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អូលន័យសង្ខេប

ក្នុងអំឡុងកពេលធ្វើកម្មសិក្សារយៈពេល៣ខែ បន្ទាប់ពីបានបញ្ចប់ការសិក្សាឆ្នាំទី៤របស់ខ្ញុំនៅវិទ្យាស្ថានបច្ចេកវិទ្យាកម្ពុជា គ្រប់សិស្សានុសិស្សទាំងអស់រួមទាំងខ្ញុំផងដែរគឺមានកាតព្វកិច្ចត្រូវចុះកម្មសិក្សាក្នុងគោលបំណងធ្វើការអនុត្តជាក់ស្តែងនូវអ្វីដែលខ្ញុំបានសិក្សានៅសាលាកន្លងមក។ របាយការណ៍នេះបានផ្តល់ឱ្យមាននូវព័ត៌មានលំអិតនៃការចុះកម្មសិក្សារបស់ខ្ញុំនៅក្រុមហ៊ុនអលវេបរយៈពេល ៣ខែ ដែលបានធ្វើឡើងចាប់ពីថ្ងៃទី ១២ ខែកក្កដា ឆ្នាំ២០២២ ដល់ថ្ងៃទី ១១ ខែតុលា ឆ្នាំ២០២២។ ប្រធានបទកម្មសិក្សារបស់ខ្ញុំគឺ **ប្រព័ន្ធសំណួរអេឡិចត្រូនិចសម្រាប់ការជ្រើសរើសបុគ្គលិក** ដែលជាប្រព័ន្ធមួយសំខាន់ដែលប្រើនៅក្នុងក្រុមហ៊ុនដែលបានបង្កើតឡើងក្នុងគោលបំណងដើម្បីផ្តល់នូវគេហទំព័រមួយសម្រាប់ការគ្រប់គ្រង់ដំណើរការធ្វើរតេស្តជ្រើសរើសបេក្ខជន និងសិស្សនិសិត្សដែលជាក់ពាក់សុំហាត់នៅក្នុងក្រុមហ៊ុន។

ប្រព័ន្ធសំណួរអេឡិចត្រូនិចសម្រាប់ការជ្រើសរើសបុគ្គលិក គឺជាគេហទំព័រមួយដែលត្រូវបានបង្កើតឡើងក្នុងគោលបំណងផ្តល់នូវមុខងារសំខាន់ៗដែលអនុញ្ញាតិឱ្យអ្នកប្រើប្រាស់អាចគ្រប់គ្រង់ទិន្នន័យបេក្ខជនទាំងអស់ដោយសំរួលការរក្សារទុក្ខជាក្រដាស់។ មួយវិញទៀតអ្នកប្រើប្រាស់អាចបង្កើតសំណួរជាច្រើនប្រភេទដូចជា ផ្គូផ្គង បំពេញចន្លោះ សំនួរមានចម្លើយត្រូវមួយ សំនួរមានចម្លើយត្រូវលើសពីមួយ និងសំនួរចម្លើយសរសេរ ដែលអាចអោយបេក្ខជនធ្វើតេស្តផងដែរ។ លើសពីនេះទៅទៀតយើងក៏មានការិភាគដែលដាក់បង្ហាញថ្ងៃដែលបេក្ខជនត្រូវធ្វើតេស្តដែលងាយស្រួលសម្រាប់គ្រប់គ្រងពេលវេលា។ មិនត្រឹមតែប៉ុណ្ណោះនៅពេលដែលបេក្ខជនធ្វើតេស្តរួចយើងមានការកែចម្លើយដោយស្វ័យប្រវត្តិដែលអាចជួយកាត់បន្ថយពេលវេលាសម្រាប់អ្នកប្រើប្រាស់។

គម្រោងនៃកម្មវិធីគេហទំព័រមួយនេះត្រូវបាយអនុវត្តនៅក្នុងភាសាសរសេរកម្មវិធី Java ដោយប្រើប្រាស់ក្រេមវើក (Framework) Spring Boot។ សម្រាប់ការគ្រប់គ្រងទិន្នន័យនៃប្រព័ន្ធនេះត្រូវបាន

អនុវត្តជាមួយជាមួយ PostgreSQL និង សម្រាប់ខាងផ្នែកការបង្ហាញទៅកាន់អ្នកប្រើប្រាស់ត្រូវបានអនុវត្តជាមួយ AngularJS។

ជាលិទ្ធផលនៃការចុះកម្មសិក្សានេះ បច្ចុប្បន្ននេះកំពុងស្ថិតក្នុងការអភិវឌ្ឍន៍បន្ថែមនៅឡើយពីព្រោះគេហទំព័រនេះត្រូវតម្រូវអោយមានការកែទៅលើប្រភេទចម្លើយដែលសរសេរដោយបេក្ខជនដែលមានទម្រង់ជាកូដច្រើនប្រភេទភាសា និងកែតម្រូវនូវមុខងារផ្សេងៗដើម្បីអោយកាន់តែប្រសើរមុនពេលដាក់ប្រើប្រាស់ជាផ្លូវការក្នុងក្រុមហ៊ុន។

RÉSUMÉ

Pendant le stage de trois mois après avoir terminé ma quatrième année universitaire à l'Institut de technologie du Cambodge. Tous les étudiants du département d'ingénierie de l'information de la technologie et de la communication et moi-même avons été obligés de faire un stage pour appliquer ce que j'ai appris à l'école dans la pratique. Ce rapport détaille mon stage de trois mois du 12 juillet 2022 au 11 octobre 2022 chez ALLWEB Co., Ltd. L'objectif principal de mon stage était de créer « Système de quiz électronique ALLWEB pour le recrutement » qui est un système important utilisé dans les entreprises destiné à fournir un site internet pour la gestion du processus de recrutement des candidats et étudiants qui postulent pour des stages dans l'entreprise.

Le système questionnaire du recrutement est un site Web conçu pour fournir des fonctions clés qui permettent aux utilisateurs de gérer toutes les données des candidats en facilitant la conservation du papier. D'autre part, les utilisateurs peuvent créer une variété de questions, telles que l'appariement, le remplissage des blancs, avec une réponse correcte, plusieurs réponses correctes et des questions écrites qui permettent aux candidats de passer le test. De plus, nous avons également une analyse qui montre les dates auxquelles les candidats passent le test, ce qui est pratique pour la gestion du temps. De plus, une fois que les candidats ont passé le test, nous avons une correction automatique des réponses qui peut réduire le temps des utilisateurs.

Ce projet d'application Web est implémenté dans le langage de programmation Java à l'aide du framework Spring Boot. Pour les données système à appliquer avec PostgreSQL et pour ce qui précède appliqué avec AngularJS.

À la suite de ce stage, il est actuellement en cours de développement, car ce site nécessite des modifications du type de réponses rédigées par les candidats, codées en plusieurs langues, et diverses fonctions ajustées à mieux avant le lancement officiel dans l'entreprise.

ABSTRACT

During the three-month internship after ending my fourth academic year at Institute of Technology of Cambodia. All students of the department of Information of Technology and Communication Engineering and I were obliged to undergo an internship to apply what I have learned in school into practice. This report drives into details of internship which took place between 12 July and 11 October 2022 at ALLWEB Co., Ltd. The project during the internship concerns the “ALLWEB Online Quiz for Recruitment” whose object is to provide a web application platform for controlling the candidate information and candidate test when they apply internship and work at ALLWEB.

The Quiz Online System is a web application project developed for offering useful functionalities in terms of doing test for candidate by enabling users to manage all of the candidate information. Another feature is that the system allows users to create multiple types of question, such as Yes/No question, multiple choice question, fill in the blanks, matching and free text question. Moreover, users can view the schedule of candidate to do test and easily manage timetable without bookmark in other tools. For one of the main functions that the system can do is automatically answer correctly after candidate completes the test and return result.

This web platform project is implemented in JAVA programming language by using Spring Boot framework. For the database of the system, it is implemented with PostgreSQL and also AngularJS is implemented as client side.

As a result of this internship, the project is currently still in developing stage since it is required to addition of another correct answer as the source code and configuration. There are some bugs for making sure that the system works well before hosting for the utilization in the company.

LIST OF ABBREVIATION

UI	: User Interface
MVC	: Model View Controller
UML	: Unified Modeling Language
URL	: Uniform Modeling Language
JPA	: Java Persistence API
IDE	: Integrated Development Environment
SQL	: Structure Query Language
CSS	: Cascading Style Sheets
HTML	: Hypertext Markup Language
ERD	: Entity Relation Diagram

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INTRODUCTION

Being as an engineer student of department of Information and Communication Engineering at ITC, the students are required to take an internship for thesis defending before graduation, so they can apply the knowledge that have learned from school as well as they acquire new knowledge both soft and hard skill from a company, organization or somewhere else.

Technology offers us many new innovations from day to day, especially the smart phone, laptop and desktop which contain modern browser. Nowadays, there are several platforms of browser applications in the market like Google Chrome, Microsoft Edge and Apple Safari that offered the use and develop many types of websites. Through this

evolution, during my internship I have made a decision of developing a website application. Otherwise, I applied knowledge, I have got from my adviser, about design patterns in order to proof the lesson theory.

Due to the year fourth internship required students to hold an acceptable project considered by their own adviser. Meanwhile, management at ALLWEB needs a system to help the administrator manage their ALLWEB easier than usual. ALLWEB Online Quiz System to manage all user's information and result when they do quiz. Moreover, this application is built using our recruiting team to manage the quiz for candidate.

As a result, ALLWEB Group has proposed a project on Web application "ALLWEB Online Quiz System" to meet these constraints to facilitate user to manage their system in ALLWEB.

This is the final internship report such a thesis divided into 7 chapters. The first is the general presentation of the internship project and information about place where I took in order to build this application. The second focuses on the internship project presentation that I work on during three months internship. Third is the analysis of project ideas, conception and design that talk about main functional requirement and optional functional requirement. Fourth talk about technology and tool that I use. Fifth is focuses on project implement. The last one is the conclusion.

1. GENERAL PRESENTATION OF INTERNSHIP

1.1 Introduction

ALLWEB Co., Ltd is one of the leading Cambodia IT companies since 2004. The company are specialized offshore software development, website development and also aim to address emerging needs in Cambodia as its companies are growing fast. The Company intends to participate in the emergence of a local high-end software development market. We are currently having many partners around the world and also has experience in website development and build the system to the company, bank and shop in Europe and Asia.

Figure 1: Logo of ALLWEB Co., LTD

1.2 Activity and service

ALLWEB Co., Ltd have specializes teams are specifically created to provide each customer need with unique quality of service and solution:

- **Mobile app and software**

ALLWEB is specialized in Mobile and Software development as well as IT infrastructure management and support. We provide custom software solutions for both desktop and mobile use that fit your business with a wide range of technology. Most of the component we have builds for more than ten years implement complex business logic independently from development considerations.

ALLWEB mobile Solutions enable:

- Support for Any Device – Build applications once, and run them on all devices including the ISO, Android, BlackBerry, and Window mobile.
- Stunning Usability – With ALLWEB Mobile Platform, we ensure highly usable applications that lead to high user adoption rates.
- Fast and Risk-Free Change – Quickly deliver new functionality and change requests without ever breaking your application.

- **Website**

  Website Offer includes:

  - Implementation of personalized content with text, photo
  - High performance delivery within 2 weeks
  - SEO optimized Website: get ready to be worldwide known!
  - Domain name registration: give us the name you want and we do the online registration for you!
  - Website hosting with professional service and reliable uptime 24/7.
  - Website maintenance: 1 month offered

  Website Offer + includes:

  - Website offer features included
  - Email management with hosting services
  - Mobile version for any devices (IOS, Android)
  - High performance delivery within 1 month
  - Many options to choose, like
    - Forum management
    - Blog management
    - Live chat
    - Any many more!

- **eCommerce**

  eCommerce Offer includes:

  - Optimized Product display: Multiple pictures per products, Zoom-in on product photos, Display available quantities, Sort products by relevance / price, etc.
  - Quick product search tool: your customers will go straight to your product!
  - Coupons and vouchers management: increase your customers' loyalty and attract new ones!
  - From one shop to multiple shops management: get an efficient and easy to use centralized management system!
  - High quality Analytics and Reports: manage the performance of your online shop from your desk. Realtime results for Order and sales, best performing categories, coupons, products, etc!
  - Domain name registration: give us the name you want and we do the online registration for you!

- Website hosting with professional service and reliable uptime 24/7: Your shop is now opened for online customers anytime!
- Optional: Want to deploy your shop also on mobile phone and tablet use? Let's take the mCommerce option! (+2 weeks in delivery)

- **Hosting solutions and domain registration**

  Web Hosting

  - Reliable, fast andsecured
  - Easy to set up and use
  - Prosional support
  - For any budget size

  Every domain registration includes the following domain tools:

  - URL Forwarding Redirect traffle from one domain to another
  - Email Forwarding: Automatically forward emails to other valid email addresses
  - DNS Management: Retain total control over your DNS records
  - Transer Look: Protect your domain from unauthorized domain transfers

- **IT and strategy consulting**

  We bring a full range of IT capabilities to a variety of IT business situations, including:

  - IT Strategy Development: Information technology helps companies transform themselves and grow their business
  - IT Performance Improvement: Under-performing IT hurts business performance
  - IT Project Effectiveness: ALL WEB CO LTD helps clients to maximize their business results from major IT initiatives, including turnaround programs

- **Network and IT support**

  We are working with general contractors, IT consultants, system furniture vendors, etc. We understand that time is money, and jobs must absolutely stay on schedule. ALL WEB provides high quality support whatever your business is, with premium manufacturer products, and a timely and professional installation.

1.3 Address and contact

- Address : Kim Hap Building (5th floor), Street 388, Mao Se Toung Blvd, Sangkat Toul Svay Prey 2, Khan Chnamkarmon, Phnom Penh, Cambodia
- Tel : +855 23 221 320
- Email : contact@allweb.com.kh
- Website : https://www.allweb.com.kh/about-us
- Location : Shown in *Figure 2*

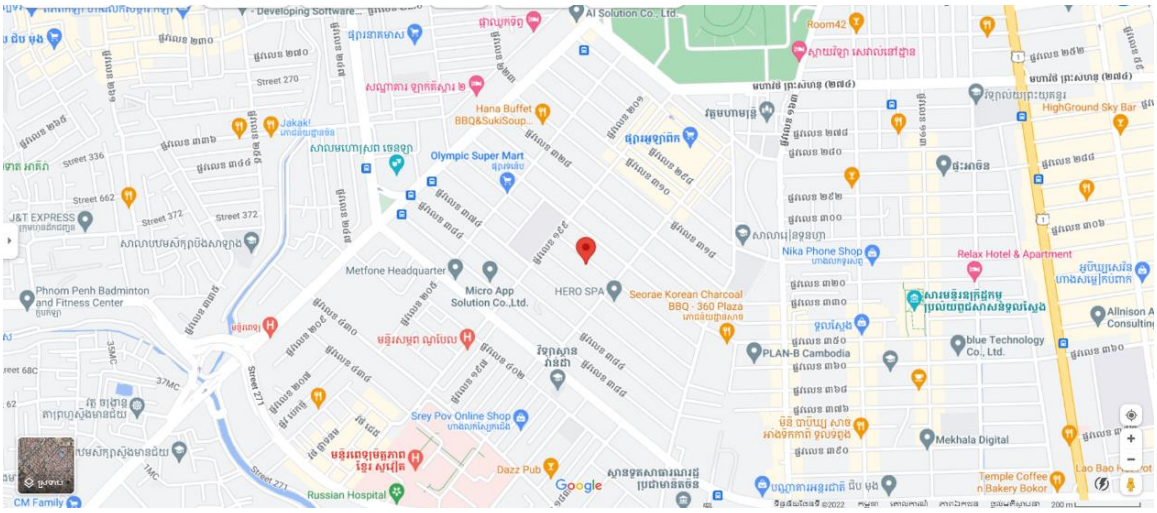

Figure 2: Location map of ALLWEB Co., LTD

2. THE INTERNSHIP PROJECT PREESNTATION

For the internship during three months at ALLWEB company, I work on a project called "Online Quiz Management System", which is a web application developed to manage the user quiz and assign quiz for user. This project is a new project in company.

