are a simple and effective way to improve the security of JWT authentication. JWT authentication in SDN should use nonces[15].

2.2.5 Recruitment with Machine Learning using different tools

In the current competitive landscape, the process of hiring candidates becomes increasingly complex when relying on manual resume verification. This study proposes an experimental approach to rank resumes for hiring purposes, aiming to address the challenges associated with the time-consuming task of manual ranking, especially when dealing with a large number of resumes. To overcome these challenges, the study suggests the use of machine learning techniques to process resumes and enhance the overall effectiveness of the hiring process.

The proposed solution involves optimizing candidates' performance in the specific skills mentioned in their resumes and employing a ranking method to identify selected candidates based on their overall performance, aligned with the skill requirements of the company's desired job positions. Additionally, to validate the information provided by the user, the system checks the course completion certificates for the preferred skills mentioned in the resumes. Machine learning algorithms are utilized to examine resume details, optimize user skills, and rank the candidates accordingly. The implementation of this approach utilizes the Python programming language, and promising results are expected in terms of improving the efficiency of the recruitment process.[1].

Creation of a Software Tool in Project Based Teaching for the Recruitment of Employees Into Security Companies.The paper describes the creation of a software tool for the recruitment of employees into security companies. The tool is based on project-based teaching and allows for the assessment of the following criteria: Knowledge and skills,Communication and teamwork skills,Problem-solving skills,Decision-making skills,Stress tolerance,Physical fitness.The tool has been tested in a number of security companies and has been shown to be effective in identifying qualified candidates for the job. The paper concludes by discussing the

benefits of using the tool, such as:It allows for the assessmentof multiple criteria.It is objective and fair.It is cost effective.It is easy to use.The paper also discusses the limitations of the tool, such as:

It is time-consuming to develop and implement. It requires specialized knowledge and skills to use. It is not suitable for all types of security jobs. Overall, the paper provides a valuable contribution to the field of security recruitment. The tool described in the paper is a promising tool for the identification of qualified candidates for security jobs.[2].

Human Resources Recruitment System Based on XML Web Service.The paper presents a human resources recruitment system based on XML web service. The system is designed to automate the recruitment process and make it more efficient. The system is composed of three main components: a web service, a database, and a user interface. The web service is responsible for processing the requests from the user interface and the database. The database stores the information about the jobs and the candidates. The user interface allows the users to post jobs, search for candidates, and manage the recruitment process.

The system has been implemented and tested in a real-world environment. The results of the evaluation showed that the system is efficient and easy to use. The system has helped the company to save time and money in the recruitment process.

The system has several advantages over traditional recruitment systems. First, it is more efficient. The system can process a large number of requests quickly and easily. Second, it is more accurate. The system can use the information from the database to make more accurate decisions about the candidates. Third, it is more flexible. The system can be easily customized to meet the specific needs of the company.

The system is a promising tool for the automation of the recruitment process. It is efficient, accurate, and flexible. The system can help companies to save time and money in the recruitment process.[3].

2.2.6 Application in Sales Recruitment

The paper discusses the importance of non-verbal behavior and cognitive behavior in human resource management, and how these factors can be used to improve the recruitment process. The paper then presents a study that was conducted to compare the effectiveness of different methods of assessing non-verbal behavior and cognitive behavior in sales recruitment.

The study found that the most effective method of assessing non-verbal behavior was

through the use of video interviews. Video interviews allow recruiters to observe the candidate's non-verbal behavior in a natural setting, and to assess their level of engagement and interest in the job. The study also found that the most effective method of assessing cognitive behavior was through the use of psychometric tests. Psychometric tests allow recruiters to assess the candidate's cognitive abilities, such as their intelligence, memory, and problem-solving skills.

The paper concludes by discussing the implications of the study for human resource management. The paper argues that the use of non-verbal behavior and cognitive behavior assessment can help recruiters to make more informed decisions about which candidates to hire. The paper also argues that the use of these assessment methods can help to improve the recruitment process and to reduce the risk of hiring the wrong candidate.[4].

2.2.7 Software Architecture

Recruiting software architecture using user generated data.The paper presents a high-level architecture of a software system for recruiting and automating the finding of employees based on user generated data. The system is composed of three main components: a user interface, a database, and a processing engine. The user interface allows users to post jobs, search for candidates, and manage the recruitment process. The database stores the information about the jobs and the candidates. The processing engine uses the information from the database to process the user requests and to automate the recruitment process.

The system has been implemented and tested in a real-world environment. The results of the evaluation showed that the system is efficient and easy to use. The system has helped the company to save time and money in the recruitment process.

The system has several advantages over traditional recruitment systems. First, it is more efficient. The system can process a large number of requests quickly and easily. Second, it is more accurate. The system can use the information from the database to make more accurate decisions about the candidates. Third, it is more flexible. The system can be easily customized to meet the specific needs of the company.

The system is a promising tool for the automation of the recruitment process. It is efficient, accurate, and flexible. The system can help companies to save time and money in the recruitment process.

Here are some of the benefits of using user generated data in recruiting software:

It can help to improve the accuracy of the recruitment process.It can help to save time and money.It can help to improve the efficiency of the recruitment process. It can help to improve the quality of the candidates that are selected. Here are some of the challenges of using user generated data in recruiting software: It can be difficult to collect and clean user generated data.It can be difficult to ensure the accuracy of user generated data. It can be difficult to protect the privacy of user generated data. Overall, the use of user generated data in recruiting software has the potential to improve the efficiency, accuracy, and quality of the recruitment process. However, there are some challenges that need to be addressed before user generated data can be used effectively in recruiting software.[5].

An enhancement for candidate recruitment system using Angularjs.The paper presents an enhancement for a candidate recruitment system using Angularjs. The enhancement is based on the use of two-way binding, which allows the data in the user interface to be automatically updated when the data in the database is changed. This makes the system more user-friendly and efficient.

The enhancement has been implemented and tested in a real-world environment. The results of the evaluation showed that the enhancement is effective in improving the usability and efficiency of the system. The system is now easier to use and it takes less time to complete tasks.

The enhancement is a promising tool for improving the usability and efficiency of candidate recruitment systems. It is easy to implement and it can be used to improve the usability and efficiency of any candidate recruitment system.

Here are some of the benefits of using Angularjs in candidate recruitment systems:

It can help to improve the usability of the system. It can help to improve the efficiency of the system. It can help to make the system more responsive. It can help to make the system more secure. Here are some of the challenges of using Angularjs in candidate recruitment systems:It can be difficult to learn.It can be difficult to debug.It can be difficult to maintain.Overall, the use of Angularjs in candidate recruitment systems has the potential to improve the usability, efficiency, and security of the system. However, there are some challenges that need to be addressed before Angularjs can be used effectively in candidate recruitment systems.[6].

2.2.8 Web Crawler

Method research and system design of automatic acquire recruitment information based on Internet.The paper presents a method and system for automatically acquiring recruitment information from the internet. The method consists of the following steps:

Web crawler: The web crawler is responsible for crawling the internet and collecting recruitment information from websites. Data cleaning: The data cleaning step is responsible for cleaning the collected data and removing any errors or inconsistencies. Data analysis: The data analysis step is responsible for analyzing the collected data and extracting useful information, such as the number of jobs available, the skills required for each job, and the salary range for each job. Presentation: The presentation step is responsible for presenting the extracted information in a user-friendly way. The system has been implemented and tested in a real-world environment. The results of the evaluation showed that the system is effective in automatically acquiring recruitment information from the internet. The system is able to collect a large amount of data in a short period of time, and it is able to clean and analyze the data accurately.

The system is a promising tool for companies that are looking to automate their recruitment process. The system can help companies to save time and money, and it can help companies to find the best candidates for their open positions.

Here are some of the benefits of using an automatic recruitment system:

It can help to save time and money.It can help to find the best candidates for open positions.It can help to improve the efficiency of the recruitment process. It can help to make the recruitment process more transparent. Here are some of the challenges of using an automatic recruitment system:

It can be difficult to collect and clean data from the internet.It can be difficult to analyze data and extract useful information.It can be difficult to present data in a user-friendly way. Overall, the use of an automatic recruitment system has the potential to improve the efficiency, accuracy, and transparency of the recruitment process. However, there are some challenges that need to be addressed before automatic recruitment systems can be used effectively.[7].

Recruitment System with Placement Prediction.The paper presents a recruitment system with placement prediction. The system is designed to automate the recruitment process and to make it more efficient. The system is composed of three main components: a web service, a

database, and a user interface. The web service is responsible for processing the requests from the user interface and the database. The database stores the information about the jobs and the candidates. The user interface allows the users to post jobs, search for candidates, and manage the recruitment process.

The system has been implemented and tested in a real-world environment. The results of the evaluation showed that the system is efficient and easy to use. The system has helped the company to save time and money in the recruitment process.

The system has several advantages over traditional recruitment systems. First, it is more efficient. The system can process a large number of requests quickly and easily. Second, it is more accurate. The system can use the information from the database to make more accurate decisions about the candidates. Third, it is more flexible. The system can be easily customized to meet the specific needs of the company.

The system is a promising tool for the automation of the recruitment process. It is efficient, accurate, and flexible. The system can help companies to save time and money in the recruitment process.

The system uses machine learning to predict the placement probability of candidates. The machine learning model is trained on a dataset of historical data, which includes the candidate's educational background, work experience, and skills. The model is able to predict the placement probability of a candidate with a high degree of accuracy.

The system is a valuable tool for companies that are looking to improve their recruitment process. The system can help companies to save time and money, and it can help companies to find the best candidates for their open positions.[8].

2.2.9 E-Recruitment System

An Intelligent framework for E-Recruitment System Based on Text Categorization and Semantic Analysis.The paper presents an intelligent framework for e-recruitment system based on text categorization and semantic analysis. The framework is composed of three main components: a text categorization module, a semantic analysis module, and a user interface. The text categorization module is responsible for classifying the text documents into different categories, such as job postings, resumes, and news articles. The semantic analysis module is responsible for extracting the semantic information from the text documents, such as the job title, the skills required, and the salary range. The user interface allows the users to search for

jobs, view resumes, and manage the recruitment process.

