# A Feasible Solution for the Challenges Faced in Job Searching and the Recruitment Process

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## ABSTRACT

The competitive job market makes it difficult for people to find the best job opportunity that suits them well. A job seeker must apply for a considerably higher number of vacancies to at least be selected for an interview. There is no way for a job seeker to keep track of the application status, or to know the reason for rejections in the traditional application process. Not only job seekers but also recruiters face issues in the process as they receive many applications per day. There is a high chance for them to miss the most suitable candidates. This research paper aims to propose a web-based system to address the difficulties faced by both job seekers and job recruiters by analyzing the existing issues. The functionality of the proposed system will be based on four main components. Those components are considered user and inquiry management, vacancy management, application management, and assessments and interview management. User-friendliness and usability will be given priority in this proposed system.

*Keywords*— Job Portal, Web Development, Recruitments, Job Searching

## I. INTRODUCTION

This proposed system is designed as a solution for the issues related to finding jobs, starting from searching for jobs to rejection or acceptance. Since the whole process is considered, it is not only for job seekers but also for companies/recruiters [1]. This application is support Job Seekers to find a job and get opportunities at the same place. No need to get service from different services. Company/Recruiters can find a suitable candidate for their available position and contact them via this application.

Job seekers can search for required jobs. They can register for the system by providing user details. This system provides a service to create an online resume. Job seekers can select a preferred resume template and fill in the necessary information. This resume can share with a recruiter, and it can be downloaded. The system can suggest jobs related to the user's requirements. Once the application is submitted, the candidate can view the status. If the user's application is shortlisted by the recruits, users can see information about these steps. Recruits can send a task with candidates. Candidates can refer to these tasks and send responses via the application. And recruiters can schedule an interview for the candidate and share it with them and the interview panel. Users can send responses to these messages. That information is notified to the users by notifications, Once the job seekers get the opportunity from the company that information is also notified via this application.

From the recruiter's perspective, they can create a profile including company information and post the job vacancies. They can view all the applications coming from candidates. Recruiters can review the applications and send responses to the candidates. If needed, an assignment can be sent to the candidates. And can schedule an interview for the candidate and notify the interview panel. Also, recruiters can notify the necessary information to the candidate via the application.

Mainly this proposed system has three user roles to manage this system. Jobseeker, Recruiter, and Admin of the system. Admin can manage provided services of the system and can-do upgrades of the system. And can view analyzed reports of the usage of the system. For the development, these system functionalities plan to dive into

main functions. User Management, Vacancy Management, Application Management, Assessment Management, and Interview Management. These sections are explained in the below sections.

This system supports both job seekers and recruiters to complete their recruitment process and find jobs using one place. Comparison of most of the other services available they provide different stages of the service. Some systems provide services job posting to companies. But the candidate needs to build communication with recruiters using other services. If users apply for different positions that are in different places. This system helps manage these works in one place.

The proposed Job Portal Management System will be developed using technologies such as NodeJS, ReactJS, and MongoDB. The ExpressJS framework of NodeJS is used for server-side development. ReactJS is used for client-side development. And MongoDB is used for database management. Also, get integrated with third-party API services. The Methodology section explains furthermore about these technologies.

The following sections in this paper consist of the sections as related work, methodology, proposed system, discussion, conclusion, and references. The related work section will be based on the existing systems in this domain and the methodology section will explain the technologies that will be used in the proposed system development. The proposed system will contain a brief description of the proposed system as four main functionalities. Next, the future work that can be done will be stated in the discussion section. Finally, there will be the conclusion of the paper followed by the references list.

## II.    RELATED WORK

Today, computer technology plays a significant role in finding a new job and hiring employees in any field. The covid-19 pandemic has had a lot of impact on the transformation of new technology into a necessity when it comes to hiring employees and finding a new jobs. In the process of recruiting and searching for a job, the use of new technology will be able to achieve more effective and efficient results. Employers and job recruiters can easily fulfill their needs by doing all these processes using one internet application in processes such as applying for applications, shortlisting CVs, contacting applicants, and conducting interviews.

Here too, we hope to introduce the creation of a web application to carry out the entire process of hiring a job candidate in one place [2]. The main difference between this web application compared to other related applications is that the entire process can be done in one

place, from the time of application to the recruitment of job candidates as employees.

Considering the already existing application that is quite similar to the one we are about to introduce, xpressjobs [3], indeed [4] can be pointed out. But comparing the application we introduce with xpressJobs, indeed, there are several differences. Considering the user roles of xpressjobs and indeed applications, its user roles are job recruiter and job seeker. Our system also has main user roles as job recruiters and job seekers.