2.1 Structure

The internship and project development were guided and assisted by:

- Academic Supervisor: Mr. HOK Tin
  Lecturer in the department of Information and Communication Engineering.
- Company Supervisor: Mr. NY Channthoeurn

2.2 Operation manager at ALLWEB company problematic

The reason that we propose to build this system because we found out many difficulties whenever there is new candidate who want to apply to be an internee, or a staff.

- The tests are available on paper and difficult to keep document confidentiality. We cannot share this document to our candidate while they ask for the simple test in term to try to learn the test before coming to take the real test.
- Wasted the recruitment working time to print out the quiz and give it to candidate in order to take the test.
- The question is available only with the limited questions and difficult to change the questions for each candidate and it is easy for candidate share to another person.
- Difficult to keep historical records of candidate after they finish recruitment.
- After finish the test, it would be waste some working time of the staff to correct their work in order to select the candidates who got higher score.

We accelerate the automatic correction for the test, because of we do not have much time to correct them.

2.3 Objective

To develop a web application called: "ALLWEB Online Quiz for Recruitment" solve many problems such as:

- Automatically set the quizzes for the candidate to take the test, and it will stop the candidate when they finish the test or the time is out. It provides the opportunity to run the test and complete the test automatically without HR team tell the candidate to stop.

- It will calculate the score for the candidate automatically. The result of candidate will save into the database with some user's information so that HR team can consider about their ability in the future as well. In this case, it does not waste some working time of staff for checking it.
- It does not take some spaces to store the document of the candidate. Moreover, it will permanently store their result in our database system without worrying about losing the candidate document.

2.4 Software development life cycle

2.4.1 Waterfall

As show in Figure 3, in order to realize a project, it is necessarily to carefully choose a great and suitable development methodology. As a result, the Waterfall methodology was chosen for developing this project, due to the fact that the project is respect to an approach, define-before-design and design-before-code. Moreover, the methodology works well on this project with a limited development time.

- Requirement: I had to understand about the objective, functionalities, and what need to be design.
- Design: for this stage, I studied about the requirement specification and prepare for the system design.
- Implementation: the whole web application was divided into the tasks where each of them needed to be finished by coding and testing
- Verification: all of the tasks were integrated to get a complete application. And the web application is needed to do testing to find out about the errors or flaws.
- Maintenance: as a web developer, I have to check the report from user and fix the error that have occurred.

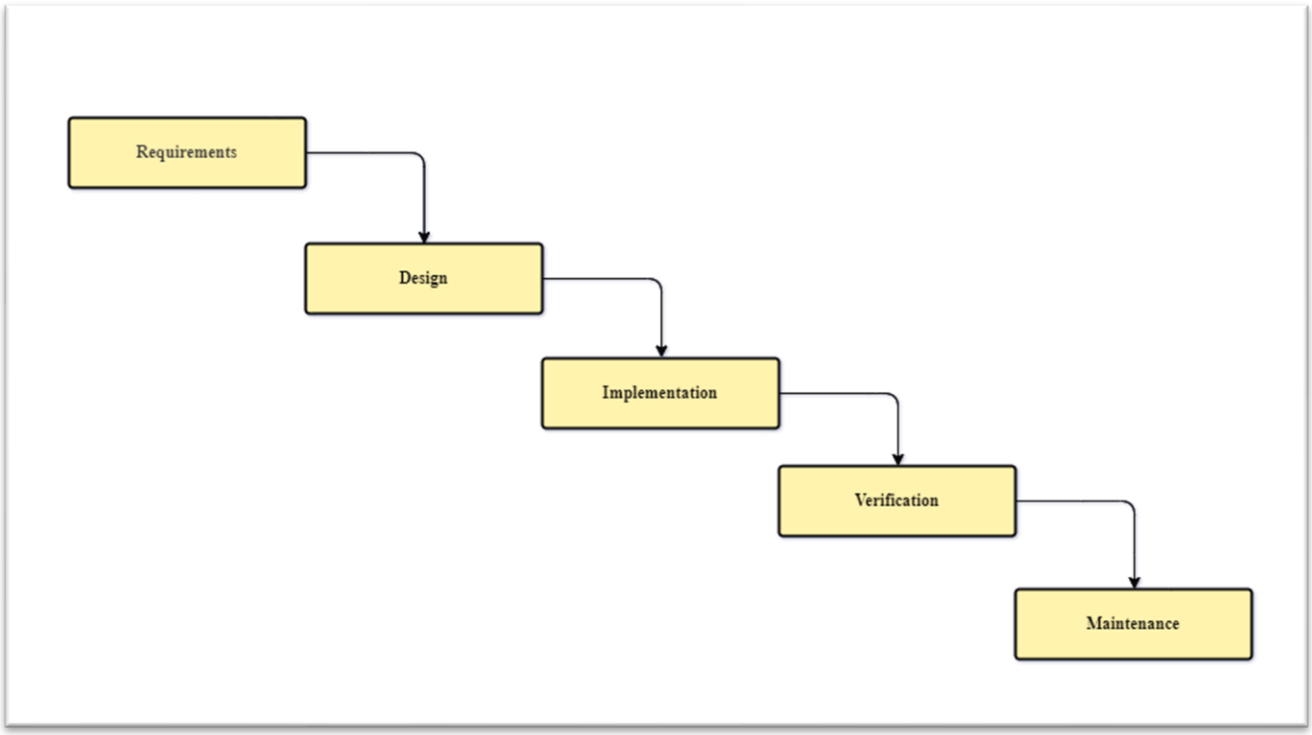

Figure 3: Project methodology

2.4.2 Planning

Tasks	Weeks											
	1	2	3	4	5	6	7	8	9	10	11	12
Do the assignment												
Learn new technology												
Analyze and design the project requirements												
Implementation												
Testing												

Table 1: Planning table

As I shown in *Table 1*, for the whole 12 weeks that I have spent during the internship at ALLWEB company, I spend the first two weeks on doing an assignment given by our company advisor, which is a tiny project on using java web application. At the start of third week, the company advisor assigned me the project that I have to do for this internship program. I learned

about the technologies where I going to implement with the project for about two weeks. At the same time, I also did the project analysis and designed the requirement of the project by using about three weeks. After that, I started working on the implementation of the project from week 6 and did testing of the functionalities from week 8.

3. PROJECT ANALYSIS, CONCEPTION AND DESIGN

In this section, I begin to identify all the main functional requirement and optional functional requirement of the system.

3.1 Case study of requirement

3.1.1 Project requirement

ALLWEB online quiz system for recruitment creates with three differences role of users. For any user role, they can work on their functions as shown in the Table 2.

User	Functional	Description
Admin	CRUD user	The admin can create, edit, view and delete users from the system
Admin & Recruiter	View dashboard	User can see useful data such as the total number of candidates, total number of quizzes, total number of questions, total results, the chart of monthly quiz candidates.
	CRUD candidates	User can manage the candidates by inputting their information into system
	CRUD quizzes	User can manage the quizzes by inputting quiz information into system.
	CRUD questions	User can manage the quizzes by inputting question information into system
	CRUD answers	User can manage the answer by inputting answer information into system
	Login authentication	The system is required user to log into the system before using the features of the system

	CRUD question level	User can create, edit, view and delete question level.
	Edit question type	User can edit question type name.
	Generate the report of candidate	User can export the report of candidates during a period of time as excel.
	Update profile and change password	User can update the information and change password as well
	Forgot password	User can reset their password by input their email. system send link for reset their password.
	Reset password	Used to set new password in case their click link in their email
	Reset password for candidate	User able to generate new password and send new password to candidates by mail
	Live quiz overview	User can see the candidate quiz process
Candidate	Candidate login	User can login by input their email and password before they can do quiz
	Do quiz	User can do their quiz that admin or recruiter asign

Table 2: Project requirements table

3.1.2 Non-Functional requirement

Non-functionality requirements refer to the functions that are used to improve the system, rather than the functions that is able to seen the system or website. The important non-functional requirement that I have consider are listed below:

- Clean code: with these requirements, as a team, we make sure that our code is indented, Comment to functions, needed parameters, and return variable and so on.
- Performance: it is very important to make the website performs smoothly without errors.

- Stability: make the website run without causing any errors or slows or losing any user data.
- Security: make the website security stronger so that no one can hack into the website.
- Maintenance: detect errors or mistakes in order to increase the quality of the application.
- GUIs: must be simple, familiar, and user friendly so that user could be easy to understand.

3.2 Project analysis

In this section, I begin to use UML Diagram that refer to a standard language. I used it to visually model processes or designs in software bases system.

3.2.1 Use Case diagram

Figure 4 shows a use case diagram is defined to prove the demanding features in our application. Each use box expresses the import module that will be implemented and that contains other features in it. There are three types of users. User is required to log into the system before using any functionalities of the website.

In the diagram in Figure 4, there is the keyword "include", that is to say before accessing our system it is necessary that this actor authenticates his identification first.

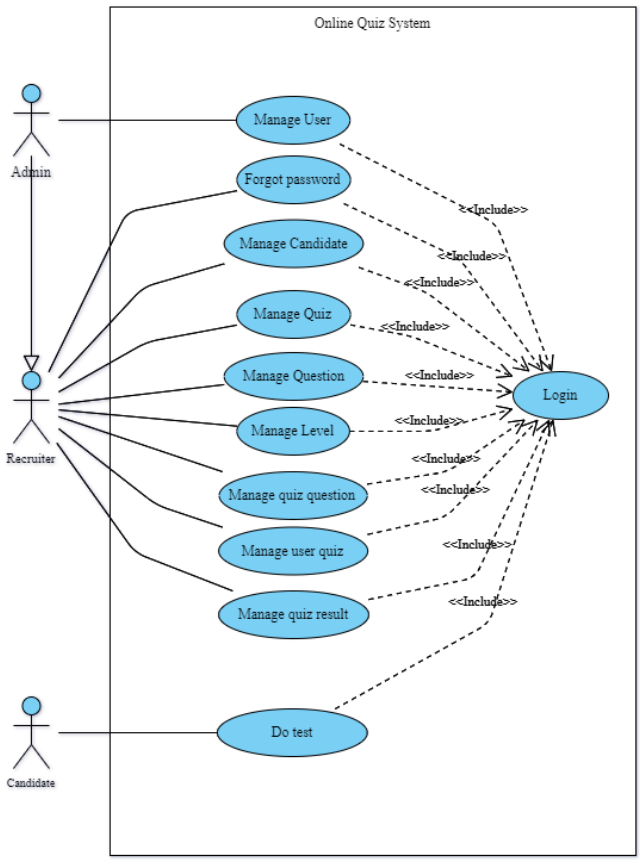

Figure 4: Use Case diagram

3.2.2 Database schema

As shown in Figure 5 is database schema that I create after analyzing the main functional of the project, one I can find the given needed and the categories in the different table. Form the conception of association entity and relational model, we can find the relations and the cardinalities between each table. In addition, we can define the conceptual model of data with the attributes in each entity.

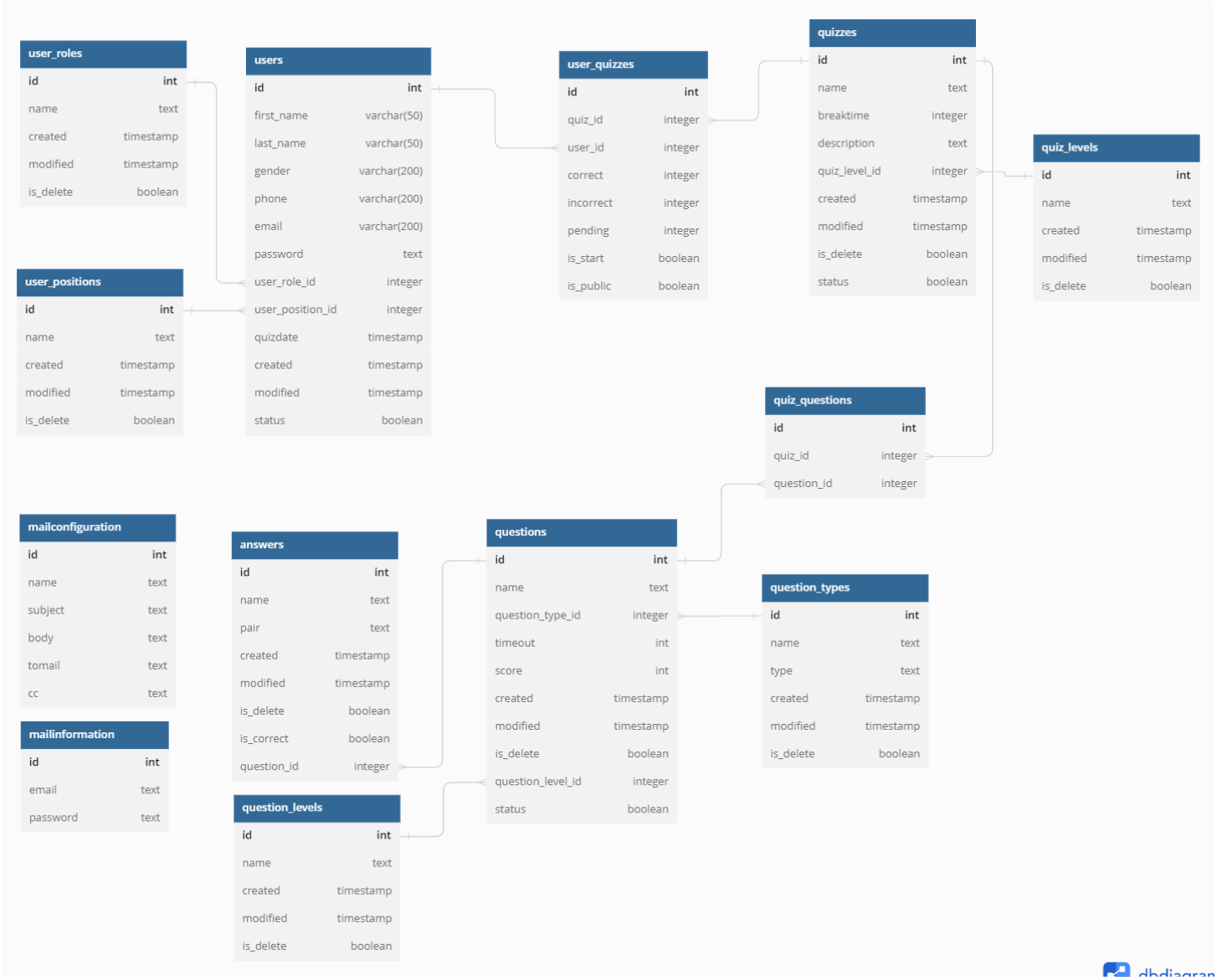

Figure 5: Database schema

3.2.3 Activity diagram

3.2.3.1 Add new candidate diagram

Figure 6 is an activity diagram for user create new candidate. In order to create new candidate, user as administrators or recruiter need to login into the system first. After successful

login, users can add candidate by selecting the button “Add Candidate”. The user is required to enter all of required data of candidate and click the “submit” button to complete process.