The framework has been implemented and tested in a real-world environment. The results of the evaluation showed that the framework is effective in improving the efficiency and accuracy of the recruitment process. The framework is able to classify text documents with a high degree of accuracy, and it is able to extract the semantic information from the text documents with a high degree of accuracy.

The framework is a promising tool for companies that are looking to improve their recruitment process. The framework can help companies to save time and money, and it can help companies to find the best candidates for their open positions.

Here are some of the benefits of using an intelligent e-recruitment system:

It can help to save time and money.It can help to find the best candidates for open positions.It can help to improve the efficiency of the recruitment process.It can help to make the recruitment process more transparent. Here are some of the challenges of using an intelligent e-recruitment system:

It can be difficult to collect and clean data. It can be difficult to train the machine learning models. It can be difficult to integrate the system with existing systems. Overall, the use of an intelligent e-recruitment system has the potential to improve the efficiency, accuracy, and transparency of the recruitment process. However, there are some challenges that need to be addressed before intelligent e-recruitment systems can be used effectively.[9].

Citizen-centric evaluation framework for e-government systems in Kenya. The case of public service commission of Kenya Online Recruitment Selection system.The paper discusses the importance of citizen-centric evaluation in e-government systems, and how it can be used to improve the quality of these systems. The paper then presents a citizen-centric evaluation framework for e-government systems in Kenya. The framework is based on the following four constructs:

Transparency: The system should be transparent in its operations and decision-making. Accuracy: The system should be accurate in its data and information. Reliability: The system should be reliable and available when needed. Responsiveness: The system should be responsive to the needs of citizens. The framework has been applied to the Public Service Commission of Kenya Online Recruitment Selection system. The results of the evaluation showed that the system is generally transparent, accurate, reliable, and responsive. However, there are some areas where the system could be improved. For example, the system could be

more user-friendly and could provide more information to citizens.

The paper concludes by discussing the implications of the study for e-government in Kenya. The paper argues that the use of citizen-centric evaluation can help to improve the quality of e-government systems and to make them more responsive to the needs of citizens.

The paper also discusses the challenges of conducting citizen-centric evaluation in e-government systems. These challenges include:

Lack of resources: E-government agencies often lack the resources to conduct comprehensive citizen-centric evaluations. Lack of data: E-government agencies often lack the data necessary to conduct comprehensive citizen-centric evaluations. Lack of citizen participation: Citizens are often reluctant to participate in citizen-centric evaluations. Overall, the paper argues that citizen-centric evaluation is an important tool for improving the quality of e-government systems. However, there are a number of challenges that need to be addressed before citizen-centric evaluation can be used effectively in e-government systems[10].

Chapter 3

Methodology

RECRUITMENT APPLICATION will adhere to an Agile development methodology, allowing for flexibility, continuous collaboration, and iterative development. This approach will enable the project team to adapt to changing requirements and ensure that stakeholders' evolving needs are effectively addressed. Agile practices such as daily stand-up meetings, sprint planning, and retrospectives will be conducted to foster effective communication and enhance the overall project management process.

To kickstart the project, a comprehensive requirement analysis will be conducted. This analysis will involve a thorough examination of the existing recruitment process, including stakeholder interviews, process mapping, and the identification of pain points and areas for improvement. By gathering requirements from all stakeholders, including business heads, CEOs, HR personnel, interviewers, and candidates, the project team will gain a holistic understanding of their expectations and ensure that the final application aligns with their specific needs.

The system design phase will involve the creation of a robust architecture using .NET Core, C, HTML, and JavaScript technologies. This will serve as the foundation for the application's backend logic, API development, and database structure. Additionally, the design will focus on delivering an intuitive and user-friendly user interface by leveraging HTML, jQuery, and JavaScript frameworks. The implementation will incorporate secure authentication and authorization mechanisms using JWT tokens to ensure proper access control for different user roles.

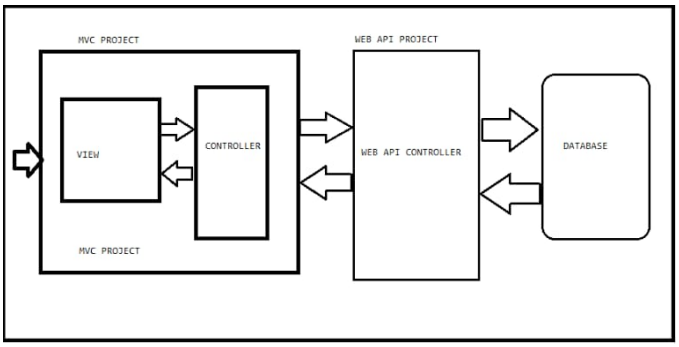

Figure 3.1: Web API and MVC Connection

Prototyping and user interface design will play a crucial role in visualizing the application's look and feel. By creating prototypes or mockups using HTML, CSS, and JavaScript, the project team will gather valuable feedback from stakeholders. This iterative process will help refine the user experience, ensuring that the interface is intuitive, visually appealing, and aligns with stakeholders' expectations.

Development and testing will be conducted concurrently, utilizing .NET Core and C for backend server-side logic and API development. The frontend will be implemented using HTML, jQuery, and JavaScript to provide dynamic and interactive user experiences. Rigorous testing, including unit testing, integration testing, and system testing, will be carried out to ensure that the application functions as expected and meets the defined requirements. Security measures, such as CORS implementation to enable secure communication between domains, will be incorporated. The project team will follow secure coding practices and validate user inputs to prevent common security vulnerabilities.

The deployment and configuration phase will involve deploying the application on a suitable hosting platform or server using industry-standard deployment tools and techniques. The application will be carefully configured to ensure optimal performance, scalability, and security in the production environment. Comprehensive documentation will be created, encompassing system architecture, API documentation, database schema, and user manuals. This documentation will serve as a valuable resource for future reference, maintenance, and troubleshooting.

Throughout the project, version control systems such as Git will be employed to manage source code and facilitate collaboration among developers. Clear project milestones, deliverables, and timelines will be established, and regular communication with the project team and stakeholders will be maintained to provide updates on progress, gather feedback, and address

any concerns or issues that may arise.

By following these methodologies, the Recruitment Application project using .NET Core, C sharp, HTML, jQuery, JavaScript, JWT tokens, and CORS will proceed systematically. These methodologies ensure effective collaboration, high-quality deliverables, and a successful outcome for the project, ultimately streamlining and optimizing the recruitment process within the organization.MVC and Web Api connection has described in the figure 3.0.

3.1 Key Features of Recruitment Application

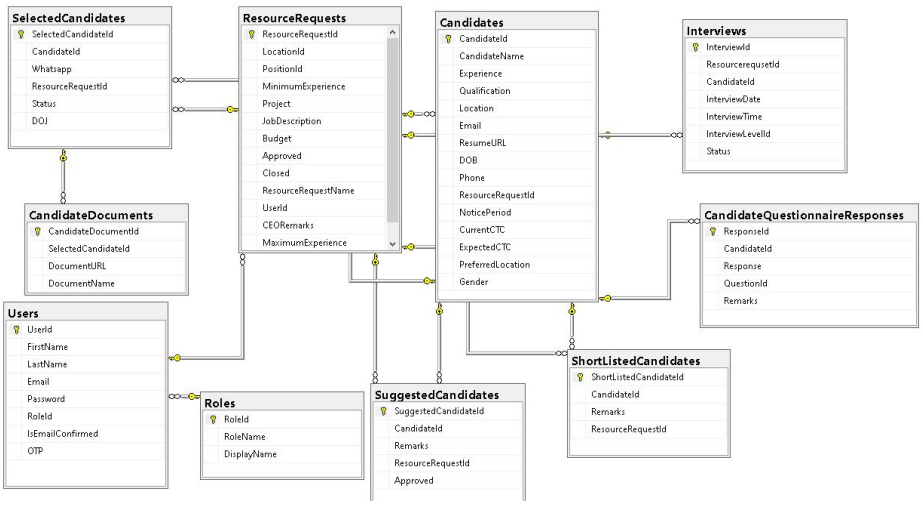

Figure 3.2: Project Architecture

By analysing the figure 3.1 the key feautures of Recruitment Application are

- Login Page:

  The application features a secure login page where authorized users can access their respective accounts. User authentication ensures that only authenticated individuals can access the system.

- Resource Request Management:

  Business heads can submit resource requests for specific positions along with allocated budgets. CEO receives email notifications about new requests and can approve or reject them through the application.

- Candidate Suggestion and Shortlisting:

  HR personnel can suggest candidates for positions based on skills and qualifications. Pre-existing candidate database is leveraged to provide recommendations. Business heads can review and easily shortlist candidates based on specific requirements.

- Interview Management:

  HR personnel can schedule interviews for shortlisted candidates within the application. Interviewers assigned to each candidate can add interview statuses, remarks, and evaluations. Centralized platform streamlines the interview process and reduces coordination efforts.

- Candidate Verification and Questionnaires:

  Selected candidates can upload credentials and certificates for verification. Customized questionnaires ensure a standardized evaluation process. Reduces manual handling of documents and streamlines verification procedures.

- Email Notifications:

  Automated email notifications sent to stakeholders at various stages of the recruitment process. Business heads notified when resource requests are created or updated. Interviewers and candidates receive notifications about interview schedules, status updates, etc.

- User Roles and Access Control:

  Different user roles (business heads, CEOs, HR personnel, interviewers, candidates) with specific access permissions. Ensures data confidentiality and security by controlling access to sensitive information.

- Centralized Collaboration:

  Centralized platform enables effective collaboration and communication among stakeholders. Business heads, CEOs, HR personnel, interviewers, and candidates can interact, exchange information, and provide feedback. -Friendly Interface:

  Intuitive and user-friendly interface ensures a smooth and efficient user experience. Enhances usability and accessibility for all stakeholders.

3.2 Module Description

3.2.1 Login Module:

The login module provides a secure authentication mechanism for users to access the application. Users are required to enter their credentials (username and password) to log in. This module ensures that only authorized individuals can access the system, protecting sensitive information.The login module is shown in the figure 3.2.

Once the user submits their login information, the system validates the credentials and checks the user's role in the database. Based on the assigned role, the user is granted access to the corresponding functionalities and features within the application.