Although user roles are similar when considering function and features, features that are not present in xpressjob and indeed are introduced in our system. Although xpressjob and indeed apps have key features, from the first step of recruitment, i.e. cv creation, application invitation, cv shortlisting, and interview call for selected candidates, after the relevant interview, all the processes are not done at the same place.

Currently, no one has presented an existing system that performs this entire process in one place. This job portal management system that we present will be a very efficient and easy web application for the job seeker and the recruiter by doing all the processes from the first step to the last step in one place. An overview of the proposed system is given in Figure 1.
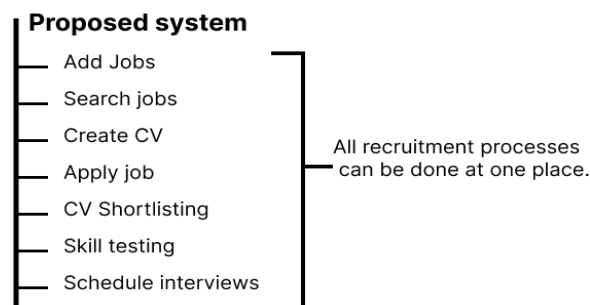


**Figure 1:** Proposed system

## III.    METHODOLOGY

### A. Technology

With the advancement of technology, many people are adapting to develop software products using frameworks and libraries. Because these frameworks and libraries are easy to handle, have good security, and are continuously maintained.

So that we can develop this job portal management system using MERN stack technology. That technology is a collection of frameworks and libraries like React js, Node js, Express js, and Mongo DB. In this system, Frontend is developed using React js and the Backend is developed using Node js and Express js. The system's database is MongoDB atlas. And also, we can use Rest API to connect the client side and server side.

## 1) React js

This system frontend can be developed using react js and it is a free and open-source front-end JavaScript library for building user interfaces based on reusable UI components [5]. It is maintained by the Meta community.

First, we need to install the react js library and then we get a default folder structure [6]. This folder structure contains various files for implementation. Package.json file is a very important file because all required dependencies are installed using that package.json. Also, that folder structure has the public folder and the src folder. Inside the public folder, we can store the images or the files, Inside the src folder we can create a components folder and inside the component folder we can create several JSX files to implement the user interfaces or the reusable components like the navbar, footer, etc. This JSX is a collection of JavaScript and XML, it makes it easier to write and add HTML in React. Also, the App.js file is used to connect all these interfaces and components.

There are many advantages of using react js, they have asynchronous operations, and the process runs independently from other processes, their performance is good, excellent cross-platform support, handle dependencies, provide amazing developer tools, and UI-focused designs, and are easy to adopt.

## 2) Node js and Express js

The server side of this system can be developed using express js [7] and node js [8]. Node.js is an open-source, cross-platform, back-end JavaScript runtime environment that runs on a JavaScript engine and executes JavaScript code outside of a web browser designed to build scalable network applications. Express js is a backend web application framework for building RESTful APIs with Node.js and is released as free and open source.

In developing the project using node js and express js there is a folder structure for it. It has a controller folder, and all the controller files are inside it. These control files are used to handle incoming requests and respond to the client. And here there is a modals folder that contains modal files. These model files are used to assign database values and declare a database schema. In the router folder, it contains router files and by using these router files we can handle the router paths. The Server.js file is the main important file because database connection, server ports, and routers are declared on it.Package.js file is also there, and it's used to install the dependencies.

## 3) REST APIs

REST APIs dominate as a choice for backend API development. And it stands for representational state transfer. most commonly four Rest APIs are there. They are GET, POST, PUT and DELETE.

**GET** - fetch the data from the database

**POST** - save the data in the database
**PUT**- replace the data in the database
**DELETE** - delete the data in the database

We can use these REST APIS to handle this project's functionalities with all crud operations.

## 4) MongoDB

MongoDB is a source-available cross-platform document-oriented database program. Classified as a NoSQL database program, MongoDB uses JSON-like documents with optional schemas. And it is available in two ways like MongoDB atlas and MongoDB compass. The advantages of using this database are a full cloud-based developer data platform, flexible document schemas, change-friendly design, powerful querying and analytics, simple installation, cost-effectiveness, full technical support, and documentation.

## 5) Tools

Several tools can be used to manage this job portal management system project. First, we need an IDE to implement the project source code. Then we can use VS Code. GitHub can be used in project management and integration. We can use Microsoft azure board to manage project time and workload. Check out the project test cases using Selenium. Identify bugs and errors in the project source code using SonarQube.