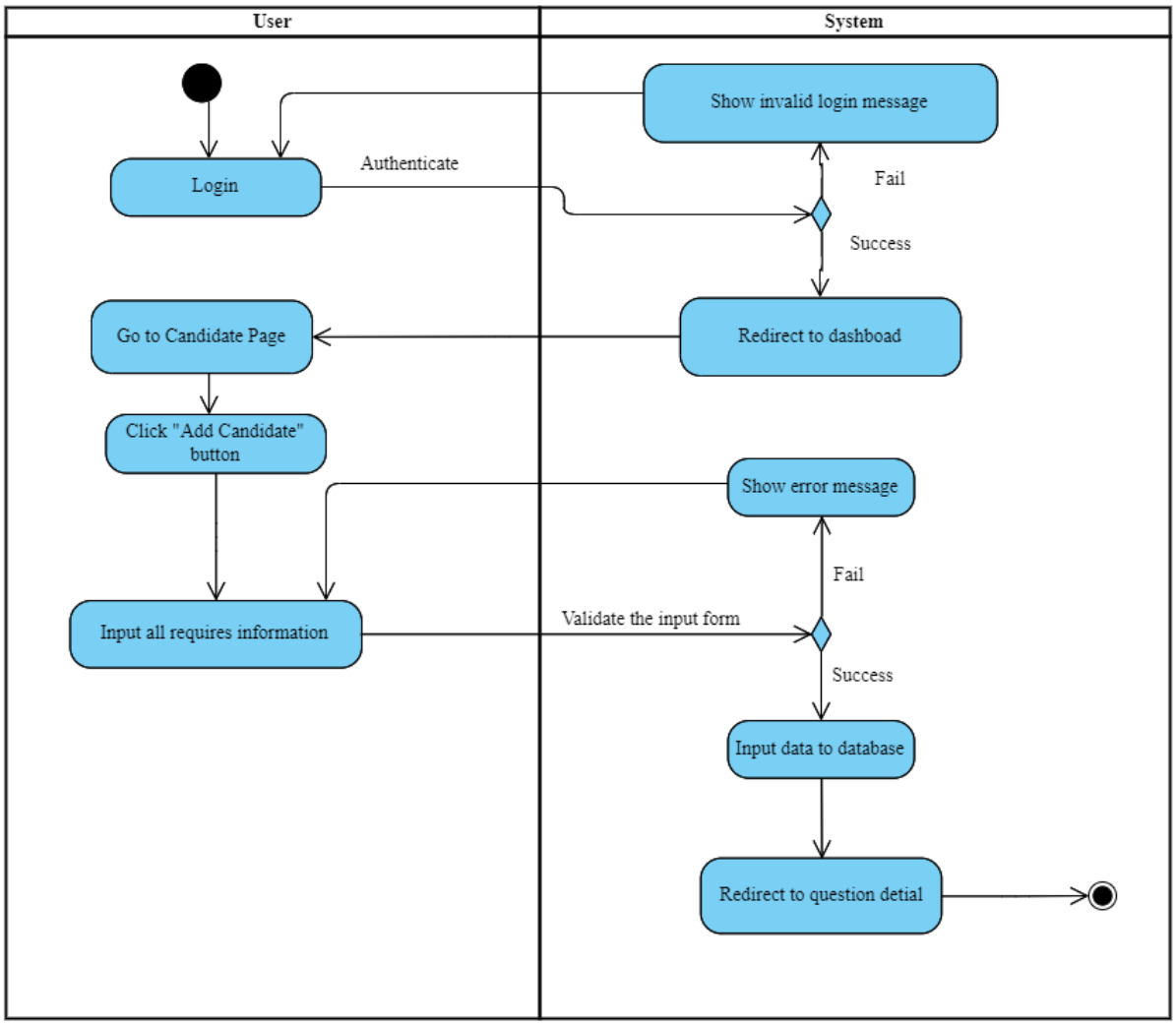

Figure 6: Activity diagram of adding new candidate

3.2.3.2 Add new question diagram

As shown in *Figure 7* is an activity diagram to create a new question. First admin user or recruiter user need to login into the system. After successful login, admin can add question by go to question page and selection “Add Question” button. User is must select question type first and enter all of the required data of question and selection “Submit” button to finish the adding question process. After create question system forward to the question detail page. In question detail page user can see details information of the question and user can add answer of question by clicking “Add answer” button. The User then has to input the required data of answer and click submit to finish adding answer process.

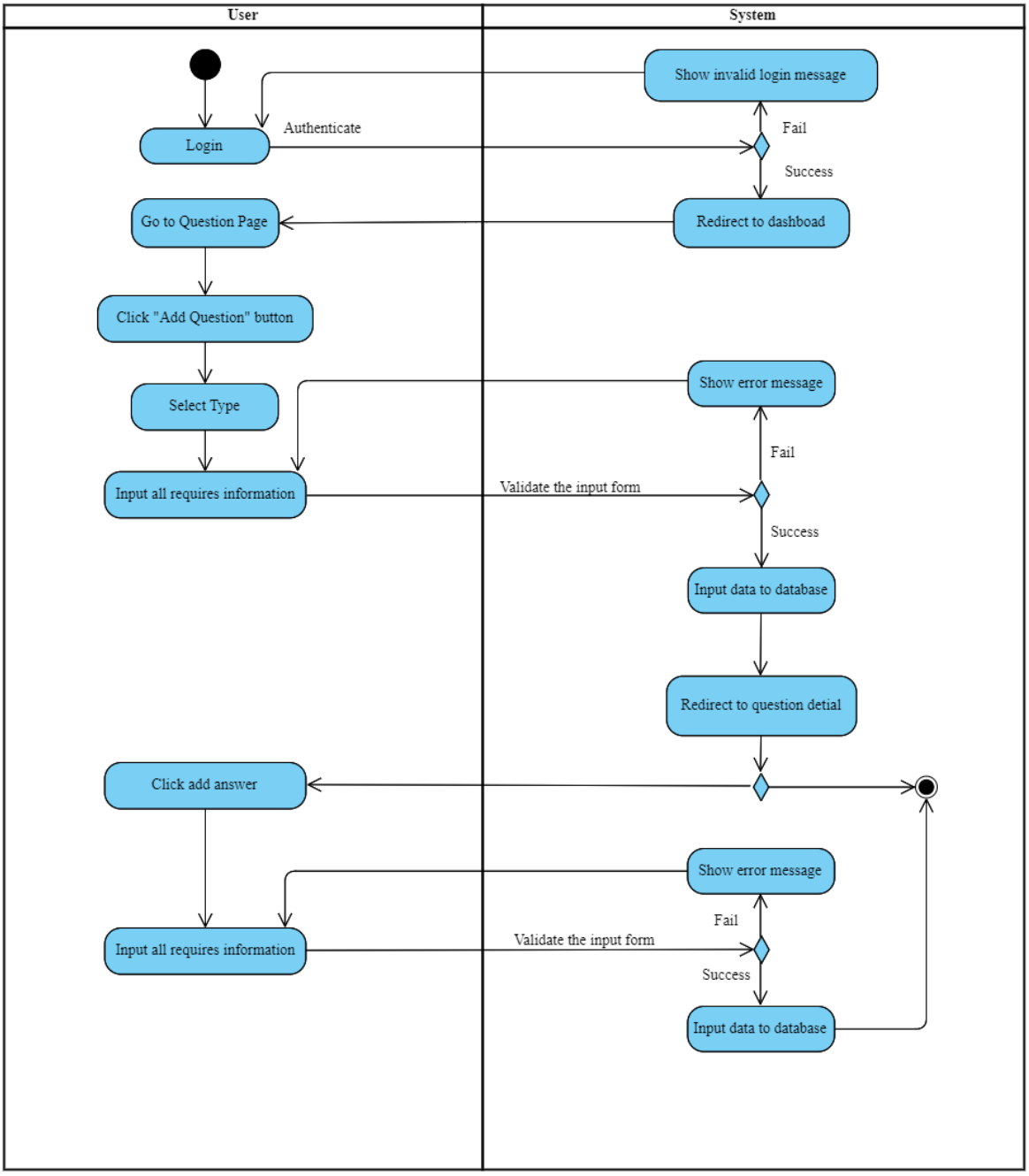

Figure 7: Activity diagram of adding new question

3.2.3.3 Assign quiz to candidate

For assign quiz to the user, admin or recruiter user need to login into the system first after successful login, user can define quiz by going to page “Candidates”. After system forward to page candidate and list all candidate. User can click view candidate detail, system is redirect to page candidate detail User can select on “Add quiz” button and check the box of quiz that user want to assign to candidate and click the “Submit” button for finish assign quiz to candidate as show in the *Figure 8*.

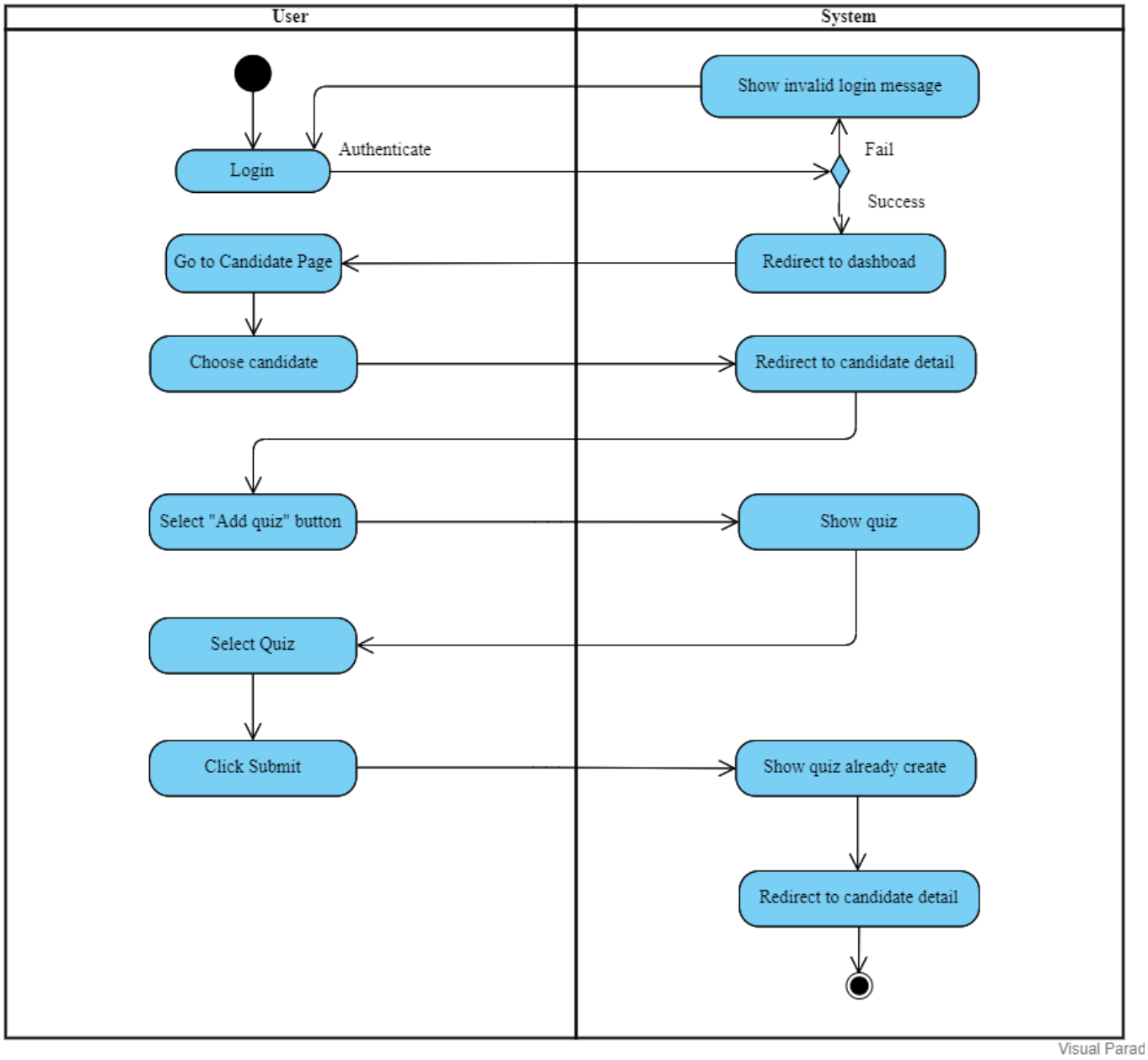

Figure 8: Activity diagram of assign quiz for candidate

3.2.3.4 Reset password diagram

Figure 9 is an activity diagram to shows order to reset password. First user is start system at “login page”. User can selection “Forgot password” button. Then system forward to page Forgot password. Next user needs to enter their email. After that system hold on and sending mail to user via their enter email. Then user can click the link and it redirect to reset password page. User need to input password and confirm password. After input already user can click the “Submit” button for finish reset password process.

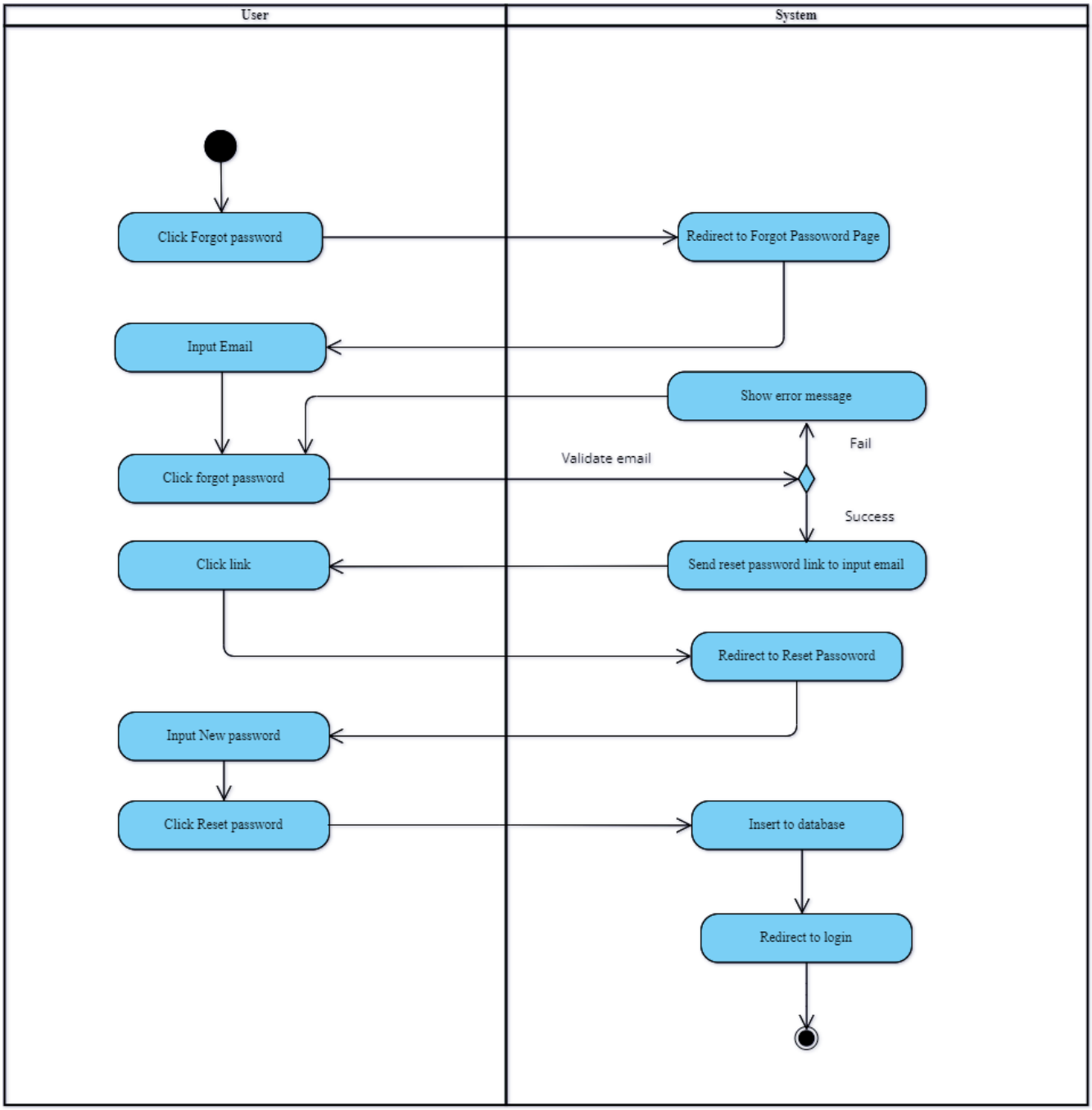

Figure 9: Activity diagram of reset password

4. TECHNOLOGY AND DESIGN

4.1 System and design

4.1.1 Physical architecture

As shown in the *Figure 10*, the physical architecture of the system is described as below through the figure and the explanation of each component.