The business head, CEO, HR personnel, and interviewers each have their specific roles and permissions within the system. The login module ensures that only authorized users can access the application and perform their designated tasks.

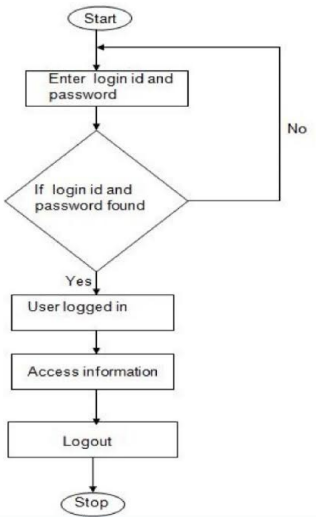

Figure 3.3: Login Page

3.2.2 Resource Request Management Module:

The resource request management module allows business heads to submit resource requests for specific positions. Business heads can provide details such as the position name, required skills, and allocated budget for the position. The module enables efficient tracking and management of resource requests throughout the recruitment process. CEOs receive email notifications about new resource requests and can review and approve or reject them within the

application.

3.2.3 Candidate Suggestion and Shortlisting Module:

The candidate suggestion and shortlisting module assists HR personnel in suggesting suitable candidates for open positions. HR personnel can browse the pre-existing candidate database and filter candidates based on their skills and qualifications. The module provides a list of suggested candidates for business heads to review and shortlist. Business heads can easily select candidates from the suggested list based on their specific requirements.

3.2.4 Interview Management Module:

The interview management module facilitates the scheduling and tracking of interviews for shortlisted candidates. HR personnel can schedule interviews and assign interviewers to each candidate within the application. Interviewers can access the module to view interview schedules, add interview statuses, remarks, and evaluations. The module streamlines the interview process, ensuring proper coordination and efficient evaluation of candidates.

3.2.5 Candidate Verification and Questionnaires Module:

The candidate verification and questionnaires module enables selected candidates to upload their credentials and certificates for verification purposes. The module provides a secure platform for candidates to submit their documents. Additionally, candidates are prompted to complete customized questionnaires that are relevant to the position or organization's requirements. This module simplifies the verification process and ensures a standardized evaluation process for candidates.

3.2.6 Email Notifications Module:

The email notifications module automates the sending of email notifications to stakeholders at various stages of the recruitment process. Stakeholders, including business heads, CEOs, interviewers, and candidates, receive timely notifications about important updates. Notifications can include new resource requests, interview schedules, status updates, and other relevant information. This module enhances communication and keeps all stakeholders informed throughout the recruitment process.

3.2.7 User Roles and Access Control Module:

The user roles and access control module manages user permissions and access levels within the application. Different roles, such as business heads, CEOs, HR personnel, interviewers, and candidates, are defined with specific access privileges. This module ensures that each user can only access the functionalities and data relevant to their role, ensuring data confidentiality and security.

3.2.8 Reporting and Analytics Module:

The reporting and analytics module generates comprehensive reports and provides analytical insights into the recruitment process. It collects and analyzes data related to resource requests, candidate evaluation, interview outcomes, and other metrics. The module offers visualizations and summaries that help in data-driven decision-making and identifying areas for process improvement.

3.3 System Specifications

The software and hardware specifications recognized for the system on the basis of their requirements are specified in this section.

3.3.1 Hardware Requirements

- Processor:Minimum 1 GHz (Recommended 2GHz or more)
- Hard Drive: Minimum 100 MB (Recommended 6 GB or more)
- Memory (RAM): Minimum 1 GB (Recommended 4 GB or above)
- Internet connection

3.3.2 Software Requirements

- Front End-JQuery,Javascript,Bootstrap,CSS,HTML
- Back End-C#,ASP.NET Web API core 6

- Web Server - Apache or Nginx
- Database -MS SQLServer
- Windows, Mac, Linux, Any - OS
- Mozilla Firefox, Microsoft Edge, Any - Browser

3.3.3 Software Description

- jQuery: jQuery is a popular JavaScript library designed to simplify and streamline client-side scripting in web development. It provides a wide range of functions and utilities that allow developers to manipulate HTML documents, handle events, create animations, and make AJAX requests more efficiently. jQuery's syntax is concise and easy to understand, making it a preferred choice for enhancing the interactivity and responsiveness of web applications. It abstracts complex JavaScript tasks into simpler methods, enabling developers to write code more rapidly and cross-browser compatible. With its extensive plugin ecosystem, jQuery offers a wealth of additional functionalities that can be easily integrated into projects.
- C:C (pronounced C sharp) is a versatile and modern programming language developed by Microsoft. It is part of the .NET framework and widely used for building a variety of applications, including web applications, desktop software, mobile apps, and games. C is an object-oriented language that combines the power of C++ with the simplicity of Java. It provides a rich set of features such as strong typing, garbage collection, scalability, and extensive libraries, making it highly suitable for enterprise-level applications. C is known for its robustness, reliability, and performance, and it enjoys strong integration with other Microsoft technologies.
- ASP.NET Core 6: ASP.NET Core is an open-source and cross-platform web framework developed by Microsoft. It is the latest version of the ASP.NET framework and is designed to build modern, high-performance, and scalable web applications. ASP.NET Core offers a modular and lightweight architecture, providing developers with flexibility and improved performance compared to its predecessor. It supports the Model-View-Controller (MVC) pattern, allowing for clean separation of concerns and facilitating

testability and maintainability. ASP.NET Core is built on top of the .NET Core runtime, enabling it to run on multiple platforms, including Windows, macOS, and Linux.

- MS SQL Server: Microsoft SQL Server is a relational database management system (RDBMS) developed by Microsoft. It is widely used in enterprise environments for storing, managing, and retrieving data efficiently and securely. SQL Server offers a robust and scalable platform for building database-driven applications. It supports a wide range of data types, provides advanced security features, and offers high availability and disaster recovery options. SQL Server also includes powerful query optimization capabilities, allowing for efficient data retrieval and manipulation. It integrates well with other Microsoft technologies, making it a popular choice for applications developed on the Microsoft stack.

- ASP.NET Web API:Web API is a framework for building HTTP services that can be consumed by various clients, including web browsers, mobile devices, and other applications. It is a part of the ASP.NET Core framework, which is a cross-platform and open-source web development platform by Microsoft.

  Web API in .NET Core allows developers to create RESTful APIs that follow the principles of Representational State Transfer (REST). RESTful APIs enable communication between clients and servers using standard HTTP methods, such as GET, POST, PUT, and DELETE, and utilize the HTTP status codes for indicating the status of the request.

  Here are some key points about Web API in .NET Core:

  Controller-Based Approach: Web API in .NET Core follows a controller-based approach, where developers create classes that inherit from the Controller base class. These controller classes define action methods that handle incoming HTTP requests and return the appropriate HTTP responses.

  Attribute Routing: Web API in .NET Core supports attribute-based routing, which allows developers to define routes for individual action methods within the controller using attributes like [HttpGet], [HttpPost], [HttpPut], etc. This provides flexibility in defining the API routes and mapping them to specific action methods.

  Content Negotiation: Web API in .NET Core includes content negotiation, which allows clients to request data in different formats, such as JSON, XML, or others. The API can return the requested data format based on the Accept header in the client's request.

Model Binding and Validation: Web API in .NET Core provides model binding, which automatically maps incoming HTTP request data to the parameters of the action methods. It also includes model validation capabilities for validating the input data based on defined validation rules.

Built-in Support for JSON and XML: Web API in .NET Core includes built-in support for JSON and XML serialization and deserialization. It can automatically convert objects to JSON or XML format when returning responses and deserialize incoming JSON or XML data into objects.

Middleware Pipeline: Web API in .NET Core leverages the middleware pipeline concept, allowing developers to add custom middleware components to handle cross-cutting concerns such as authentication, authorization, logging, exception handling, and more.

Dependency Injection: Web API in .NET Core supports dependency injection, which facilitates the development of loosely coupled and testable code. Dependencies can be easily injected into controllers or other components, promoting maintainability and extensibility.

Testing and Integration: Web API in .NET Core provides a comprehensive testing framework for unit testing and integration testing of APIs. It allows developers to write test cases to ensure the correctness and reliability of the API endpoints.

Web API in .NET Core is a powerful framework for building flexible and scalable APIs. It offers a rich set of features and integrates well with other components of the ASP.NET Core ecosystem, making it a popular choice for developing robust and high-performing web services.

3.4 System Design

System design is the process of defining and organizing the components, modules, and interactions of a software system. It involves translating the requirements of the system into a structured design that can be implemented and deployed.

The system design phase focuses on creating a blueprint for the software system, taking into account various factors such as functionality, performance, scalability, security, and maintainability. It includes both the logical design, which defines the high-level structure and

flow of the system, and the physical design, which involves selecting the appropriate hardware, software, and infrastructure components for implementation.

In the logical design, the system is divided into modules or components, each responsible for a specific set of functionalities. The relationships and interactions between these modules are defined through diagrams, such as use case diagrams, activity diagrams, and sequence diagrams. The logical design ensures that the system meets the requirements of the stakeholders, provides a user-friendly interface, and facilitates the smooth flow of data and processes.

The physical design, on the other hand, focuses on the actual implementation and deployment of the system. It involves selecting the hardware and software components that will be used to build the system. This includes considerations such as the choice of programming languages, frameworks, databases, and deployment environments. The physical design also includes decisions regarding the configuration, optimization, and integration of these components to ensure reliable performance, scalability, and security.

Overall, system design plays a crucial role in transforming the requirements of a software system into a concrete design that can be developed, deployed, and maintained. It provides a roadmap for developers to follow and ensures that the resulting system meets the desired objectives and expectations.

Logical Design:The logical design of the Recruitment Application involves defining the structure and organization of the system components and their interactions. It focuses on the functional requirements and high-level architecture of the application. The application can be logically divided into modules such as Login, Resource Request Management, Candidate Suggestion and Shortlisting, Interview Management, Candidate Verification and Questionnaires, Email Notifications, User Roles and Access Control, and Reporting and Analytics. Each module has its specific set of functionalities and interactions, which are defined through use cases, activity diagrams, and sequence diagrams. The logical design ensures that the application meets the desired business requirements, provides a user-friendly interface, and ensures smooth flow and coordination of data and processes.