# IV.    PROPOSED SYSTEM

This system is mainly focused on user and inquiry management, vacancy management, application management, and interviews and assessments management. The system overview diagram is given in Figure 2.
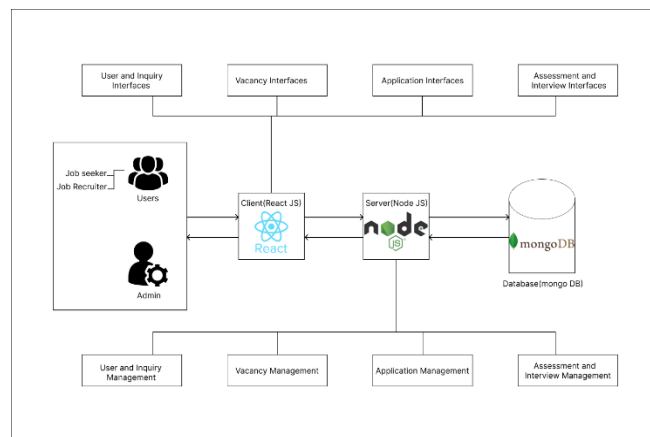


**Figure 2:** System overview diagram for the proposed system

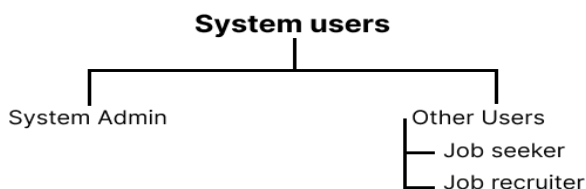## A. User and Inquiry Management
## 1) User Management

**Figure 3:** User types

The user management function mainly focuses on managing system user roles. There are two main user categories. They are admin and other users. Job seekers and Job Recruiters are considered as other users. System users can be categorized according to Figure 3.
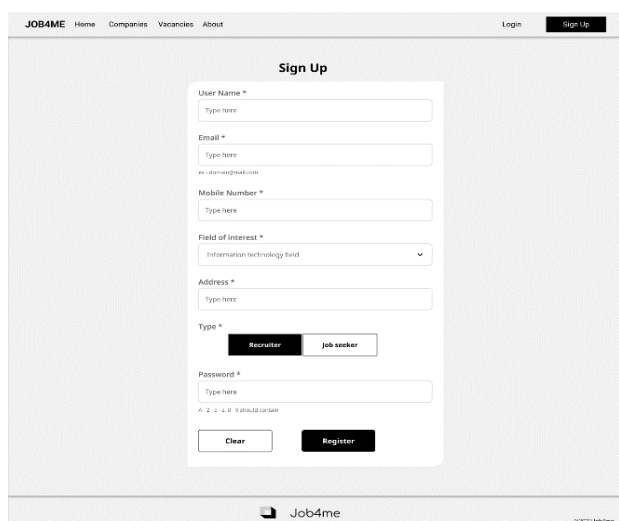


**Figure 4:** Wireframe for user signup page

There is a separate login for admins. But for all the other users there is one login. Validations are used in login forms. Once a user successfully logged in to the system, the system will navigate the user according to the user type.

JSON web tokens are used for creating user tokens. BcryptJS is used for comparing the hashed password saved in the database with the entered password.

Registration is available for job recruiters, and job seekers. Since the validations are used in the registration form users cannot register by giving an invalid email or mobile number. Users cannot register using a form with empty fields. Password should have at least 8 characters for a valid registration. BcryptJS is used for password hashing. A wireframe of the user registration page is provided in Figure 4.

User Profile can be accessed by users except for admin. Details in the user profile will be different according to the user type. Users can update their profiles ( including the password, and profile picture). Users cannot update their profiles with empty fields.

Admin can view, update, and delete all the registered users. There is an option to analyze the number of each month's registered users as a bar chart according to the user type and generate the monthly report. Admin can search users by their username or type. Admin can separately view users according to the type.