- Client access to the system via web browser where the HTTP request will be sent to web server (Apache Tomcat).
- web server receives HTTP request and generate JSP file for the web view by using Java language in Struts framework.
- Database server (PostgreSQL) is used for storing data for this system. When there is any request from the web server, the query corresponding to the request will be generated.

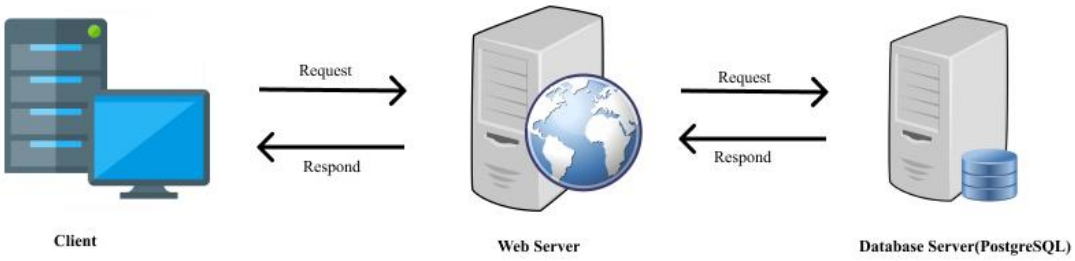

Figure 10: Physical architecture of application

4.1.2 Logical architecture

The logical architecture as shown in Figure 11 is describes about the idea of how Struts framework using MVC structure to build the web application with Java programing language with Angular JS.

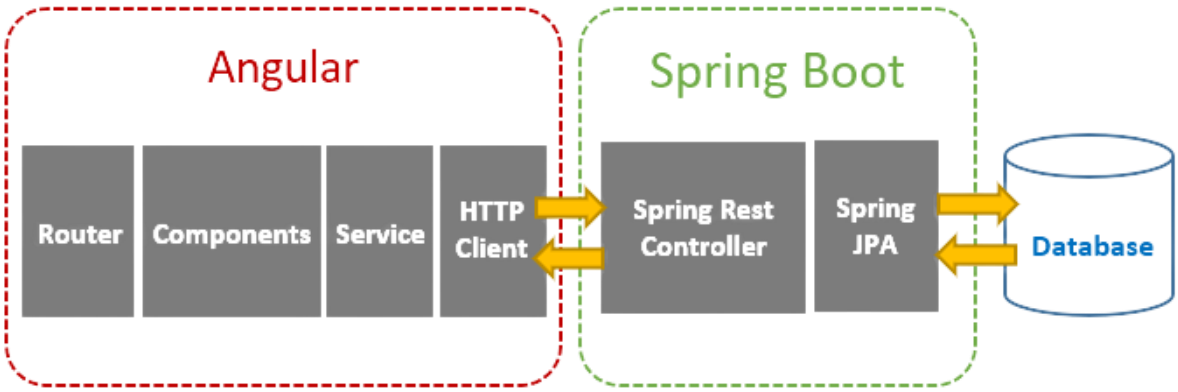

Figure 11: Logical architecture of application

- Spring Boot exports REST Apis using Spring Web MVC & interacts with PostgreSQL Database using Spring JPA
- Angular Client sends HTTP Requests and retrieve HTTP Responses using HttpClient Module, shows data on the components. We also use Angular Router for navigating to pages.

4.2 Programming language

Java [1] is a high level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible. I choose Java programming language for my project because Java is easy to learn, simple to use with object oriented and it is used in many companies in the world. In addition, Java is fast secure and reliable.

Figure 11: Java language logo

4.3 Framework and technology

Spring Boot [2] is an open sources Java-based framework used to create a micro service. It is developed by Pivotal Team and is used to build stand-alone and production ready spring applications. I choose Spring Boot for developing my project because spring boot have more features for me to choose and more libraries to use in project to help develop faster and safe.

Figure 12: Spring Boot logo

HTML [3] is used to put the structure of a website together for documents designed to be displayed in a web brower. **CSS** [4] acts like makeup for HTML where it improves the user interface such as color and layout of a website structure build with HTML. **JavaScript** [5] is a full-on programming language that adds interactivity and functionality to a website

Figure 13: Logo Html CSS Javascript

AngularJS [6] is a discontinued free and open-source JavaScript-based web framework for developing single-page applications. It was maintained mainly by Google and a community of individuals and corporations. It aimed to simplify both the development and the testing of such applications by providing a framework for client-side model–view–controller (MVC) and model–view–viewmodel (MVVM) architectures, along with components commonly used in web applications and progressive web applications.

Figure 14: Logo Angular JS

Angular Material [7] is the most popular material design components for angular for developing website. It has internationalized and accessible components for user. Well tested to ensure performance and reliability. I chose the Angular Material because it has more components for me to chose and I can update my own style on it. It can save a lot of time for design user interface and build client side from scratch.

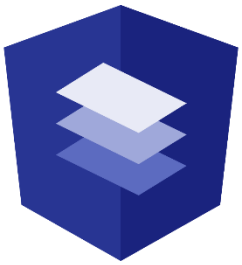

Figure 15: Logo Angular Meterial

FullCalender [8] (*FullCalendar - JavaScript Event Calendar*) is a plug-in for the calendar view for the web application. It provides many useful features such as powerful and lightweight, developer-friendly and open-source. I chose it because in my project have schedule to show the test candidates. It can help me to generate the calendar by just query and sending the data to it when we initialization.

Figure 16: Logo FullCalendar

PostgreSQL [9] is a widely used relational database management system with a proven architecture that has resulted in a strong reputation for reliability, data integrity, and performance. I use PostgreSQL because it compatible well with SQL Query Builder of the Spring Boot Framework. About performance in sever, it is working fast that MYSQL on access datas and queries.

Figure 17: Logo PostgreSQL

4.4 Version control system

In the programming field such as web development, vision control is type of practice that tracks and provides control over changes to source code. I chose GitLab [10] for project version controls. For my project, version control is very importance because it helps me to manage my project. I can store my source code every time that I complete any functionality. Easy to get it back when writing something wrong in my project. Additionally, I can create additional branch to store our code. Because it my project there are 3 main folder project is API, admin panel and candidate panel.

Figure 18: Logo GitLab

4.5 Tools

Intellij IDEA [11] is type of the best IDE. Integrated Development Environment is Intelligent Coding Assistance of the web development because it provides on-the-fly error prevention, best auto completion and code refactoring, zero configuration debugging, and an extended HTML, CSS, and JavaScript editor. Intellij have many features but the best three features are interested in and we decide to use it. Those three features are:

- Smart Java Code Editor
- Code Quality Analysis
- Easy Code Navigation and search

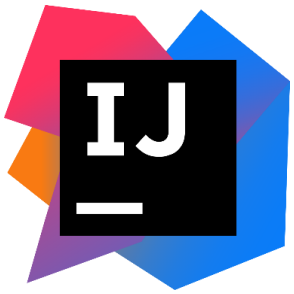

Figure 19: Logo IntelliJ Idea

Visual Studio Code [12] is a standalone source code editor that runs on Windows, macOS, and Linus. The top pick for Website development, with more extensions support. I used it because it working fast for my computer and it can create and compile the project similar other tools.

Figure 20: Logo Visual Studio Code

PgAdmin4 [13] is an administration PostgreSQL tools. We use it to design, backup, restored and manage database. It is works good and easy to manage the data in my database. It can generate query for me to select, create, update and delete. As important control on data is that we can back up the data as file from the tool and we can restore it, so our data is secure.

Figure21: Logo PgAdmin4

Postman [14] is an API platform for developers to design, build, test and iterate their APIs. It is an HTTP client that tests HTTP requests, utilizing a graphical user interface, through which we obtain different types of responses that need to be subsequently validated. I used postman for testing project API after I build it complete in each functionality, before I integrate it with front-end. When we have swagger configuration in our project, we just import the link of our API description, it generates all the requests for us to test easily.

Figure 22: Logo Postman

5. PROJECT IMPLEMENTATION

In this section, the detail about implementation of the project during the internship. I explain how to setup tools and technology, project implementation and installment.

5.1 Project setup

5.1.1 Environment setup

Prior to development of project, I need to setup some required environments and tools in order to make the project work. Those environments are list as below:

- Install JDK, at least from version 1.7.
- Install the IDE. In my case, I choose the Intellij IDEA and Visual Studio Code for code editor.
- Install the Postman for testing API
- Install PostgreSQL for database
- Install the pgAdmin4 for manage database

5.1.2 Project initialization

5.1.2.1 Create a Project with Spring Boot framework

After setup all of the required environments, I use Spring boot initializer [15] as shown in Figure 25 is to create a Spring project. I can initialize what kind of project, language and JDK version in this Spring Initializer. After I choose language, JDK version and input information already. I can add dependencies by click on “Add Dependencies” and search up all the dependencies which I need and add all the needed dependencies, we can click “Generate” to download the initialize project into our pc in a jar package.

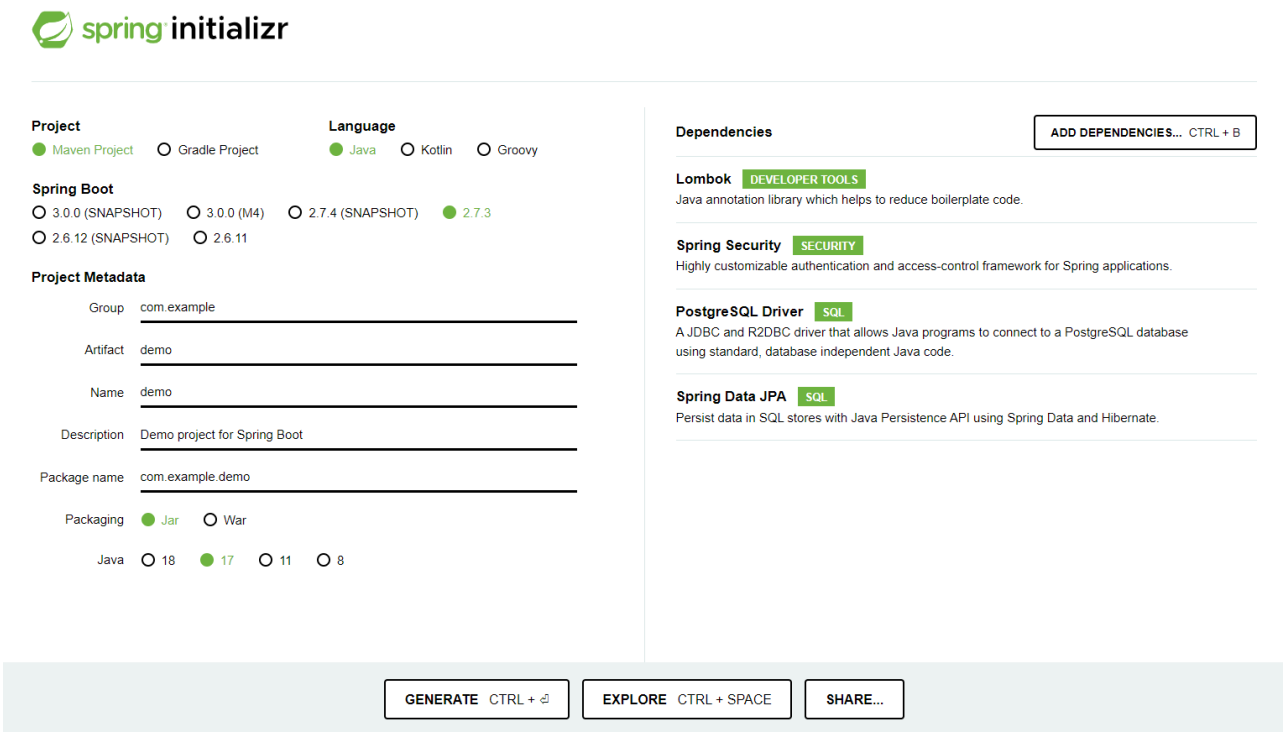

Figure 23: Spring Boot initialization

5.1.2.2 Create AngularJS application

I used AngularJS ask frontend, first of all before we can create project in AngularJS, we need to install Nodejs for handling data communication. We can download NodeJS at www.nodejs.org. Every dependencies or library is AngularJS will be store in the "package.json" file and we can add new library into the project by using "npm install". For install Angular cli we need to use command "npm install -global @angular/cli". After we install already, we can create new project by command "ng new <nameproject>" as shown in Figure 26. Then we need to press enter for add Angular routing and after that we can choose style CSS and press "enter" and waiting it running create our new project as shown in Figure 27.