Physical Design:The physical design of the Recruitment Application focuses on the actual implementation and deployment of the system. It includes decisions regarding the hardware, software, and infrastructure components required to run the application effectively. Hardware: The system should meet the hardware requirements specified earlier, such as having a minimum

processor speed, sufficient disk space, and an adequate amount of memory (RAM). The hardware infrastructure should be capable of supporting the expected user load and providing reliable performance. Software: The application is developed using technologies such as .NET Core, C, HTML, CSS, JavaScript, jQuery, and ASP.NET Web API Core. The software components are selected based on their compatibility, scalability, security, and performance. Database: The system utilizes MS SQL Server as the database management system to store and manage data. The database design includes defining tables, relationships, indexes, and constraints to ensure efficient storage and retrieval of data. Deployment: The application can be deployed on a web server or a cloud-based infrastructure. Proper configuration and optimization of the deployment environment are essential to ensure the availability, scalability, and security of the application. Integration: The system may require integration with external systems or services, such as email servers for sending notifications or third-party APIs for authentication and verification. Security: The physical design includes implementing appropriate security measures, such as authentication and authorization mechanisms, to protect sensitive data and prevent unauthorized access to the system.

3.4.1 System Architecture

System architecture refers to the overall structure and organization of a software system. It defines the arrangement and interaction of the system's components, modules, and subsystems, as well as the relationships and dependencies between them.

A well-designed system architecture ensures that the software system is scalable, maintainable, and adaptable to changes. It provides a framework for developers to build and integrate different parts of the system, ensuring that they work together harmoniously to achieve the system's objectives.

Here are some key aspects of system architecture:

Components: The system architecture defines the major components or modules of the software system. These components encapsulate specific functionalities or services and can be developed independently or reused from existing systems or libraries.

Communication and Integration: The architecture specifies how the components communicate and interact with each other. It defines the protocols, interfaces, and data formats used for communication and ensures seamless integration between different components.

Layers and Tiers: System architecture often incorporates a layered or tiered approach to

organizing the components. Layers provide a logical separation of concerns, where each layer handles a specific aspect of the system (e.g., presentation layer, business logic layer, data access layer). Tiers, on the other hand, represent the physical distribution of the system across different machines or servers (e.g., client tier, application tier, database tier).

Data Management: The architecture includes considerations for data storage, access, and management. It defines how data is stored, retrieved, and updated within the system, and may incorporate databases, caching mechanisms, or external data sources.

Scalability and Performance: System architecture addresses scalability and performance requirements by considering factors such as load balancing, caching, and distributed processing. It ensures that the system can handle increasing volumes of data and user requests without compromising performance.

Security: The architecture includes security measures and mechanisms to protect the system and its data. It may involve authentication, authorization, encryption, and other security controls to prevent unauthorized access and ensure data integrity.

Deployment and Infrastructure: System architecture defines the deployment model and infrastructure requirements. It considers the hardware, software, and network components needed to deploy and run the system effectively. It also considers factors such as fault tolerance, redundancy, and disaster recovery.

Maintenance and Evolvability: A well-designed system architecture takes into account the system's maintainability and evolvability. It allows for easy modifications, enhancements, and updates without affecting the entire system. It also considers documentation, logging, and monitoring to support ongoing maintenance and troubleshooting.

system architecture provides a blueprint for the software system, guiding the development process and ensuring that the resulting system meets the desired objectives in terms of functionality, performance, scalability, security, and maintainability.

3.4.2 Module Design

In **RECRUITMENT APPLICATION** Module design refers to the process of breaking down a software system into smaller, manageable modules or components. Each module encapsulates a specific functionality or set of related functionalities, making the system easier to develop, understand, and maintain.

- Login Module:The Login module is responsible for handling user authentication and

access control. It includes functionalities such as user registration, login, password reset, and session management. The module ensures that only authorized users can access the system and perform the required actions based on their roles and permissions.

- Resource Request Management Module: The Resource Request Management module allows the Business Head to create and manage resource requests for specific positions. It includes functionalities such as creating new resource requests, specifying budget and position details, and tracking the status of requests. The module provides interfaces for the CEO to review and approve or reject the resource requests.

- Candidate Suggestion and Shortlisting Module:

  The Candidate Suggestion and Shortlisting module enables the HR department to suggest suitable candidates for a particular position. It allows HR personnel to search and filter candidates based on their skills, experience, and other relevant criteria. The module provides the functionality to add candidates to a shortlist and submit the list for further review by the Business Head.

- Interview Management Module:

  The Interview Management module facilitates the scheduling and tracking of interviews for shortlisted candidates. It allows the HR department to schedule interview slots, assign interviewers, and notify candidates about their interview details. The module provides interfaces for interviewers to update the interview status, provide remarks, and rate the candidates.

- Candidate Verification and Questionnaires Module:

  The Candidate Verification and Questionnaires module handles the verification of selected candidates and collects additional information. It provides functionalities for candidates to upload their credentials, certificates, and other required documents. The module includes questionnaires or assessments that candidates need to complete as part of the selection process.

- User Roles and Access Control Module:

  The User Roles and Access Control module manages the roles and permissions of system users. It allows the system administrator to define user roles such as Business Head, CEO,

HR personnel, and Interviewer. The module ensures that each user has appropriate access privileges based on their role, restricting access to sensitive functionalities.

3.4.3 System Access Model Design

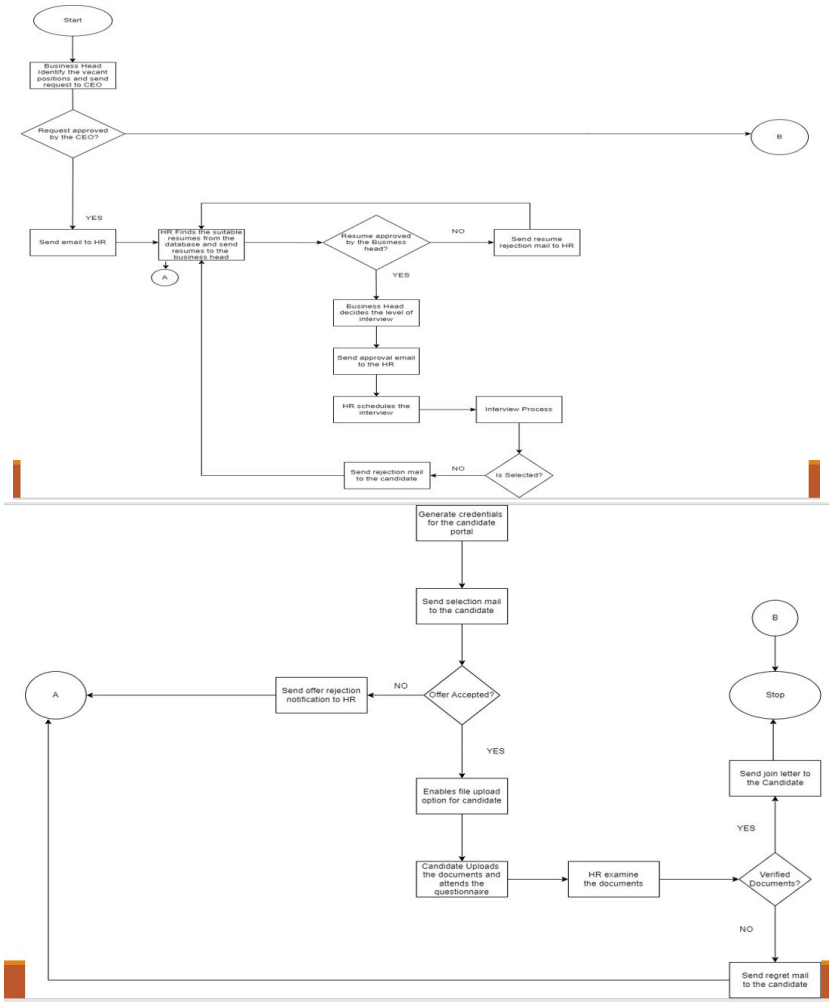

Figure 3.4: Access Control Model

The access control model for the Recruitment Application is designed to regulate user access to various functionalities and resources based on their roles and permissions. It ensures that only authorized users can perform specific actions within the system. Here is a description of the access control model design for the Recruitment Application: the flow chart 3.3 shows it.

- User Roles:

  The access control model defines several user roles, including Business Head, CEO, HR Personnel, and Interviewer. Each role represents a specific job function or responsibility

within the recruitment process. Roles are assigned to users based on their position or assigned tasks.

- Role-Based Permissions:

  Role-based permissions are defined to determine the actions that users can perform within the Recruitment Application. Permissions are associated with each role, specifying the operations and resources that users with that role can access. For example, the Business Head may have the permission to create and approve resource requests, while the HR Personnel can suggest candidates and schedule interviews.

- Resource-Based Authorization:

  The access control model includes resource-based authorization to control access to specific resources within the application. Different roles have different levels of access to resources such as resource requests, candidate profiles, and interview schedules. Users can only access and modify resources that are relevant to their roles and responsibilities.

- Authentication and User Management:

  The access control model incorporates secure authentication mechanisms to verify the identity of users. User credentials, such as usernames and passwords, are stored securely and validated during login. User management functionalities allow administrators to create, modify, and deactivate user accounts.

- Access Control Administration:

  The access control model provides interfaces for system administrators to manage user roles and permissions. Administrators can assign roles to users, modify role-based permissions, and handle role changes or revocations. Access control administration functionalities ensure that access privileges are appropriately assigned and maintained.

- Auditing and Logging:The access control model includes auditing and logging mechanisms to track user activities and access attempts. It logs information such as user logins, access requests, permission changes, and denied access attempts. Auditing and logging help in monitoring and investigating security-related incidents and maintaining compliance.