A Sample user flow diagram for the user profile from the job seeker's perspective is shown in Figure 5 and the same type of flow will be considered on the recruiter's side.
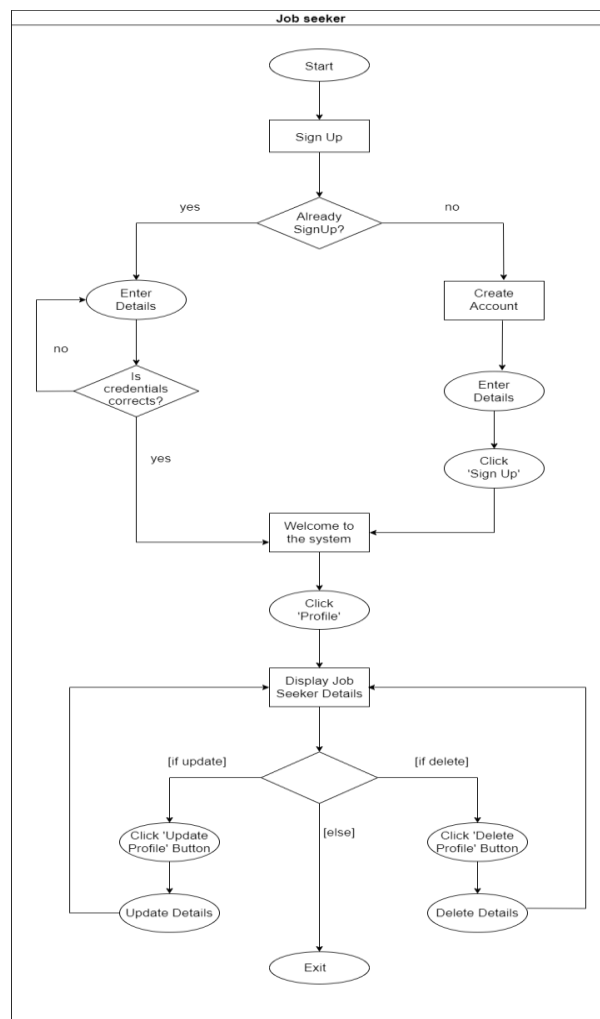


**Figure 5:** User flow diagram - User management(job *seeker*)

### 2) User inquiry management

Here, if the user has any queries, the user can simply add their queries using the system. After adding the query subject and message the user can submit it. A wireframe of the user inquiry page will be a simple form.

Admin can see all added queries of system users and admin can reply to them. If there is any unnecessary inquiry it can also be deleted.

After the admin answers the user queries, users can see the answers to its queries from the user side.

### B. Vacancy Management

The next considered component is vacancy management. In this proposed system, vacancy management is mainly used by job seekers and recruiters to manage their vacancies. Job seekers can find their dream job according to their knowledge and skills. By using this system, they can search and apply for the desired job vacancies. Recruiters or companies can post their job vacancies. They can create a new job vacancy and can update or delete the created vacancies. Also, they can see admin-approved posted job vacancies and pending or rejected job vacancy summaries. They can generate job vacancy reports for each year and download them as PDFs. Admin can search and view all the job vacancies created by the company and can also approve or reject the created job vacancies.



**Figure 6:** Wireframe for creating a job vacancy(Recruiter)

Features of this function can be explained separately as follows: Creating job vacancies is one feature of this system. It is used by recruiters to create their company job vacancies. Figure 6 shows a UI interface consisting of a form where recruiters can enter their job vacancy details. that is a pop-up model window. That form has all the required file validations, including the number of vacancies filed you can't add string value you can only add numbers and, it has a description area that is limited to a maximum of one thousand words. Also, it has a date picker, and anyone cannot add previous dates using this data picker only current dates and future dates are validated to add. Furthermore, it has some image upload fields. using that field, users can upload images in different formats like png, and jpg. A wireframe of the creating job vacancy page is provided in Figure 6.