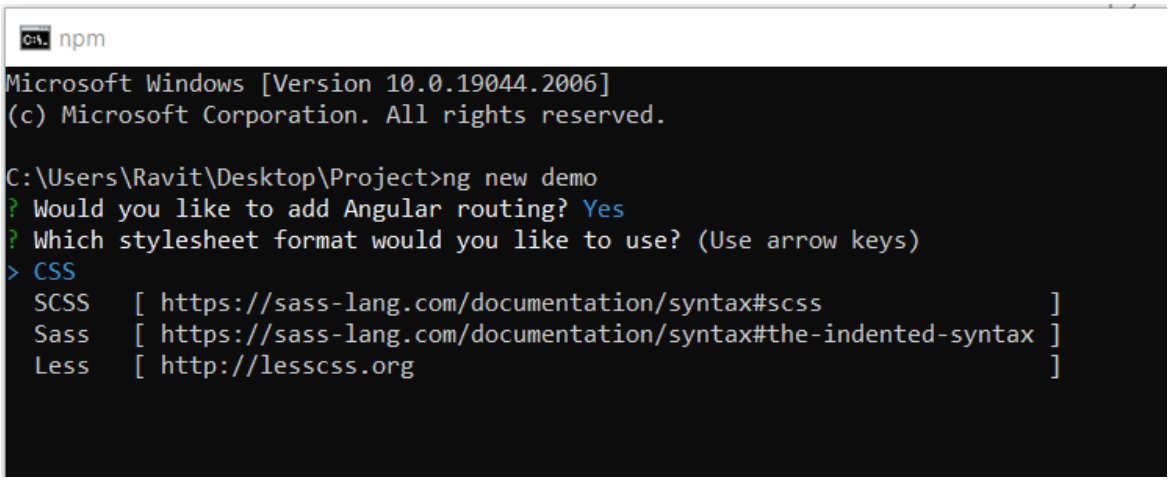

Figure 24: AngularJS new Project

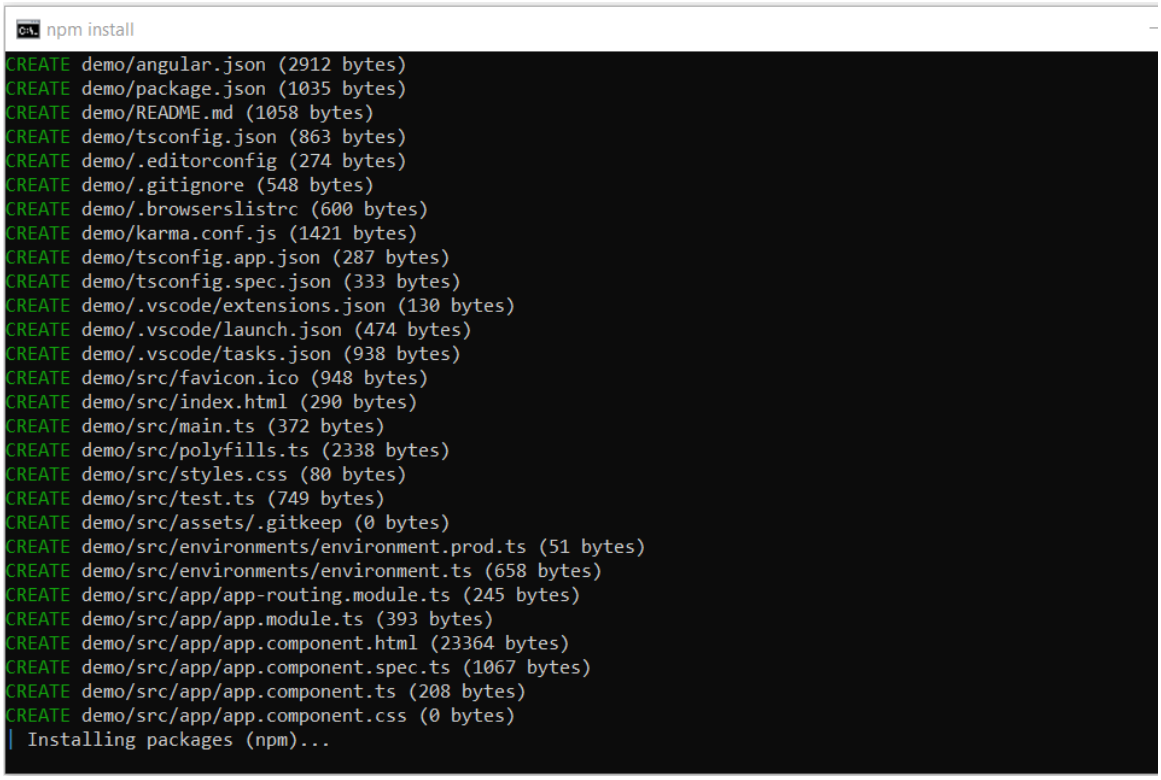

Figure 25: AngularJS new project set up

5.2 Configuration

After we installed the project, we need to do a few configurations inside the project

- Spring Boot Project
  - If we miss some dependencies when initialize. We can add those dependencies in the “pom.xml” file as shown in Figure 28 and click “load maven change”. This configuration can help us do not need to re-generate the same project again.

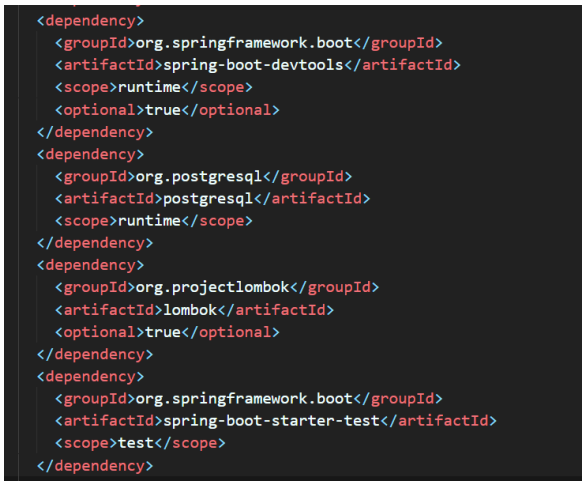

Figure 26: Adding Spring Boot dependencies in pom.xml

- If we initialize with database driver, we need to configuration on "application.properties" file by input require information as shown in Figure 29.

```
spring.datasource.url=jdbc:postgresql://localhost:5433/learn_1
spring.datasource.username= postgres
spring.datasource.password=1111
```

Figure 27: Connect to PostgreSQL database

5.3 Project structure

The application structure is Spring Boot is basically the structure of folder, sub-folders and files included in a project. When we create the project, we will get an overview of the application structure as shown in Figure 30.

- Spring Boot Structure
  - **src**: is the root fold of Spring Boot application
  - **model**: is the folder that store all entities of the project and each entity have their own attribute and they constitute as a table in the database
  - **repository**: is a mechanism for encapsulating storage, retrieval, and search behavior which emulates a collection of objects according to our logic we write.
  - **service**: is used with classes that provide some business functionalities. It is used for encapsulating the detail and providing a CRUD interface for an entity.
  - **controller**: is a folder that store all the controller for REST API and URL.
  - **config**: is a folder that store configuration security and configuration properties.
  - **dto**: is a folder for store request data entity and each request entity have their own attribute.
  - **resourses**: contain the static file for Spring Boot application that use to configuration.
  - **pom.xml**: Project Object Model is the fundamental unit of work in Maven. It is an XML file that contains information about the project and configuration details used by Maven to build the project. It contains default values for most projects.

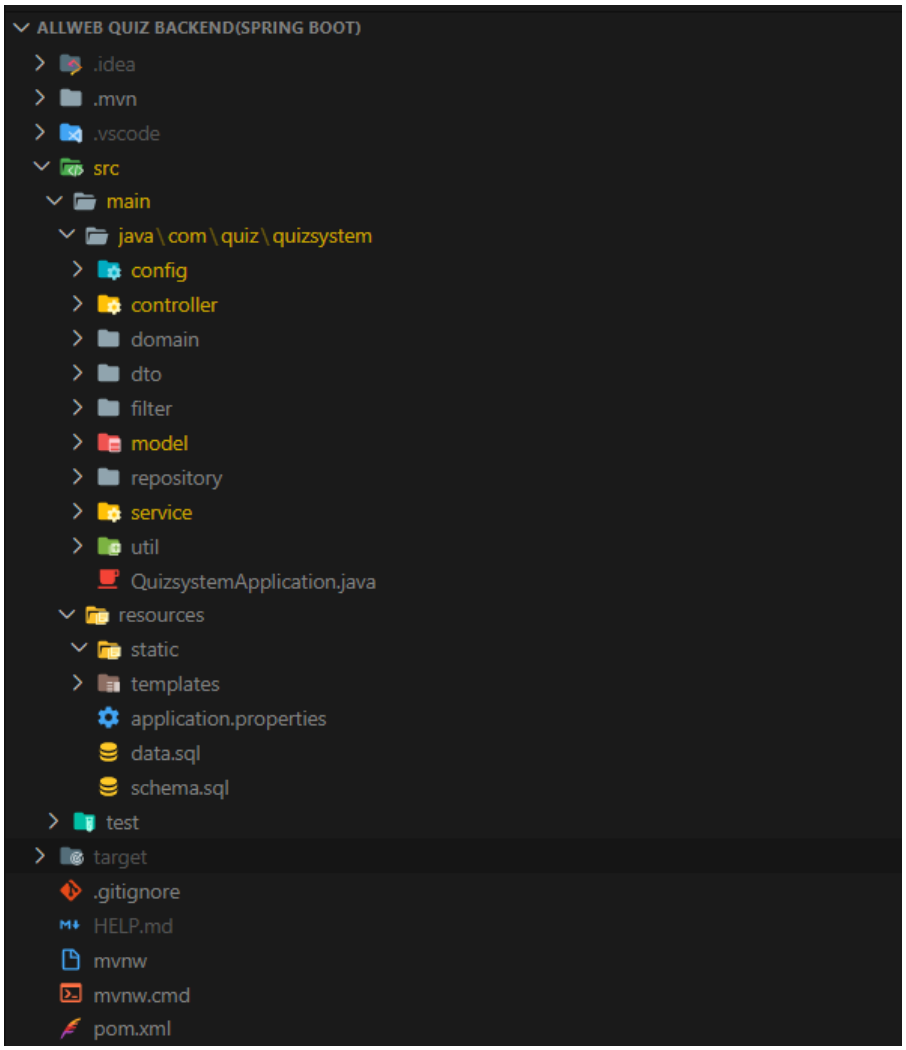

Figure 28: Project structure Spring Boot (Backend)

- AngularJS structure as show in Figure 31:
  - **node_modules**: is cache for the external modules that your project depends upon. When you command npm install them, they are downloaded form the web and copied into the node_modules folder.
  - **src**: is the root folder for storing assets, component, and views.
  - **assets**: is a folder for store custom made CSS, Javascript, picture and icon
  - **component**: is a folder for storing all the customs made component which is the UI logic, fetching API and displaying them according to the logic we write.
  - **pakage.json**: is a json file that track all of our dependencies and their version which was install using “npm install”
  - **page**: is a folder for store page for displaying them according to route
  - **dialog**: is a folder for store dialog for create and modify data in each page
  - **material**: is a folder for store modules Angular Material UI is UI component for help us design website.

- **service**: is a folder for store the service that are used to request REST API from spring

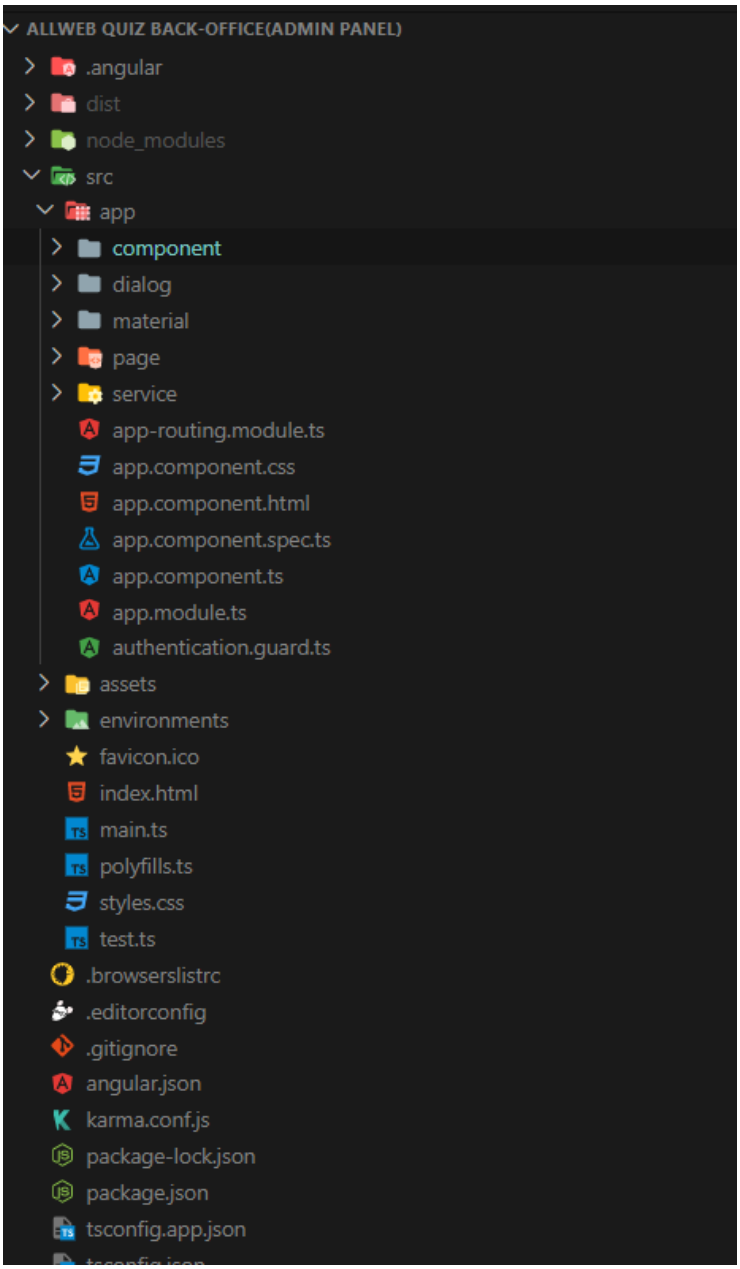

Figure 29: Project Structure Angular JS (Client Panel)

5.4 Project implement

5.4.1 Login authentication and logout process

Login and logout are one of the most important functionalities of the system since it is used for the security purpose to prevent the other using our web application without having the registered account in the system. The first stage of the procedure when a user trying to enter URL to the home page of the website is that it will check the cookies and session on the browser through the Java action class to see if the user is already login yet. In case of there is already

the information of user such as ID and email on cookies or session of the browser, then the route will be forwarded to the dashboard page or the home page of the website. In contrast, after checking the cookies and session of the browser with no any user information, it will be routed to the login page. In this case, the user has to input the correct email and password that already registered in the database.

The user authentication operation is worked in a few steps as shown in Figure 32. Firstly, I need to check session for finding user is null or not. If user is null system let user input information and user complete enter, I need query data from database by getting the user with the input email. In terms of the encrypted password of user that stored in the database is in form of hash password encrypted by using this library. In order to verify the password inputted by the user is correct or not, I have to use a build-in function from this library which is called "*checkpassword (plainPassword, hashedPassword)*", where *plainPassword* is the password inputted password and *hashedPassword* is the password of user retrieved from the database. If both passwords matched, the function will return true, or false otherwise. When the user retrieved from the database, it means that the login is success and the input password matched with the password store in the database, it means that the login is success and then the route will be forwarded to the dashboard page, otherwise, an invalid login message will be displayed to the user and the system will allow them enter their information again.

The logout operation happens when user click the logout button. It will clear the cookies and invalidate the session of the user login in the browser. Finally, it will be routed to the login page.