Chapter 4

Result and Discussion

RECRUITMENT APPLICATION was successfully implemented, providing a comprehensive platform for managing the recruitment process. The application allows users, including Business Heads, CEOs, HR personnel, and Interviewers, to collaborate seamlessly and efficiently throughout the entire recruitment lifecycle. Key features such as resource request management, candidate suggestion and shortlisting, interview scheduling, and candidate verification were developed and integrated into the application. User feedback has been overwhelmingly positive, with users expressing satisfaction with the system's usability and the automation of manual recruitment tasks. The application has demonstrated improved efficiency and time savings in the recruitment process, with a significant reduction in manual efforts.

The implementation of the Recruitment Application has had a notable impact on the organization's recruitment process. The automation of resource requests and candidate management has streamlined the workflow, enabling faster turnaround times and better decision-making. The application's role-based access control model ensures that each user has appropriate permissions, maintaining data security and privacy. The system's performance has been evaluated, and optimizations have been implemented to ensure efficient response times, system availability, and scalability. While the application has been successful in meeting the initial project objectives, some limitations were identified, such as the need for additional reporting and analytics capabilities. Future enhancements could focus on expanding the application's functionality to include more advanced analytics, integration with external job portals, and leveraging machine learning algorithms for candidate matching and assessment. Overall, the Recruitment Application has proven to be a valuable tool in modernizing and optimizing the recruitment process, leading to improved efficiency and better hiring outcomes.

4.1 Testing Methods

Testing ensures that the system is error-free based on criteria that are anticipated by the user or by the organization. A system may have high-end or low-end performance based on the environment in which it operates.

4.1.1 Unit Testing:

Unit testing focuses on testing individual components or modules of the application in isolation. Each module or function is tested to ensure that it functions correctly and produces the expected output. Unit tests are typically written using testing frameworks and cover both positive and negative scenarios. Test Coverage: Aim for high test coverage by ensuring that a significant portion of the codebase is covered by unit tests. This helps identify potential bugs or issues in the individual components.

Test Suites: Organize unit tests into logical test suites based on functionality or modules. This allows for easier management, execution, and reporting of test results.

Test Data: Create a variety of test data sets that cover different scenarios, including edge cases and boundary conditions. This helps validate the robustness and correctness of the code.

Mocking and Stubbing: Use mocking frameworks or stubs to simulate external dependencies or interactions with external systems. This isolates the unit under test and allows for more controlled testing.

Test Driven Development (TDD): Consider adopting the TDD approach, where tests are written before writing the actual code. This helps drive the development process and ensures that the code meets the expected requirements.

Continuous Integration: Integrate unit tests into the continuous integration and delivery (CI/CD) pipeline. This ensures that unit tests are executed automatically whenever changes are made to the codebase, helping catch issues early in the development cycle.

Test Assertions: Use appropriate assertions to verify the expected behavior of the code. Assertions help validate that the code produces the correct outputs and meets the specified requirements.

Test Execution and Reporting: Implement mechanisms to execute unit tests automatically and generate test reports. This provides visibility into the test results, including passed tests, failed tests, and code coverage metrics.

Test Maintenance: Regularly review and update unit tests as the application evolves. This ensures that the tests remain relevant and effective, even when the codebase undergoes changes.

Test Refactoring: Refactor and optimize unit tests to improve their readability, maintainability, and execution efficiency. This helps keep the test suite organized and facilitates easier test maintenance.

4.1.2 Integration Testing:

Integration testing verifies the interaction and integration between different modules or components of the application. It ensures that the individual modules work together correctly and exchange data seamlessly. Integration tests simulate real-world scenarios and test the end-to-end functionality of the application.

4.1.3 User Acceptance Testing

UAT involves testing the application from the end-user's perspective to ensure it meets their requirements and expectations. Real users or representatives from the user group participate in testing the application's usability, functionality, and user interface. UAT helps identify any issues or discrepancies between user expectations and the implemented system.

4.1.4 Performance Testing

Performance testing evaluates the system's responsiveness, scalability, and stability under various load conditions. It measures response times, resource utilization, and system behavior when subjected to simulated high user loads or stress conditions. Performance testing ensures that the application can handle the expected number of users and perform optimally.

4.1.5 Security testing

Security testing focuses on identifying vulnerabilities or weaknesses in the application's security mechanisms. It includes testing authentication and authorization controls, data encryption, protection against SQL injections, cross-site scripting (XSS), and other security threats. Security testing ensures that sensitive user data is protected and the application is resilient against potential attacks.

4.1.6 Usability testing

Usability testing focuses on evaluating the user-friendliness and intuitiveness of the application's interface. It involves real users interacting with the application to perform tasks and provide feedback on the ease of use, navigation, and overall user experience. Usability testing helps identify areas of improvement in the user interface and user interactions.

4.2 Test Cases

4.2.1 User Login

- Description: Verify that users can successfully log in to the application using valid credentials.
- Precondition: The user has a valid username and password.
- Test Steps: Open the application's login page. Enter a valid username and password. Click the "Login" button. Verify that the user is redirected to the dashboard page.

4.2.2 Resource Request Creation

- Description: Validate the process of creating a resource request by the business head.
- Precondition: The user is logged in as a business head. Test Steps:
- Navigate to the resource request creation page. Fill in the required details such as position, skills, and budget. Click the "Submit" button. Verify that the resource request is successfully created and saved in the system. Check that the request is visible in the list of resource requests.

4.2.3 Resource Request Approval

- Description: Ensure that the CEO can review and approve or reject resource requests.
- Precondition: The user is logged in as the CEO.
- Test Steps: Access the list of resource requests. Locate a pending request. Review the request details. Click the "Approve" or "Reject" button. Verify that the status of

the request is updated accordingly. Check that appropriate notifications are sent to the concerned parties.

4.2.4 Candidate Suggestion

- Description: Verify that HR personnel can suggest candidates for a specific position.
- Precondition: The user is logged in as an HR personnel.
- Test Steps: Navigate to the candidate suggestion page. Select the desired position. Filter and search for suitable candidates based on skills and qualifications. Add candidates to the suggestion list. Verify that the candidates are successfully added to the list. Check that the suggested candidates are associated with the respective resource request.

4.2.5 Interview Scheduling

- Description: Validate the functionality of scheduling interviews for shortlisted candidates.
- Precondition: The user is logged in as an HR personnel.
- Test Steps: Access the interview scheduling page. Select a candidate from the shortlisted candidates list. Choose an available interview slot. Assign interviewers to the selected slot. Verify that the interview is successfully scheduled and recorded in the system. Check that the interview status is updated accordingly.

4.3 Output Screens and Results

1. Login Page

   User can login using username and password or by using google account

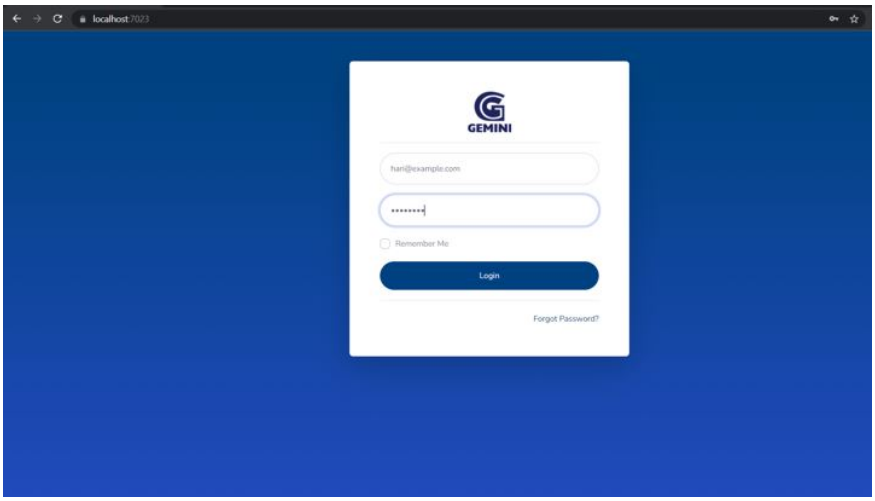

Figure 4.1: Login Page

2. Home Page

   The Home page is different for each user depending on the user's role.