The Manage Vacancy Details and generates a report part is handled by a recruiter. Using that interface users can view all company-created job vacancies. They can search the required vacancy records using that search function. Also, recruiters can update already created job vacancies by clicking the edit button. When the recruiter clicks the edit button it navigates to another page called edit details. The page contains read-only data such as company name and vacancy location, which cannot be changed by recruiters. But they can change the number of vacancies and closing dates. Back to the previous page again, recruiters can delete their posted vacancy records. But they cannot delete those records at once. For that, they need to confirm the warning pop-up message again. Also, this page has the generate report button. When the user clicks on that button it will navigate to the other page which will show a graph of job vacancies created, and it will show the total number of job vacancies created for each year. This page also has a print button where users can print or download this report in pdf format.
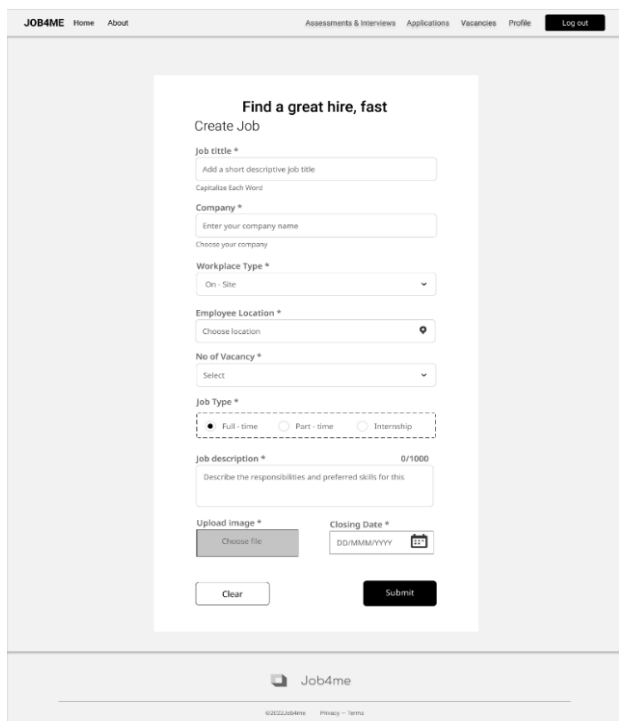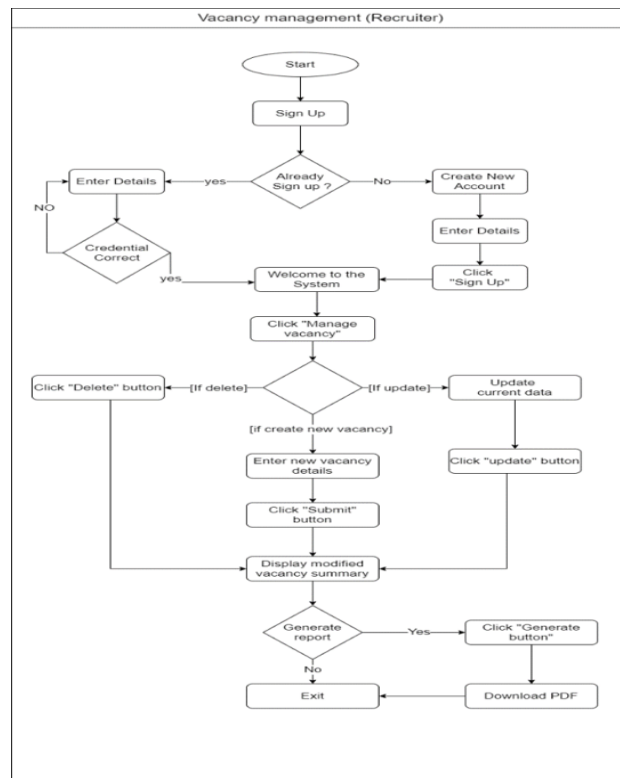


**Figure 7:** User flow diagram - vacancy management(Recruiter)

Managing company-created job vacancies is handled by the administrator. Admin can view these job records created by company recruiters and admin can accept or reject these vacancies. Once the administrator accepts or rejects these vacancies, the status of these records will change to rejected or accepted. The vacancy details will not appear on the job seeker's side until the vacancy has been reviewed and accepted by the administrator.

Job seekers can find and view job vacancies and apply for them, using this interface job seekers can filter or search using keywords and they can find their dream job here. And they can find a position that matches their skills and knowledge. Job seekers can view the details of each of these posts and apply for one or more vacancies. A wireframe of finding a job vacancy by job seeker page is provided in Figure 8.

Figure 7 represents the backend process of the vacancy management functionality. It shows that the user needs to log in to the system first. After that user has a valid login, a recruiter can access it to create new job vacancies. They can edit or delete these already-created job vacancies. Once the recruiter adds a new vacancy or changes the job vacancy details already created, the status of the record will be changed to pending or modified. Also, recruiters can download details of user reports using the generate report button.
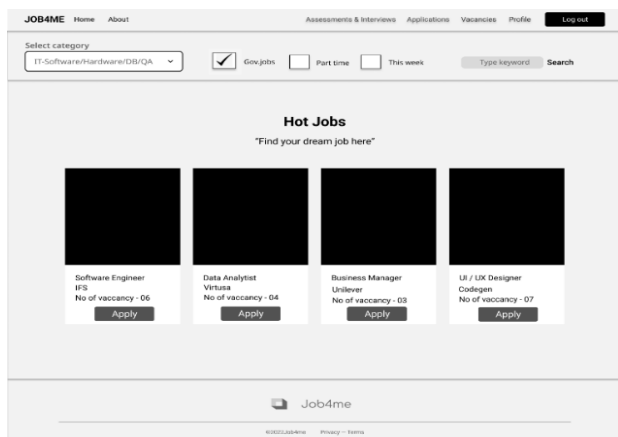


**Figure 8:** Wireframe for displaying job vacancies for a job seeker

### C. Application Management

Application management is considered the next component. In this proposed system, both the application and resume management will be considered together to make the application process easier for the job seeker A user flow for application management is given in Figure 9. By maintaining a resume, a job seeker can store all the needed details in one place. With this functionality provided for job seekers, they do not have to fill out the applications every time. The details stored in the resume will be automatically filled in when they are going to apply for a job. Job seeker only has to maintain their resume with updated details. As the job application process is the main step that should be done carefully, form validations will be given a high priority in this section. The wireframe design for the resume is similar to the structure given for the application in Figure 10 except for the cover letter field.