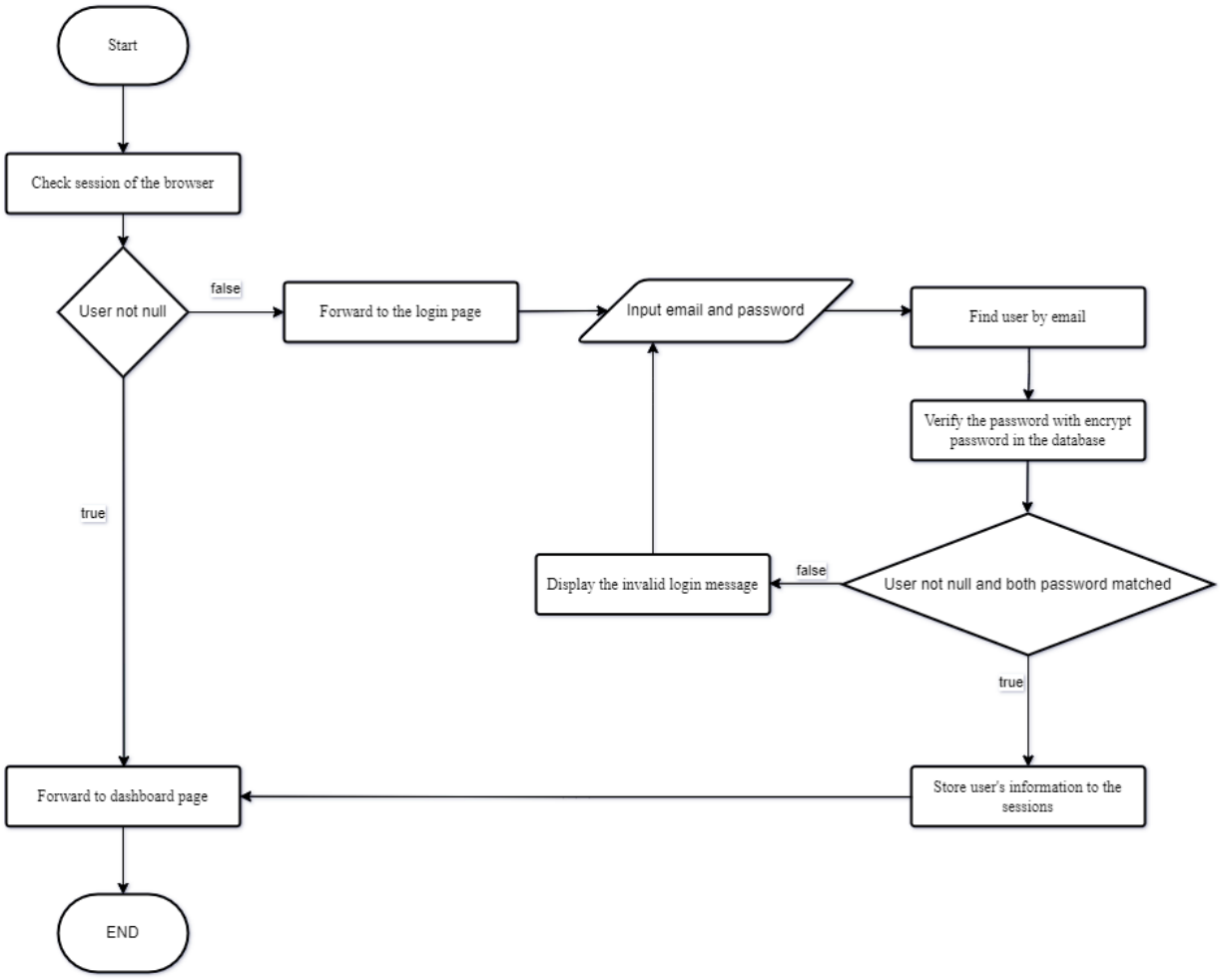

Figure 30: Login authentication flowchart

5.4.2 Create new candidate

One of the core functions of this project is to allow the admin user to manage on the candidates, which mean user need to be able to create them to do any other more function with them such as set the interview, add the result, etc.

Figure 33 shows an in order to perform this function, firstly, user need to log into the system. To create new candidate, users need to the candidate page and select the “Add candidate” button. User will be asked to enter all of the required information of the candidate into the required field. There is one special input box, which is the email input. The input email will be validated if it is the existing email or not. If email is existing system will show error message and let user enter another email. Another is when the user enters the correct email and completes all of the required input, user can finally create the candidate by clicking the button “Submit” and store the input data to the database of user table, else, it will show error message to the user and required the user to reinput data again. After data store complete, the system is forward user to candidate list page.

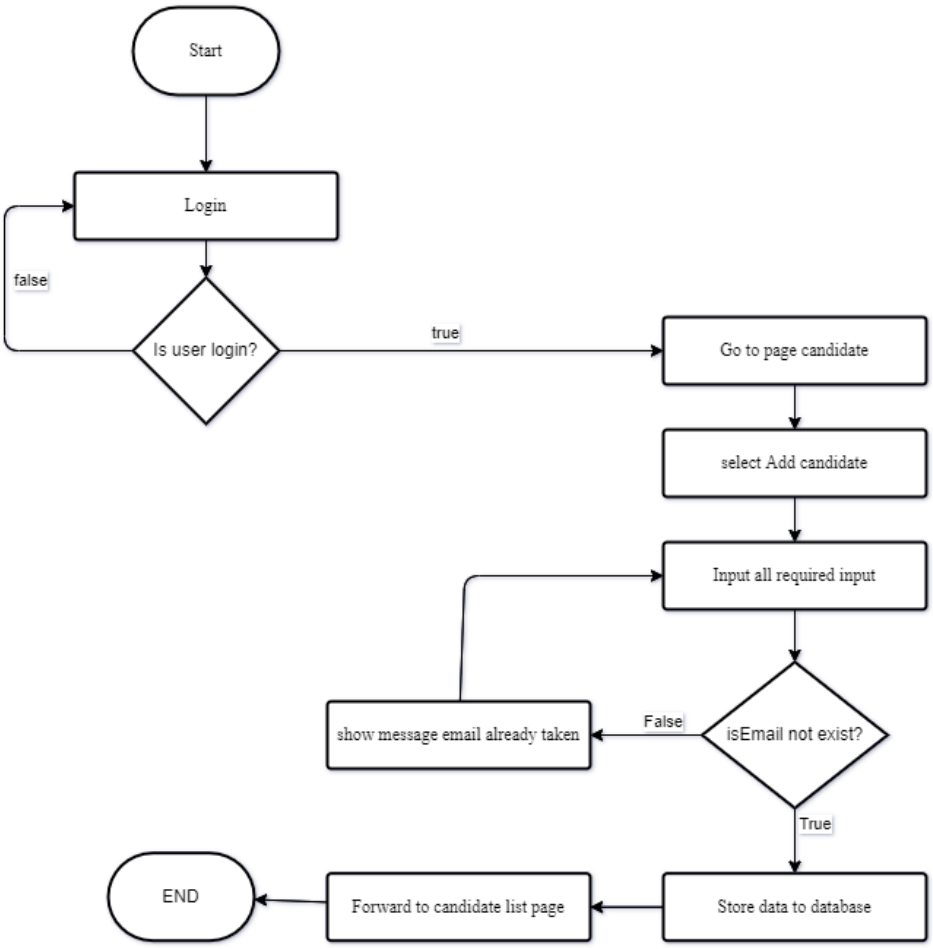

Figure 31: Create new candidate flowchart

5.4.3 Create new question

Another main function of the project is to enable user admin and recruiter to manage the question and quiz for candidate do test.

Figure 33 shows an order to creating question. Firstly, user need to login into the system, then go to the question page and select the "Add question" button. The system will let user input required information. User needed to select type of question that it is the important information for me to create new question. If user select type question "*Fill in gap*", we need to add hint and preview of question for user to understand how to create question type "fill in gap" and we need to add event for the user enters the question. Because we need to find the gap for use it as answers and insert it to database when we create question. After user input question type, question and require information user can finally create the question by clicking the button "Submit" and I store the input data to the database of question. Else, if question type "*Fill in gap*" I store the input data to database of question and database of answers. If have error system displays error message to the user and required the user to reinput data.

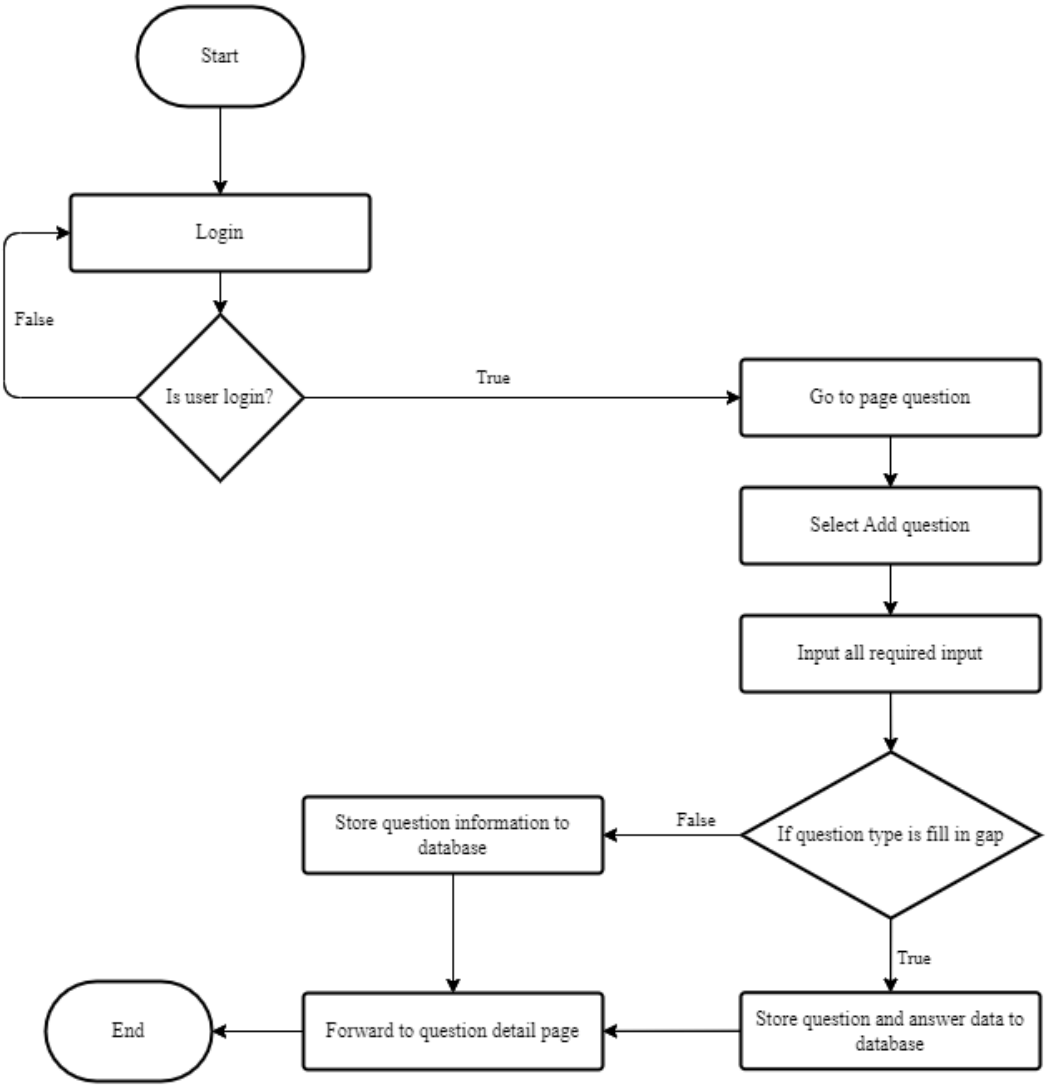

Figure 32: Create new question flowchart

5.4.4 Edit multiple answer

Another importance function of the project is to edit multiple answer of question that can help user admin or recruiter can create question and modify answer fast.

Figure 35 is shows how to edit multiple answer. Firstly, user need to login into the system, then go to the question page and select question detail and then user need to select the “Edit Multitple” button. The system is queries to database to get all answers and list in row input. User can update all answer and the system is validate all fill input for make sure user input correct. After user edit complete user can click button “Submit” for complete edit multiple answer.

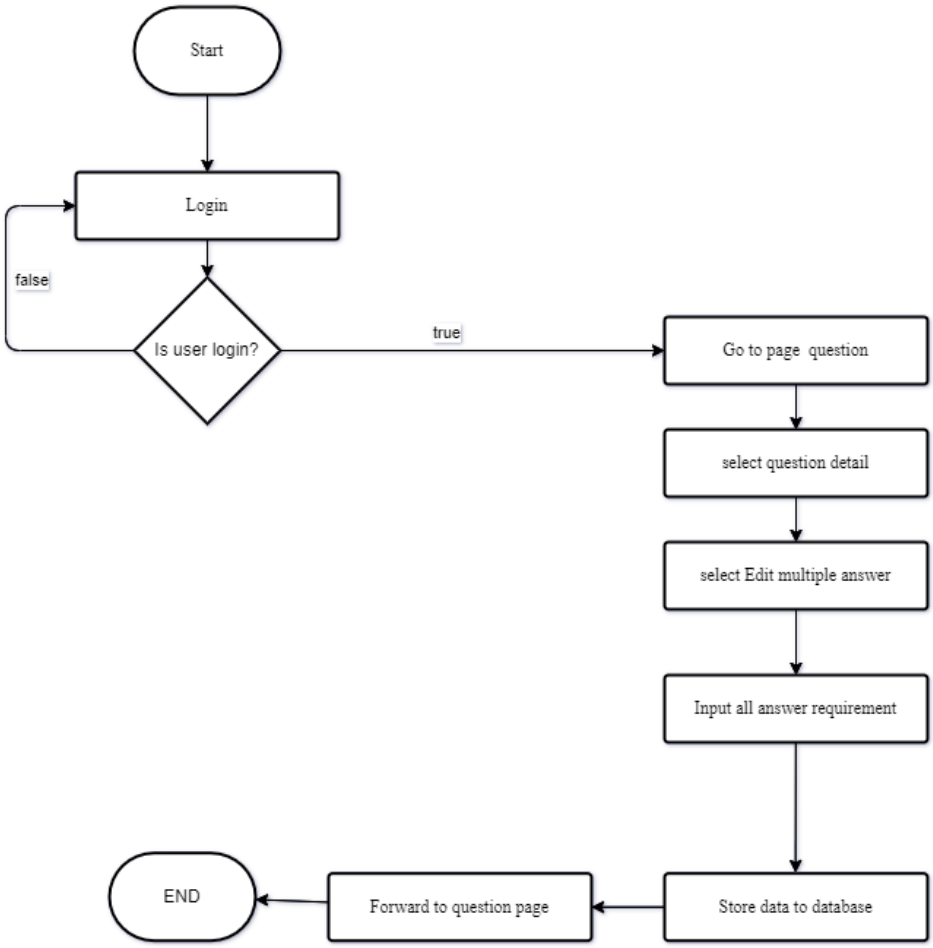

Figure 33: Edit multiple answer flowchart

5.4.5 Email configuration process

Figure 36 shows about source code that I configuration mail server to store email and password in database. I use the email configuration to running the process of sending email to users. I keep email and email app password of the application in the database. When the project start it is query data to past in *Java Mail Sender Implement*. After the process, we can send email to candidate or user with their information o users that have role as an administrator or recruiter can request the link reset password when they forgot the password.

```java
@Configuration
public class EmailConfig {
  @Autowired
  private MailinformationService mail_info_service;

  @Bean
  public JavaMailSender getJavaMailSender() {

    Mailinformation mailaccount = mail_info_service.getMailInfomation(id: 1);

    JavaMailSenderImpl mailSender = new JavaMailSenderImpl();
    mailSender.setHost(host: "smtp.gmail.com");
    mailSender.setPort(port: 587);

    mailSender.setUsername(mailaccount.getEmail());
    mailSender.setPassword(mailaccount.getPassword());

    Properties props = mailSender.getJavaMailProperties();
    props.put("mail.transport.protocol", "smtp");
    props.put("mail.smtp.auth", "true");
    props.put("mail.smtp.starttls.enable", "true");
    //props.put("mail.debug", "true");

    return mailSender;
  }
```

Figure 34: Mail Configuration

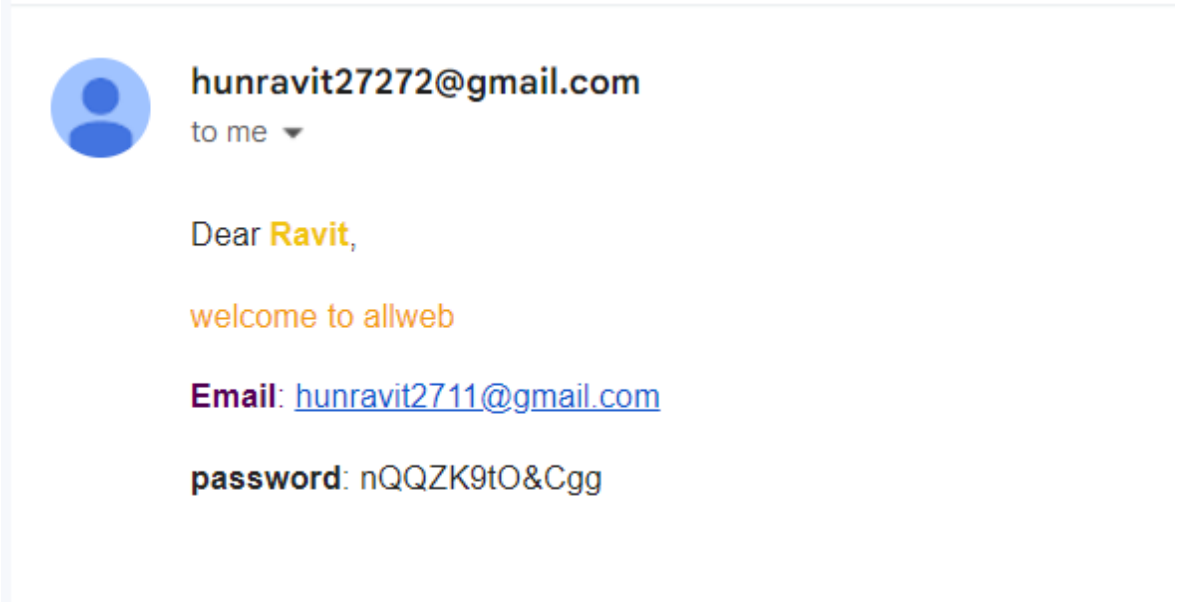

Figure 35: Mail Received

6. CONCLUSION

The internship at ALLWEB really help me develop both my technical skill and my soft skill, though there were still a few difficulties that I had during this internship, I was still able to solve them in due time.