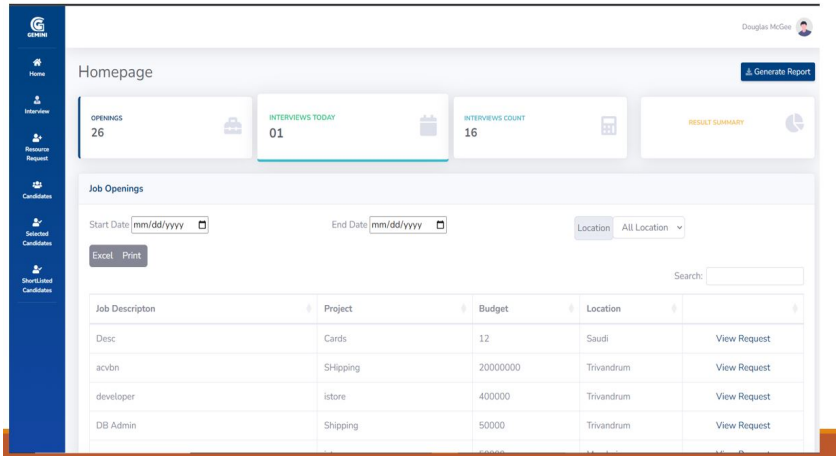

Figure 4.2: Home Page

3. Resource Request Page

   Business head can create a resource request

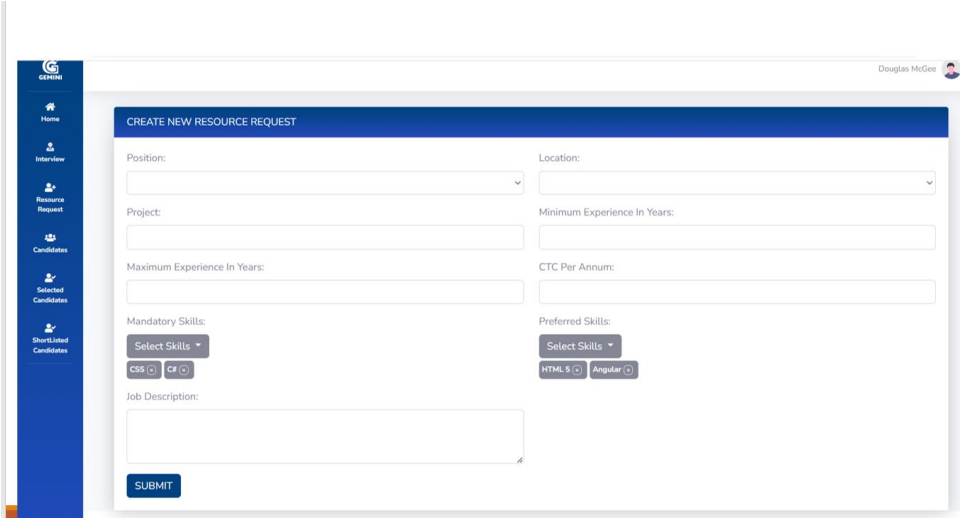

Figure 4.3: Resource Request Page

4. CEO Page

   CEO Approval or Rejection Page

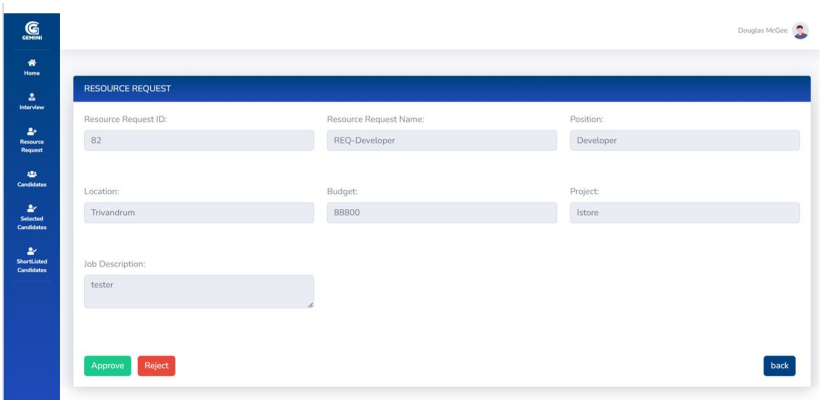

Figure 4.4: CEO Page

5. HR Suggestion Page

   HR can suggest candidates

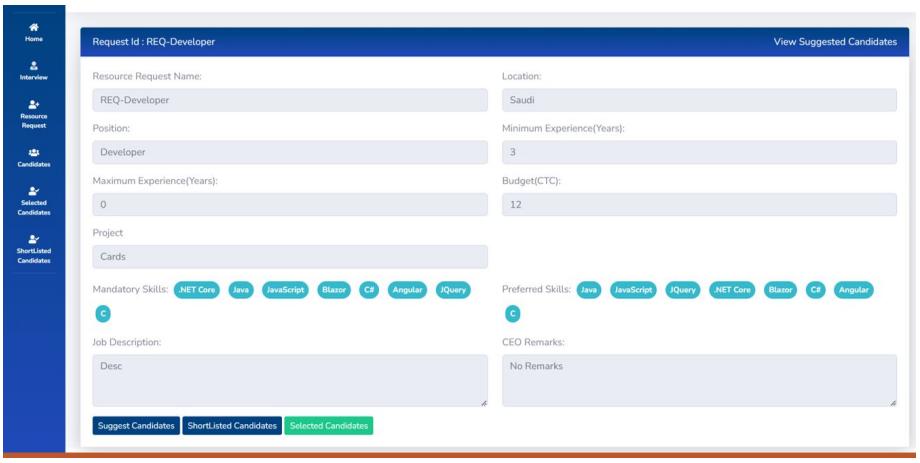

Figure 4.5: HR Suggestion Page

6. Candidate Page

   HR can upload Candidate Details

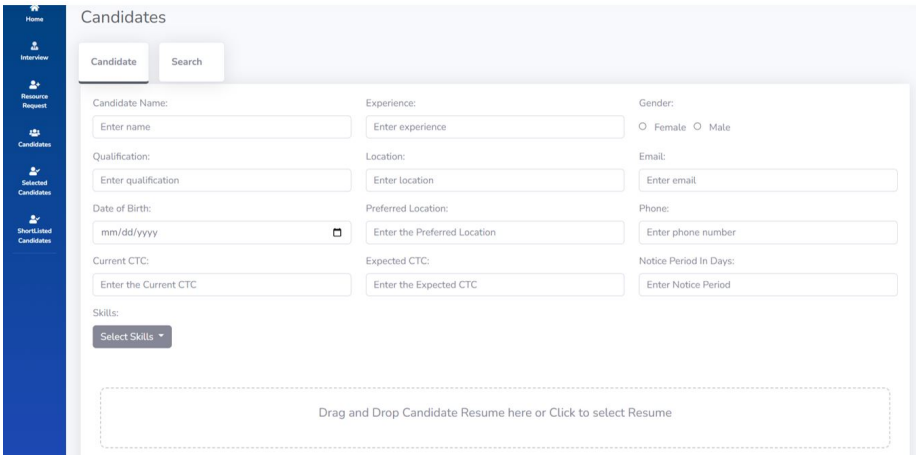

Figure 4.6: Candidate Page

7. HR Suggestion Modal

   HR can Suggest candidates by checklist

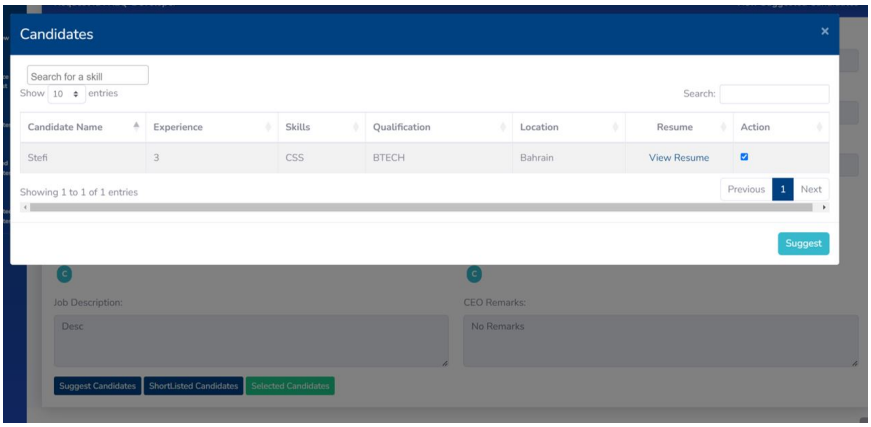

Figure 4.7: Suggestion Modal

8. Business Head Shortlisting Modal

   Business Head can shortlist the candidates for interview

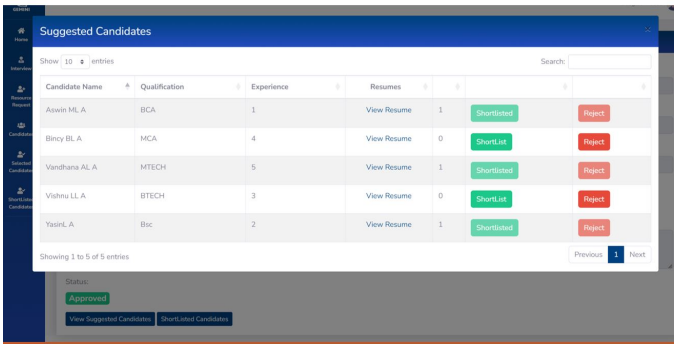

Figure 4.8: Shortlisting modal

9. Interview Scheduling Page

   HR can schedule interview for shortlisted candidates

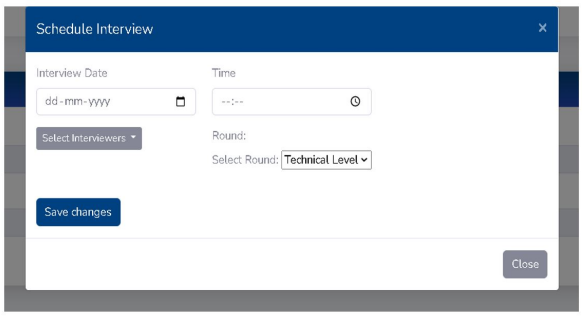

Figure 4.9: Interview Scheduling Page

Chapter 5

Conclusion

RECRUITMENT APPLICATION has successfully delivered a comprehensive and efficient solution for streamlining the recruitment process within the organization. The application's key features, such as resource request management, candidate suggestion and shortlisting, interview scheduling, and candidate verification, have significantly improved the efficiency and effectiveness of the recruitment workflow.

Through the implementation of the project, it has been demonstrated that automation and digitization of manual recruitment tasks can lead to substantial time savings, reduced manual efforts, and improved decision-making. The user feedback received during the project has been overwhelmingly positive, with users expressing satisfaction with the system's usability and the elimination of manual paperwork.

The application's access control model ensures data security and privacy, allowing for role-based permissions and secure access to sensitive information. The performance and scalability of the system have been evaluated and optimized to provide a seamless user experience, even under high load conditions.

While the Recruitment Application has achieved its primary objectives, there is still room for future enhancements and expansions. Areas for improvement may include incorporating advanced analytics for candidate matching and assessment, integrating with external job portals, and further enhancing the user interface to enhance user experience.

Overall, the Recruitment Application has proven to be a valuable tool in modernizing and optimizing the recruitment process. It has demonstrated its ability to streamline operations, enhance collaboration between stakeholders, and ultimately improve the organization's hiring outcomes. The project's success paves the way for continued advancements in recruitment technology, setting a strong foundation for future developments in the field.

5.1 Future Enhancement

In the future, the **RECRUITMENT APPLICATION** project can be enhanced with several additional features and functionalities. One important enhancement would be to incorporate advanced analytics capabilities into the application. This would involve leveraging data analytics techniques to gain insights into recruitment trends, candidate performance, and hiring success rates. By analyzing recruitment data, organizations can make data-driven decisions, optimize their recruitment strategies, and identify areas for improvement.

Another valuable enhancement would be to integrate artificial intelligence (AI) algorithms for candidate matching. This AI-powered feature would automatically match candidates with job requirements based on their skills, experience, and qualifications. By reducing manual effort in candidate shortlisting, this enhancement can improve the efficiency and accuracy of the recruitment process, ensuring that the most suitable candidates are selected.