When the job seeker maintains a resume, the cover letter is the only field that needs to be filled in the application form. The validations are the important section in the application form same as the resume. In addition to that, easily understandable error messages and warnings will be displayed. Proper naming conventions are used for the labels, titles, and buttons. So that the usability and user-friendliness will be improved, and it will be easier for everyone to use the system. The wireframe for the application is given in Figure 10.
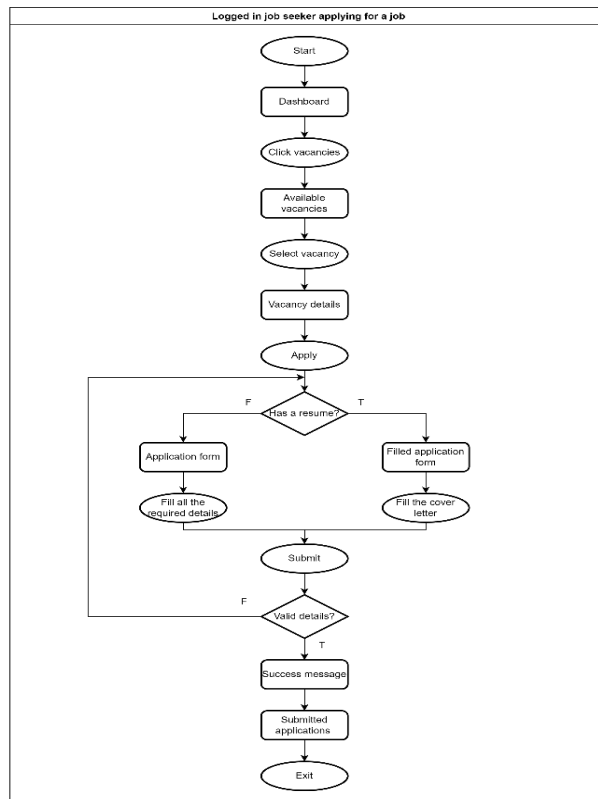


**Figure 9:** User flow diagram for application management

The aim of using these two components is to make the application process easier for the job seeker and make sure all the needed details are given.

All the submitted application forms will be shown to each job seeker filtered by their user id, which is unique to each user. Recruiters will be able to view all the received applications for their posted vacancies which will

be again filtered and displayed according to their unique id. With this approach, the privacy of both parties will remain unaffected. Users will have the option to search a specific application form based on the selected fields such as application status and job title and company name.

The submitted and received application forms can be viewed in detail by users, but the permissions will differ from the user type. Job seekers will only have permission to view their submitted applications while recruiters can reject or accept the application with a comment (optional), that will update the existing application form.

As discussed, create, view, update and delete options will be available in resume management. For the application management, create, view, and update operations will be considered. According to the user type, access claims for updating applications will differ as only the recruiters can update submitted applications. But the status and the comment field are the only sections that can be updated. In addition to the above-mentioned functionalities, generating a report related to application management will be considered. That report will be for the administrators of the system to get an overall idea of the applications. It will not give any detailed information about the applicant or the company. But it will help the administrators to get an idea about the success of the developed system.

## D. Assessments and Interview Management
### 1) Interview Management

In the proposed system job seekers and recruiters have the functionality to manage interviews. A sample user flow diagram is given in Figure 13. Using these functionalities recruiters can schedule interviews for selected candidates. By selecting a selected candidate, recruiters can give the interview date, time, and mode as necessary details and fill out the form and submit it. These details are stored in the system database. That form is also properly validated. If users get an error system will give a proper reaction to the user to handle these errors. These forms will be properly designed according to industry standards and practices. A wireframe of the form is provided in Figure 11.

Recruiters can view scheduled interviews and perform edit interviews and cancel interview functions. These data plans are to display in table format. The date filter is according to the logged user in the user session. Users can have search functions. The interview has a status attribute for managing the interview status like pending initial status and change to Pass and Fail status.