6.1 Complete and uncompleted task

After finish the internship program at the ALLWEB company, the result of the project than I have worked on will be illustrated in the table below.

Task	Completed	Uncompleted
Login authentication	✓	
View dashboad	✓	
CRUD candidate	✓	
CRUD user	✓	
CRUD quiz	✓	
CRUD question	✓	
CRUD answer	✓	
Assign and remove question	✓	
Assign and remove quiz for user	✓	
CRUD quiz level	✓	
CRUD question type	✓	
Update profile information	✓	
Forgot password and reset password	✓	
Generate report of candidate	✓	
Configuration mail	✓	
Configuration mail template	✓	
Mail sender	✓	
User result		✗

Table 3: Project result Table

6.2 Strong point

In this internship program, I have worked hardly on my project and have successfully conducted so many strong points as follow:

- Comprehensible and attractive UI
- Authentication and validation work efficiently

- Most of the functionalities are very responsive
- Loading speed is very fast
- Performance is acceptable
- Less step to archive each operation

6.3 Weak point

Even though the system was developed with many strong points, there is still some weak points. Those that are needed to improved and developed on are:

- Faster mail send operation
- Store file image of user
- Web socket communicate
- Make more configuration for help user easy configurate

6.4 Difficulties

For this internship, I have experienced many difficulties and problems. The primary issue is the limitation of work knowledge. I have to learn and adapt to the new technology that I have never worked on it before in order to work on my project. This is my first time for my internship on developing the web application project using Java language with Spring Boot framework and Angular JS as front-end. Even I have learnt a lot about it at school, there more operations and concepts applied to the project which I have never seen before. I have to do many research to do the tasks of my project.

Regarding of a great deal of issues during the implementation, it is also the valuable experiences that I get from this internship.

6.5 Experience

Honestly, three months of internship is quite a short period of time and acquiring knowledge. Following are experiences that I have received from my internship including soft skills and hard skills:

- The working process in the company
- Communication between co-worker
- New technology
- Project management and processes
- Time management
- Deal with trouble

- Self-learning and doing research

6.6 Perspective

If I have an opportunity to continue working on this project, I want to certain feature has not satisfied the users yet and adding new feature that are useful for company.

There are functionalities that I should have builds in the future:

- Upgrade web socket
- Upgrade front-end for candidate quiz to improve user friendly
- Upgrade security when candidate do test
- Make system can store user information
- Enables the system to save files and videos for inclusion in order question to improve testing to be more user friendly

6.7 Summary

The internship is finally very vital for students to gain their social and academic skill. After finish the internship, I become fully aware of the fact that the knowledge which we have learned in class is like a foundation for us to adapt to every new thing that we need in our future job. Furthermore, this internship program allows me to get more experience, I am able to practice the use of methodology of project management and how to use it properly. I am sure that all of the experiences will be the most valuable for my future career.