To leverage the power of social media in recruitment, integrating the application with popular social media platforms would be beneficial. This integration would allow organizations to tap into a wider pool of candidates, enable targeted recruitment campaigns, and facilitate easy sharing of job openings on social networks.

Furthermore, developing a mobile application version of the Recruitment Application would enhance flexibility and convenience for users. This mobile application would enable users to access and perform recruitment tasks on the go, ensuring that they can manage recruitment processes anytime, anywhere.

Other enhancements could include implementing interview assessment tools within the application, integrating with background verification services for automated verification of candidate credentials, and improving collaboration and communication features for seamless interaction between stakeholders.

References

[1] D. Sam, M. Ganesan, S. Ilavarasan and T. J. Victor, *"Hiring and Recruitment Process Using Machine Learning," 2023 International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF), Chennai, India, 2023, pp. 1-4, doi: 10.1109/ICECONF57129.2023.10084133.*

[2] M. Vaclavkova and J. Bohacik, *"Creation of a Software Tool in Project Based Teaching for the Recruitment of Employees Into Security Companies," 2018 16th International Conference on Emerging eLearning Technologies and Applications (ICETA), Stary Smokovec, Slovakia, 2018, pp. 611-616, doi: 10.1109/ICETA.2018.8572224.*

[3] W. Liu, *"Human Resources Recruitment System Based on XML Web Service," 2009 Third International Symposium on Intelligent Information Technology Application, Nanchang, China, 2009, pp. 203-206, doi: 10.1109/IITA.2009.163.*

[4] R. Khosla, C. Lai and M. -t. Chu, *"Measurement and Comparison of Non-verbal Behavior and Cognitive Behavior in Human Resource Management - Application in Sales Recruitment," 2006 IEEE International Conference on Computational Intelligence for Measurement Systems and Applications, La Coruna, Spain, 2006, pp. 57-62, doi: 10.1109/CIMSA.2006.250749.*

[5] A. Sambir, V. Yakovyna and M. Seniv, *"Recruiting software architecture using user generated data," 2017 XIIIth International Conference on Perspective Technologies and Methods in MEMS Design (MEMSTECH), Lviv, Ukraine, 2017, pp. 161-163, doi: 10.1109/MEMSTECH.2017.7937557.*

[6] G. Kejkar, A. Khan and R. Sharma, *"An enhancement for candidate recruitment system using Angularjs," 2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Coimbatore, India, 2017, pp. 1-4, doi: 10.1109/ICIIECS.2017.8276096.*

[7] Yi Ding, Baoshan Luo, Yao Feng and Xiao Mei, *"Method research and system design of automatic acquire recruitment information based on Internet," 2016 2nd IEEE*

International Conference on Computer and Communications (ICCC), Chengdu, 2016, pp. 2818-2822, doi: 10.1109/CompComm.2016.7925212.

[8] S. Gupta, A. Hingwala, Y. Haryan and S. Gharat *"Recruitment System with Placement Prediction," 2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS), Coimbatore, India, 2021, pp. 669-673, doi: 10.1109/ICAIS50930.2021.9395768.*

[9] R. Shaikh, N. Phulkar, H. Bhute, S. K. Shaikh and P. Bhapkar, *"An Intelligent framework for E-Recruitment System Based on Text Categorization and Semantic Analysis," 2021 Third International Conference on Inventive Research in Computing Applications (ICIRCA), Coimbatore, India, 2021, pp. 1076-1080, doi: 10.1109/ICIRCA51532.2021.9544102.*

[10] J. O. Ogutu and J. K. Irungu, *"Citizen-centric evaluation framework for e-government systems in Kenya. The case of public service commission of Kenya Online Recruitment Selection system," 2013 IST-Africa Conference Exhibition, Nairobi, Kenya, 2013, pp. 1-8.*

[11] E. Ferreira, C. Páris and L. Roseiro, "Web API BLE Communication using .Net Core," 2022 17th Iberian Conference on Information Systems and Technologies (CISTI), Madrid, Spain, 2022, pp. 1-5, doi: 10.23919/CISTI54924.2022.9820449.

[12] D. Damyanov, Z. Varbanov and S. Varbanova, *"An improved approach of using data storage services in ASP.NET Core," 2022 International Conference Automatics and Informatics (ICAI), Varna, Bulgaria, 2022, pp. 287-291, doi: 10.1109/ICAI55857.2022.9959991.*

[13] A. Shakhov and O. Kupraty, "Basic project of autonomous main engine control and it implementation in C (C sharp) environment," 2021 IEEE 16th International Conference on Computer Sciences and Information Technologies (CSIT), LVIV, Ukraine, 2021, pp. 319-322, doi: 10.1109/CSIT52700.2021.9648721.

[14] I. Darmawan, A. P. A. Karim, A. Rahmatulloh, R. Gunawan and D. Pramesti, *"JSON Web Token Penetration Testing on Cookie Storage with CSRF Techniques," 2021 International Conference Advancement in Data Science, E-learning and Information Systems (ICADEIS), Bali, Indonesia, 2021, pp. 1-5, doi: 10.1109/ICADEIS52521.2021.9701965.*

[15] P. Varalakshmi, G. B, V. S. P, D. T and S. K, *"Improvising JSON Web Token Authentication in SDN," 2022 International Conference on Communication, Computing and Internet of Things (IC3IoT), Chennai, India, 2022, pp. 1-8, doi: 10.1109/IC3IOT53935.2022.9767873.*