Job seeker can view their scheduled interviews by login their account. The system will filter users' data to display. Candidates can view their interview titles and more details about the interviews. Users can filter their interviews like completed, upcoming keywords, and search interviews. Also, the candidate can send a response to the organizer. A wireframe of the candidate interviews page is provided in Figure 12.
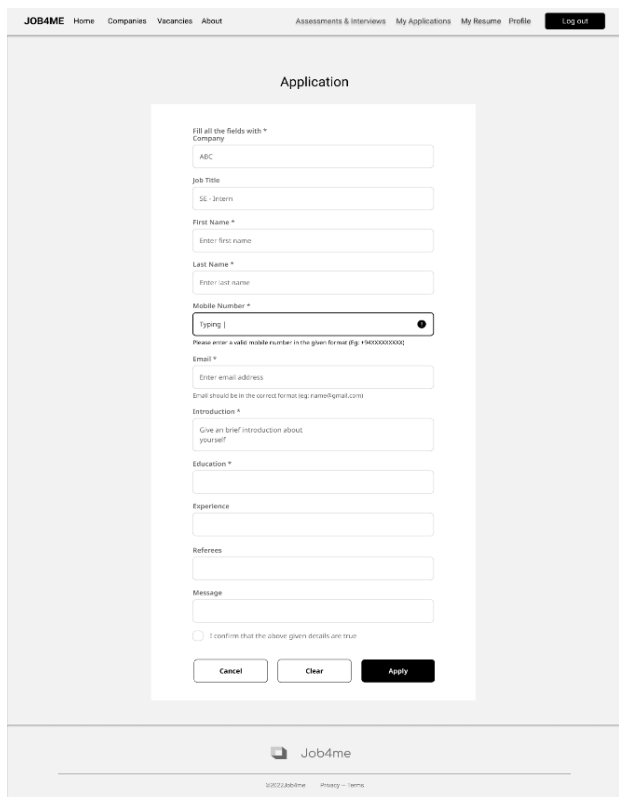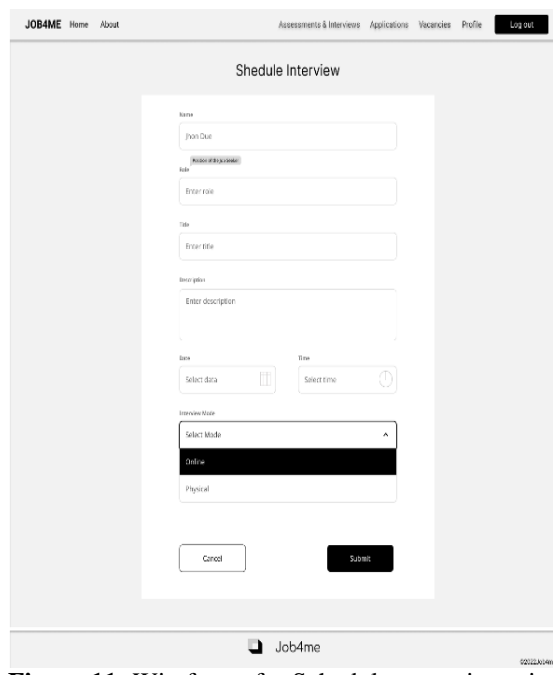


**Figure 10:** Wireframe for a job application



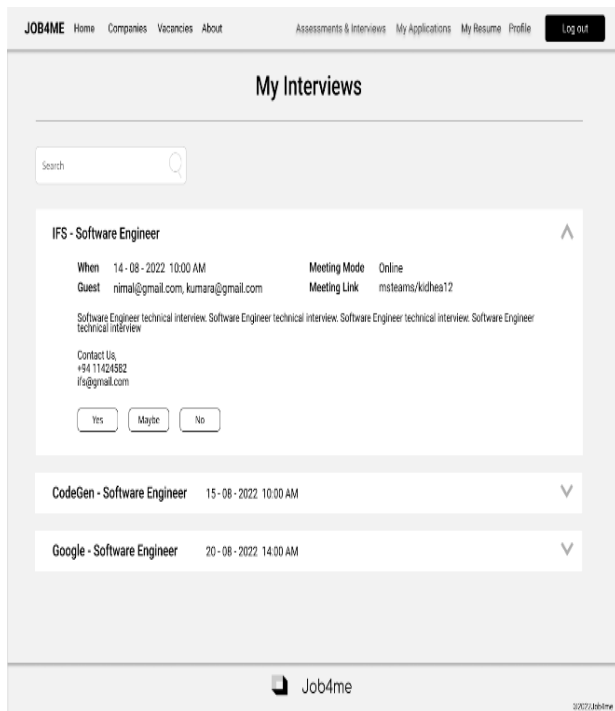**Figure 11:** Wireframe for Schedule a new interview

**Figure 12:** Candidate's interview page wireframe

### 2) Assessment Management

In the proposed system job seekers and recruiters have the functionality to manage assessments. Recruiters can send assessments to the selected candidates. If can be before the interview. Based on that task response recruiters can schedule interviews for candidates. Recruiters can add assessments to the application by providing the necessary details. And can send these assessments to the selected candidates. These added assessments detail can edit and delete. Already send assessment can view separately. A wireframe of the add a new assessment page is similar in structure to the add new interview page given in Figure 11.

Job seekers can view their assessments coming from each recruiter. They can see all the details about the assessment. If have any problems related to the assessment, they can drop a message to the provided contact details throughout the application. After completing the task candidate can send answers to the recruiters and wait until getting a response. A wireframe of the candidate assessment page is similar to the wireframe used in the candidate interviews page as Figure 12.
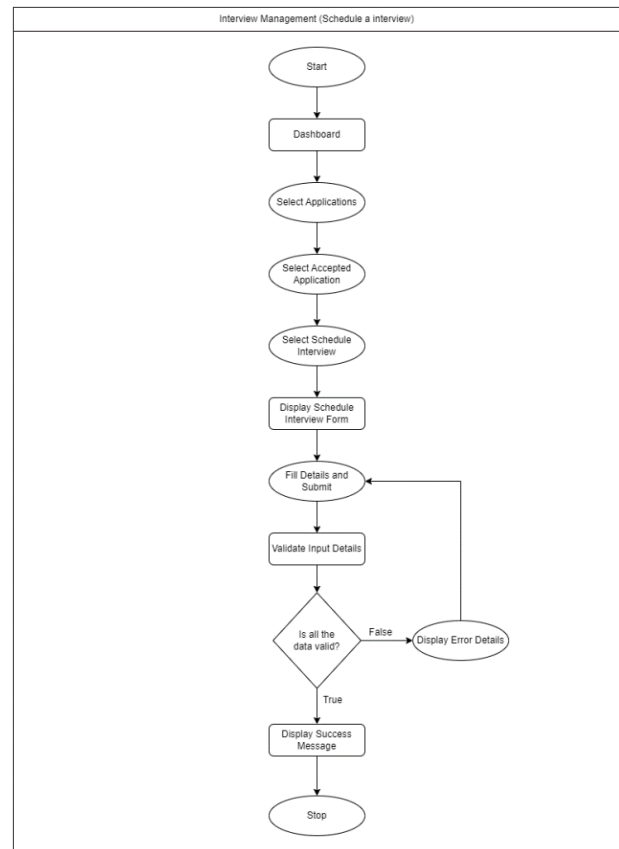


**Figure 13:** User flow diagram for interview management

## V. DISCUSSION

With the enhancement of technology, many problems can be solved. Using software developments, problems in the job-finding and recruitment process can be easily analyzed and solved [9]. Existing research can be found in more advanced fields like Machine Learning [10] and Artificial Intelligence [11]. According to the proposed solution, people can save their time as well as effort in job finding and recruitment process as this system provides everything in an online platform. It will only need a working internet connection and basic knowledge of technology. Since usability is considered in this system design it will be easier to use for anyone who needs this service. This will only focus on the basic needs of the system using four main functionalities named user management, vacancy management, application and resume management, and assessment and interview management. But some sections can be included in the later stages with this minimal system design. The facilities such as comparison functionalities, filtering functionalities according to user preferences, and downloadable structured resumes can be implemented in the next stages

[12]. Based on the success of the system, a mobile application can be designed for this proposed system.

## VI. CONCLUSION

There are currently many job seekers in Sri Lanka, and it has become very difficult to find a good job based on their skills and knowledge. Due to this, many educated and talented young people waste their time and are stuck in their careers. This can affect the development of the entire country as there is an insufficient contribution from youth labor and people with modern ideas. Also, recruiting companies may have problems finding and identifying suitable job seekers. And, there are cases where the companies were affected due to the appointment of unqualified job seekers for jobs.

Therefore, we aim to develop a good system to provide solutions to all these problems. For that, we can introduce this job portal management system. The system is designed to be user-friendly. Also, the icons, pictures, and colors in the interface are very attractively designed, and their performance is high. Also, it has new features over existing systems.

The system consists of three user roles. they are Jobseeker, Recruiter, and Admin. Job seekers can create their job profile, they can find and apply for the most suitable job and participate in the interview process using this system. Job recruiters can post job vacancies in their company, manage information about job seekers who have applied for jobs, they can manage interviews, and they can generate vacancy reports. An administrator can manage the users, view all posted vacancies, manage the vacancy posts published by the recruiters, and Do the report generation with analytics data.

This system is designed to overcome the problems in the current employment sector and through which job seekers and recruiters can make their work more efficient. The uniqueness of this is that all job-related activities can be done using the same system. Job seekers can perform all the tasks from the step of applying for the job to the final stage of selection for the job, such as interviews, discussions, information exchange, etc. It is possible to make new job opportunities and exchange ideas about modern jobs and people through this. Finally, our future goal is to improve this system globally and provide opportunities for local job seekers to easily apply for overseas job opportunities.

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