Appendix

Screenshots

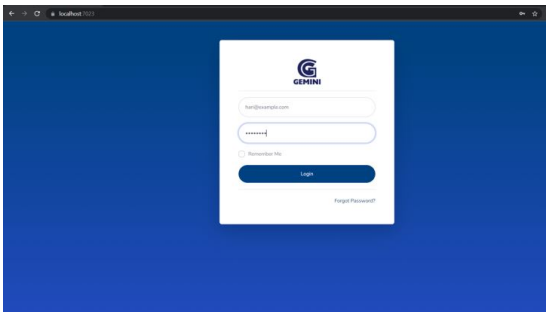

Figure A.1: Login Page

Figure A.2: Home Page

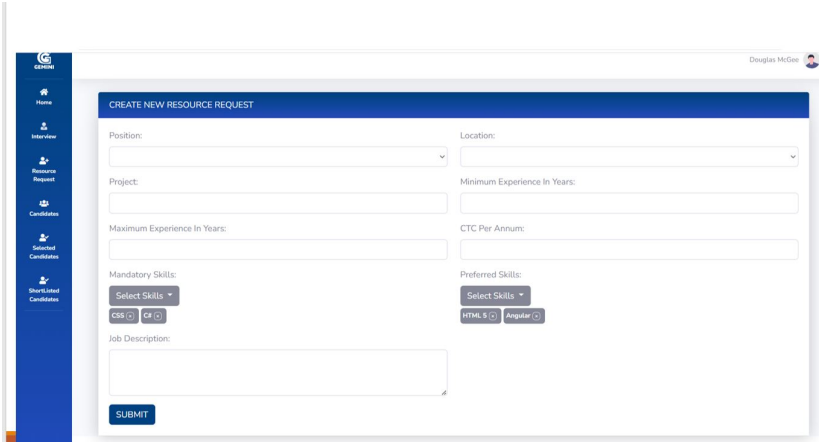

Figure A.3: Resource Request Page

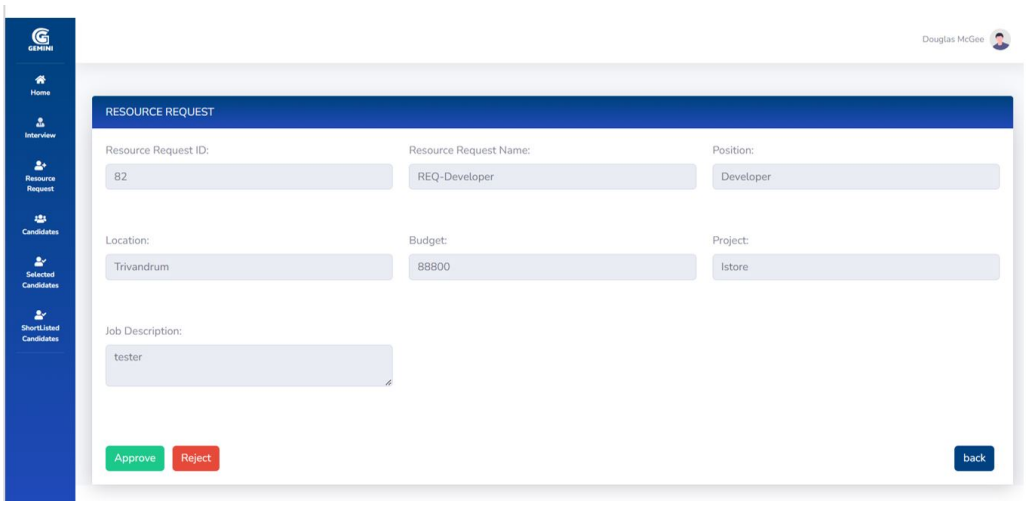

Figure A.4: CEO Page

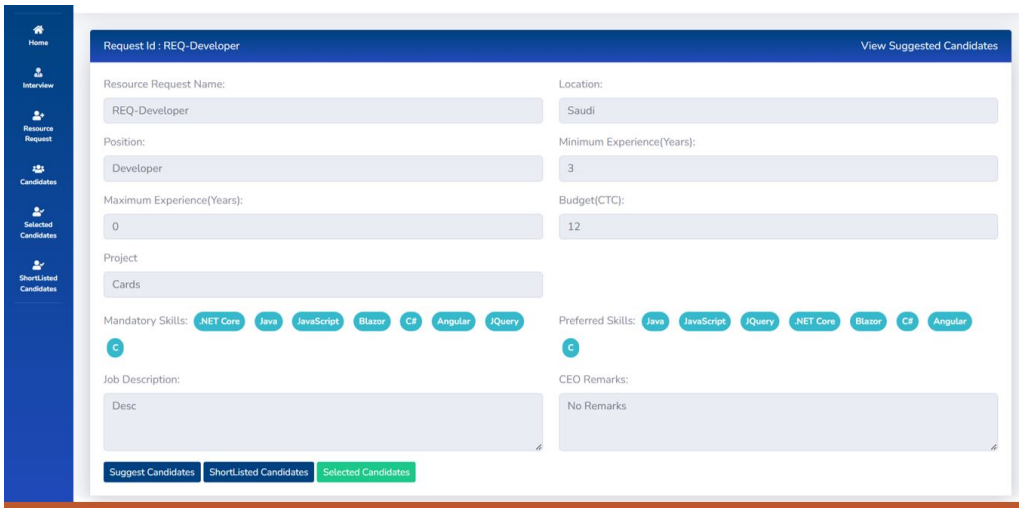

Figure A.5: Suggestion page

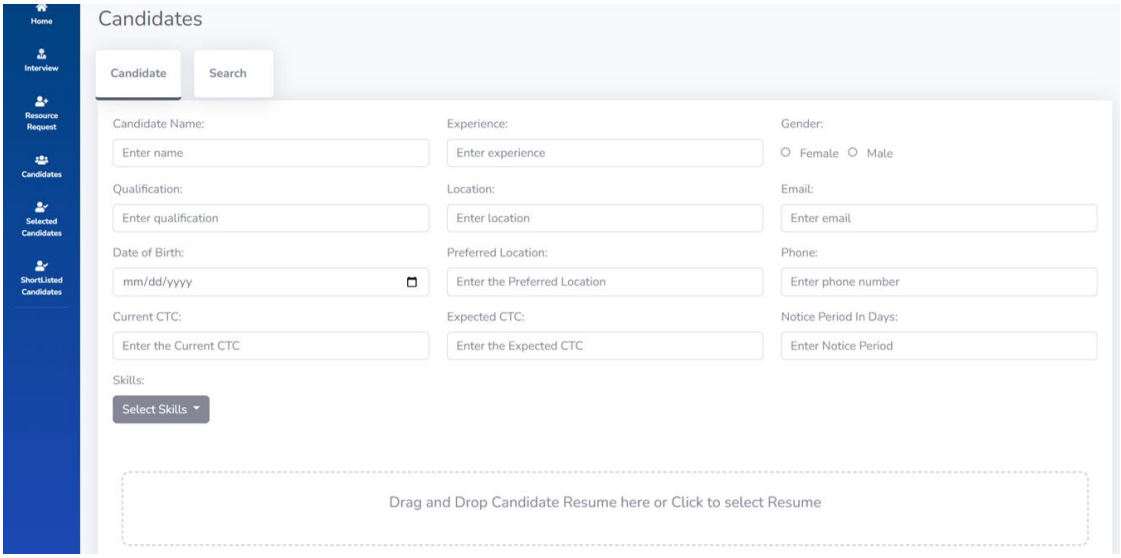

Figure A.6: Candidate Page

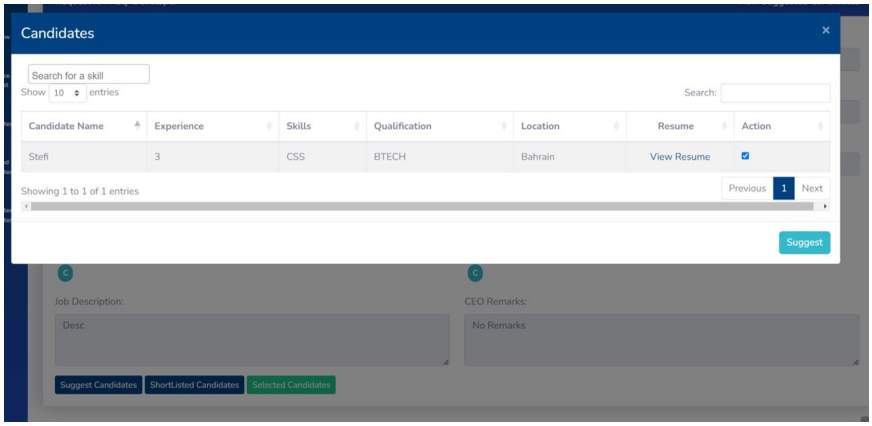

Figure A.7: Suggestion Modal

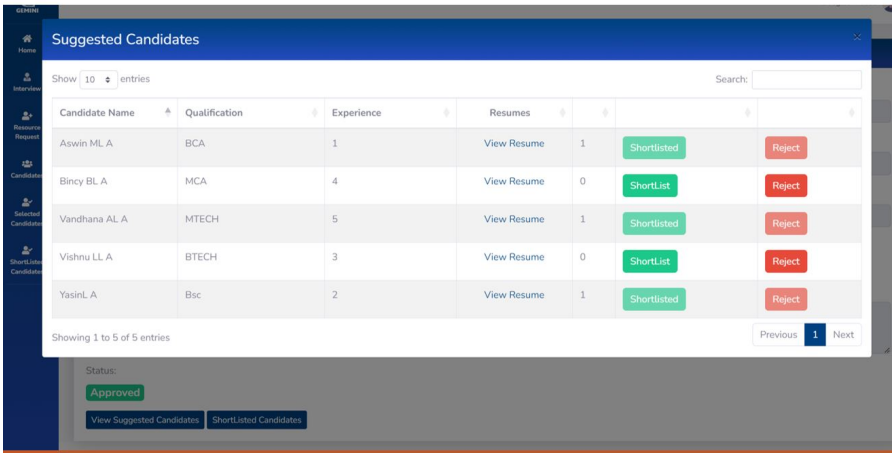

Figure A.8: Shortlisting Page

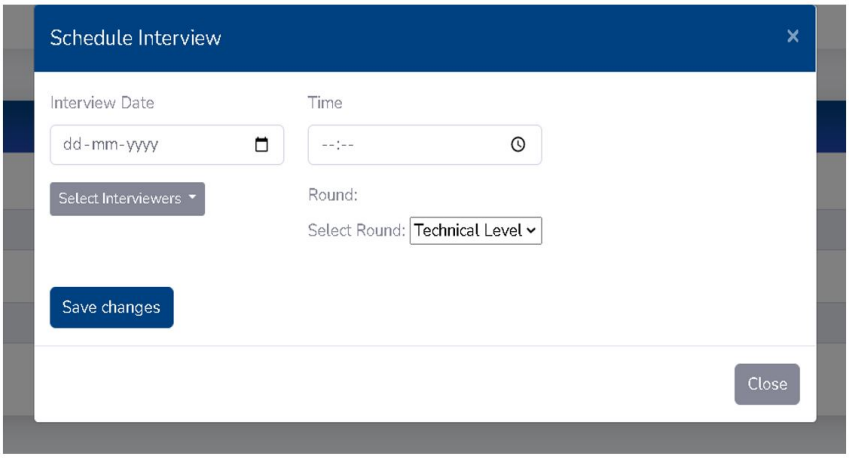

Figure A.9: Interview Schedule Page

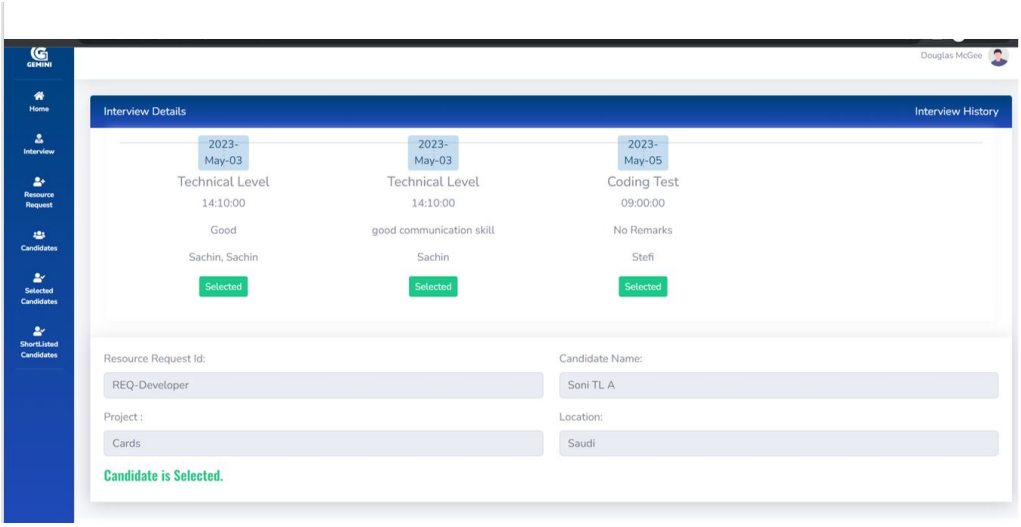

Figure A.10: Interview Details Page

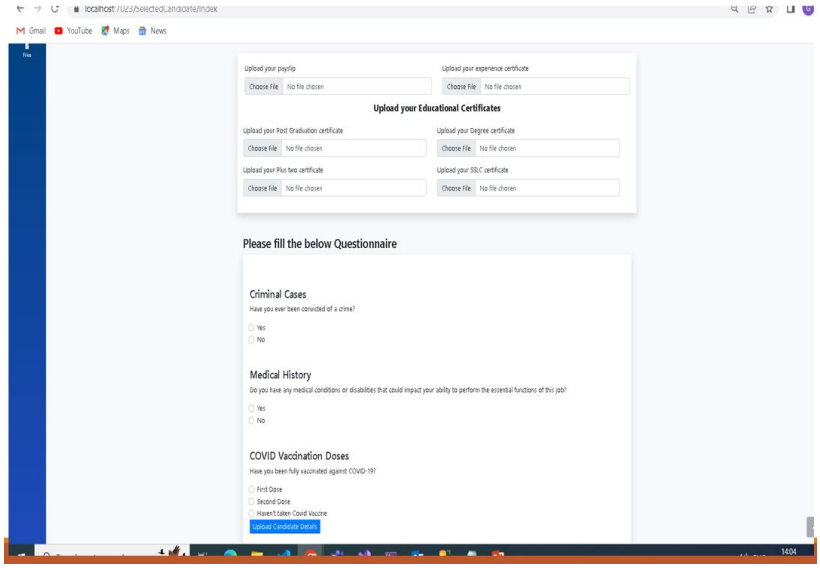

Figure A.11: Selected Candidate Page