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8. ANNEXES

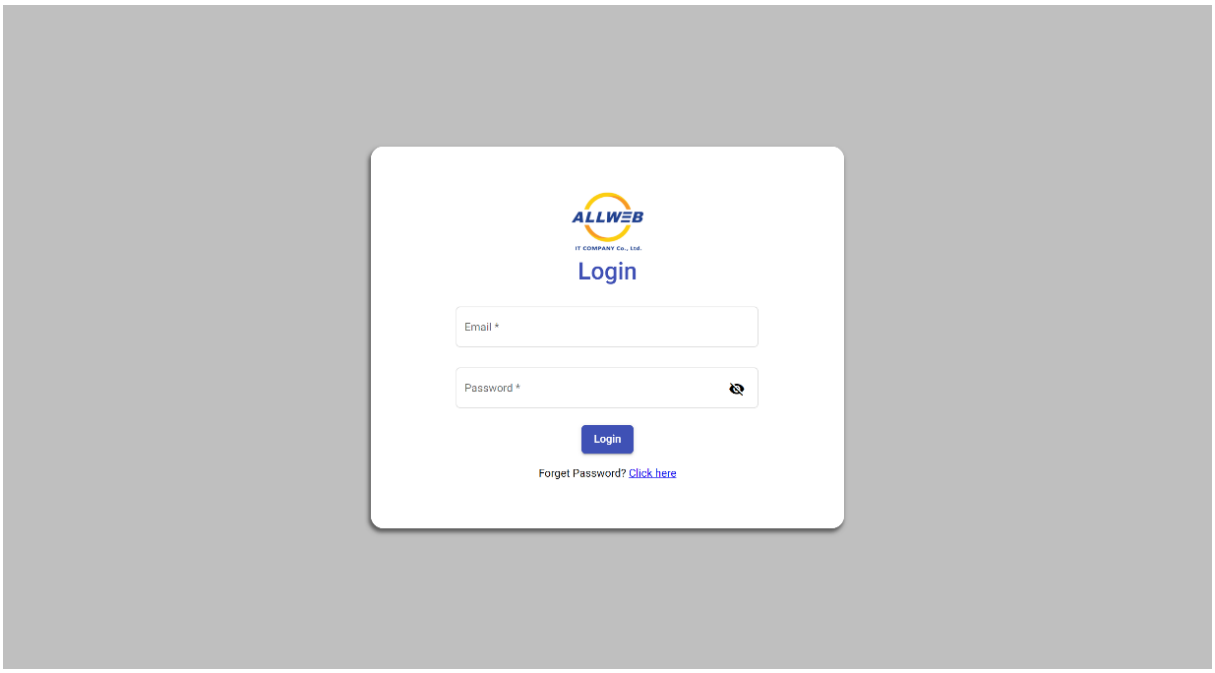

Figure 36: Login page

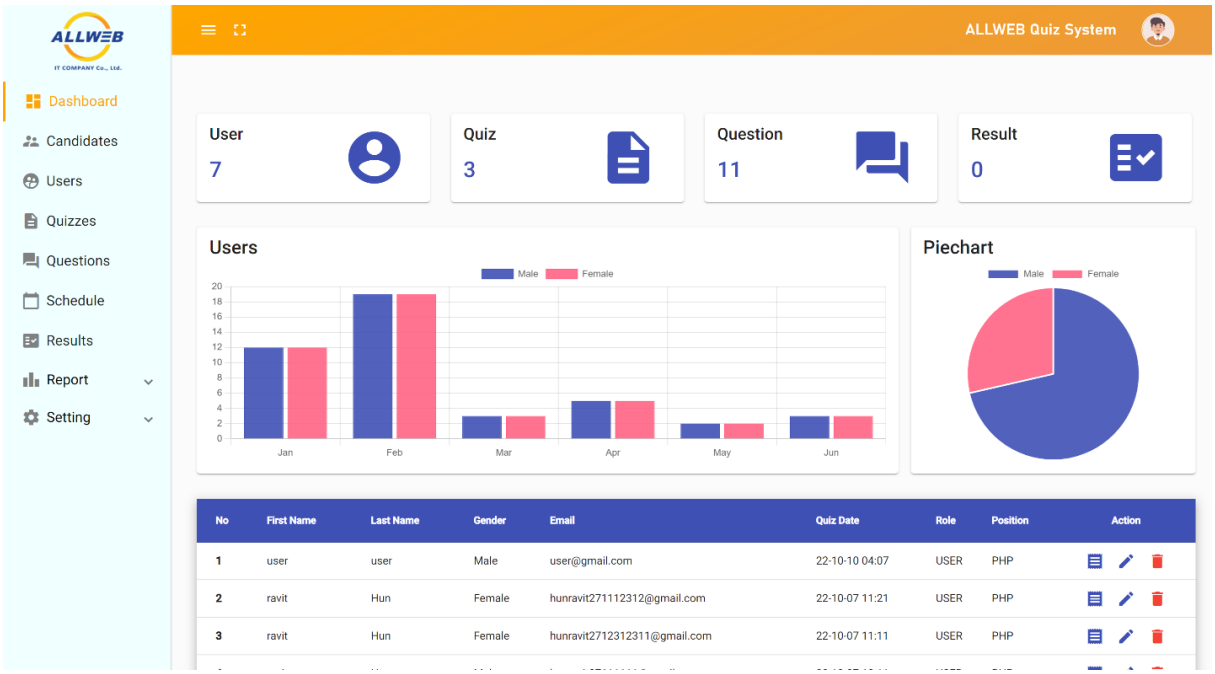

Figure 37: Dashboard page

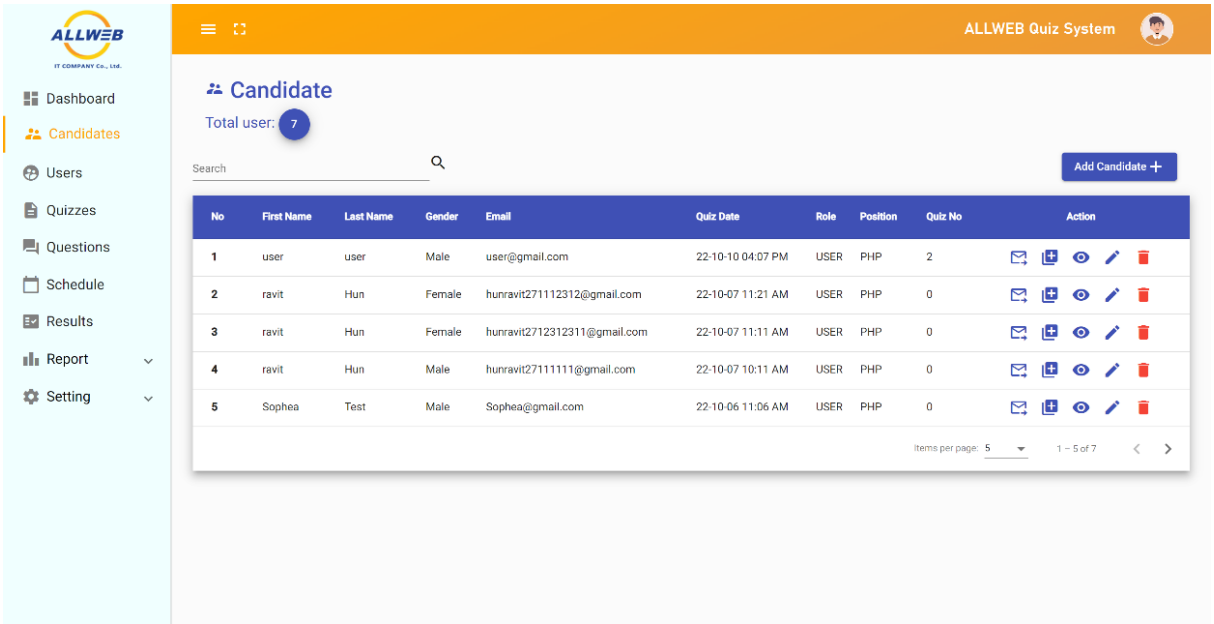

Figure 38: Candidate list page

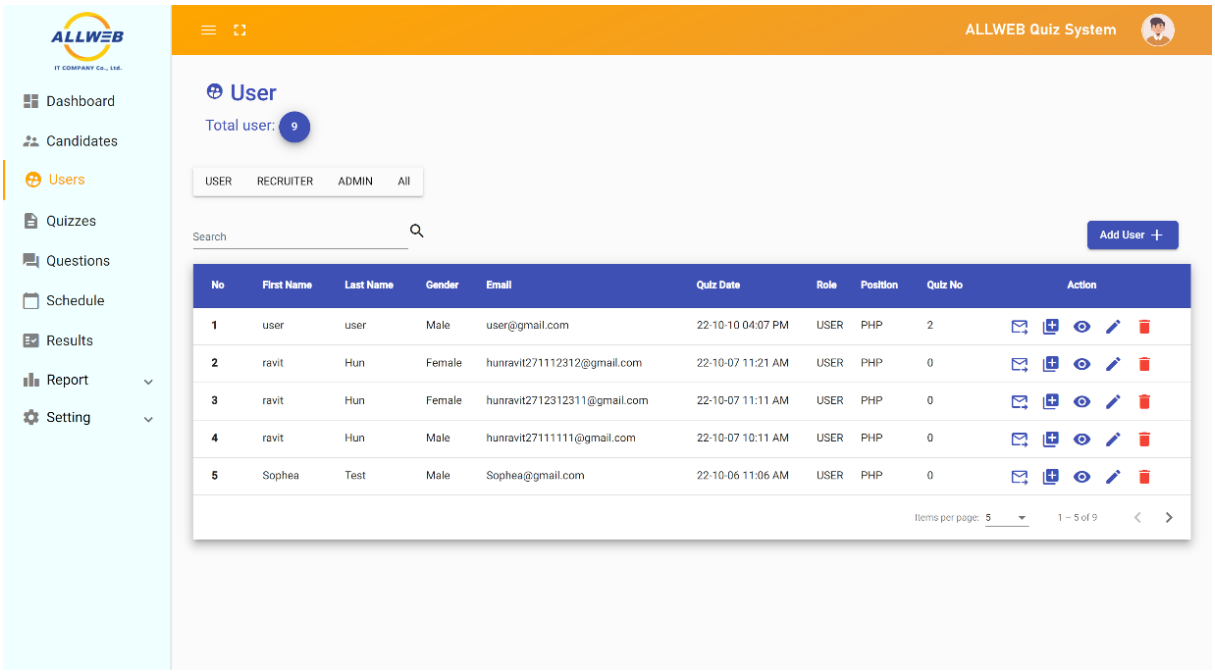

Figure 39: User list page

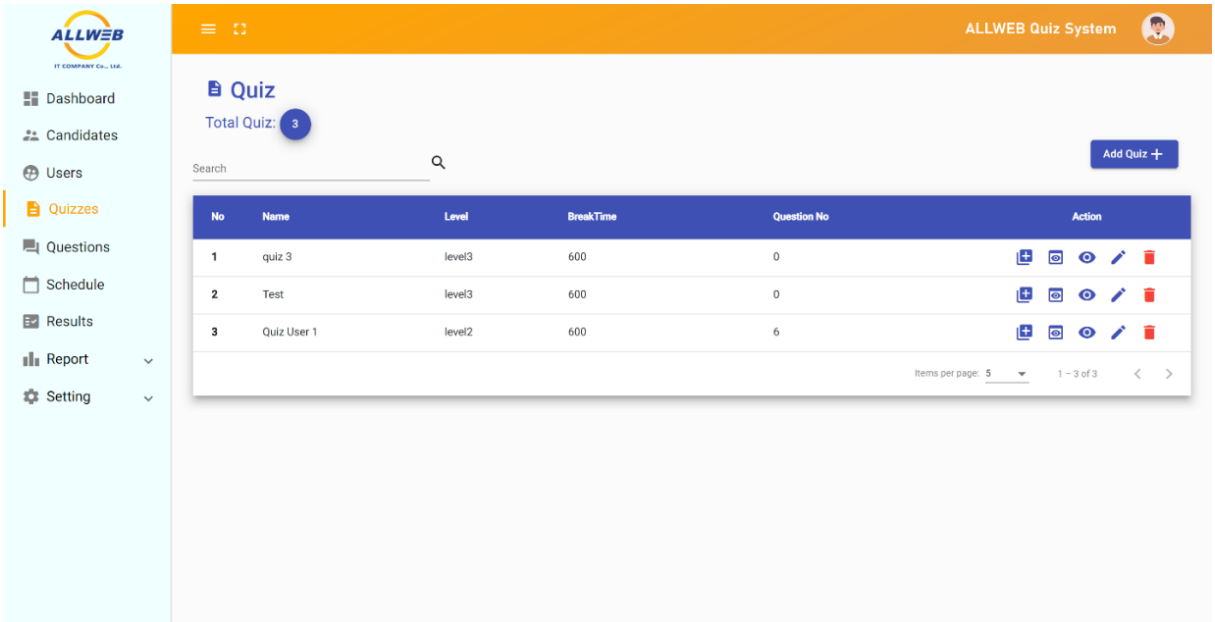

Figure 40: Quiz list page

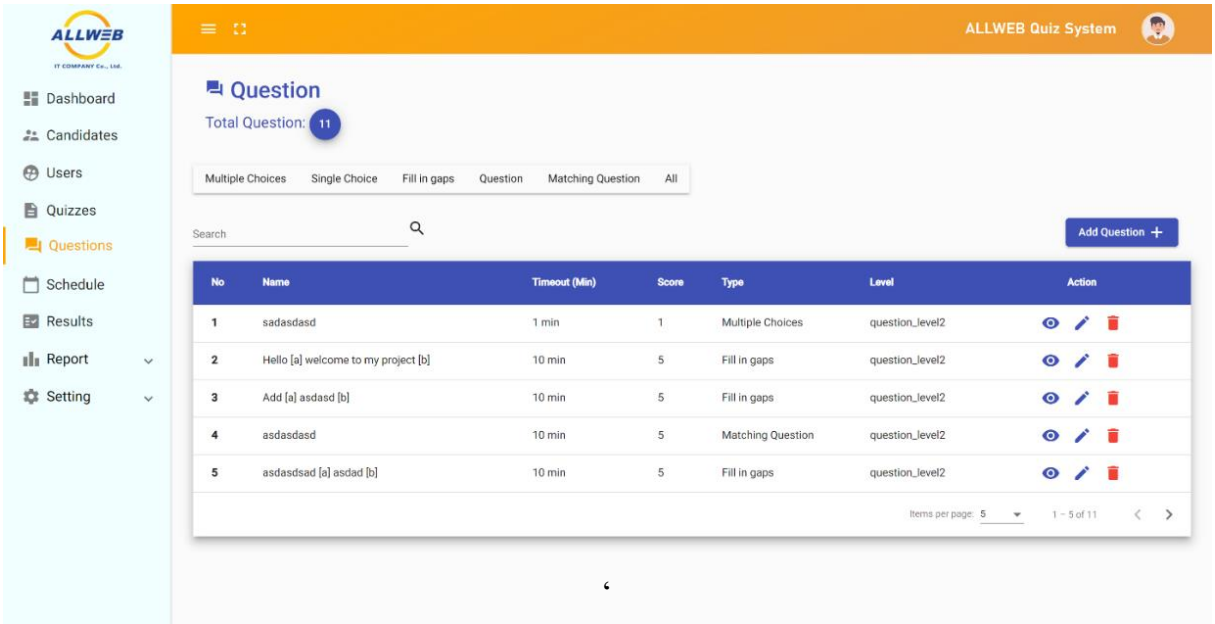

Figure 41: Question list page

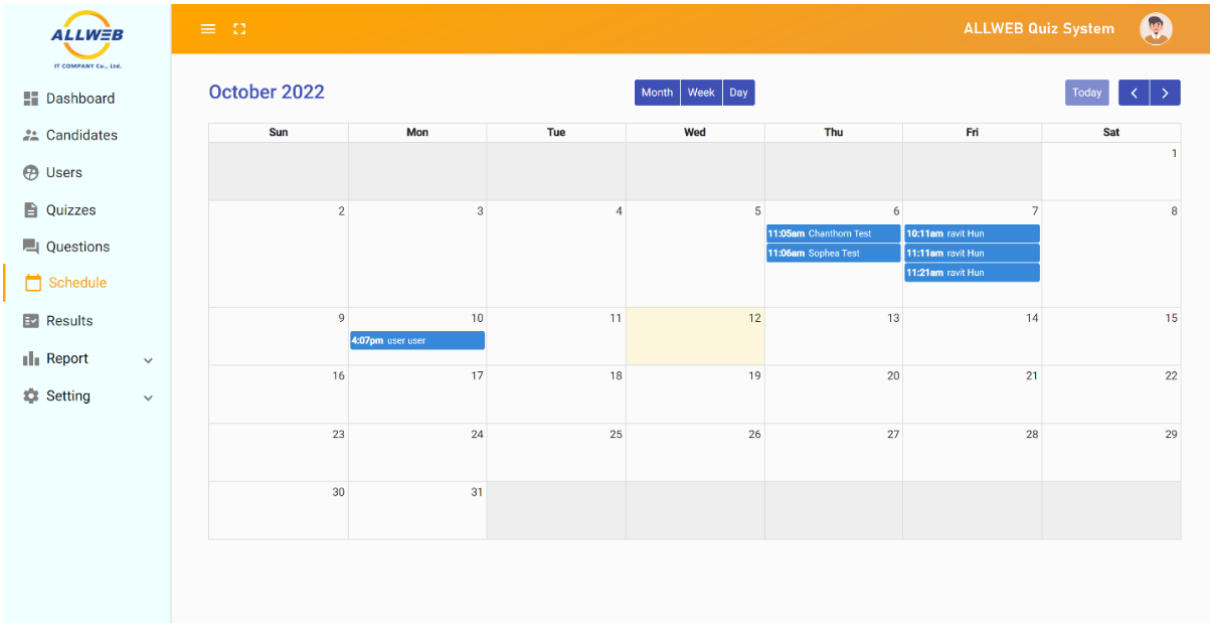

Figure 42: Schedule page

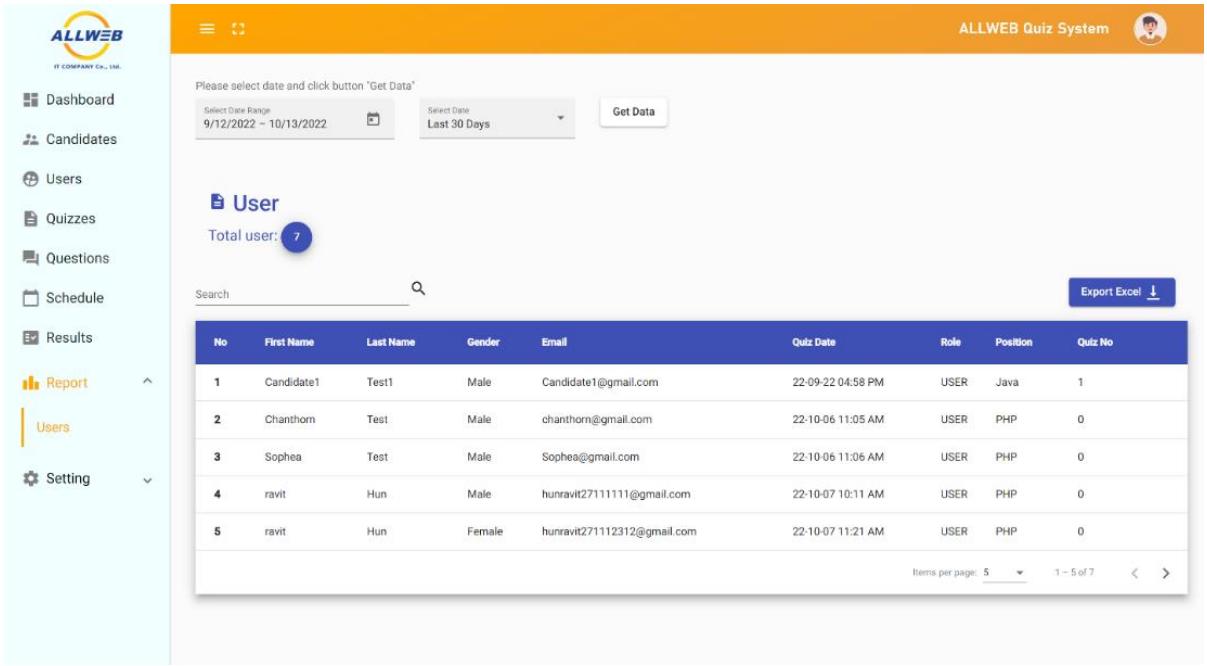

Figure 43: Report user page

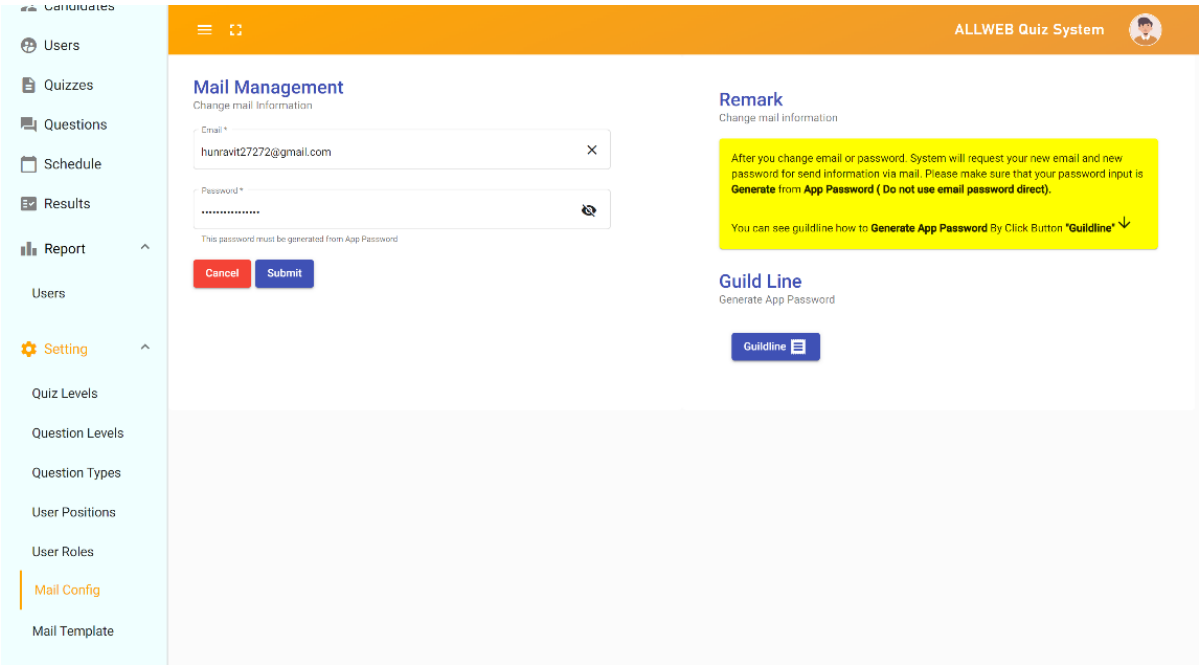

Figure 44: Mail configuration page

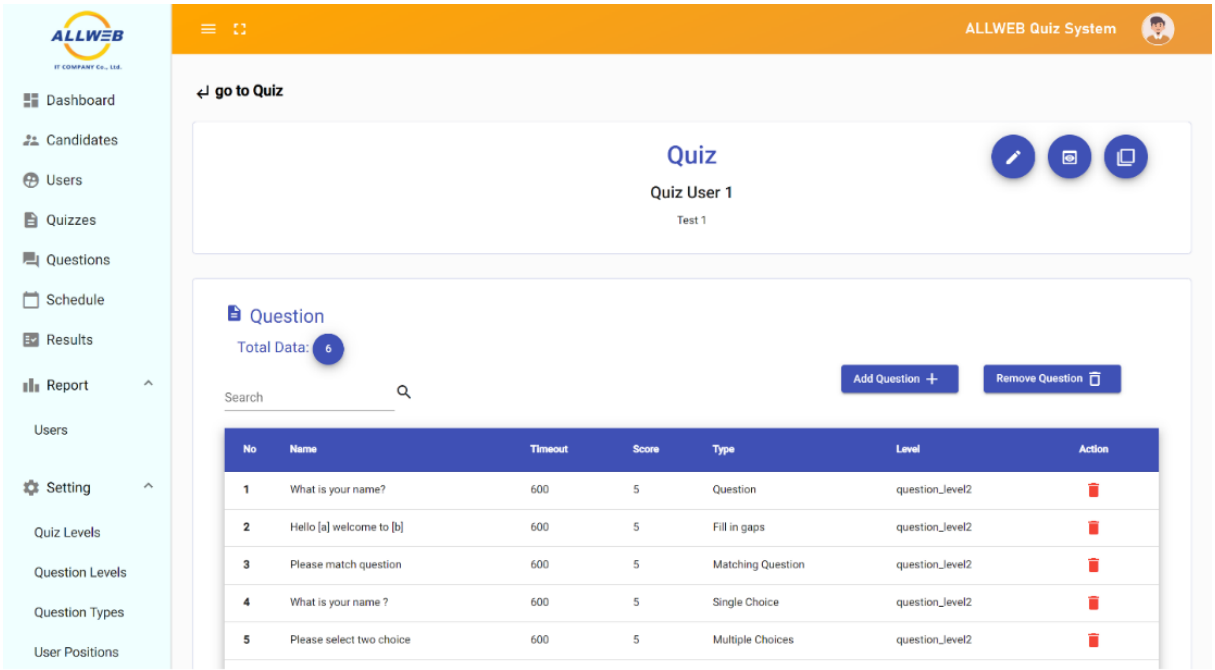

Figure 45: Quiz detail page

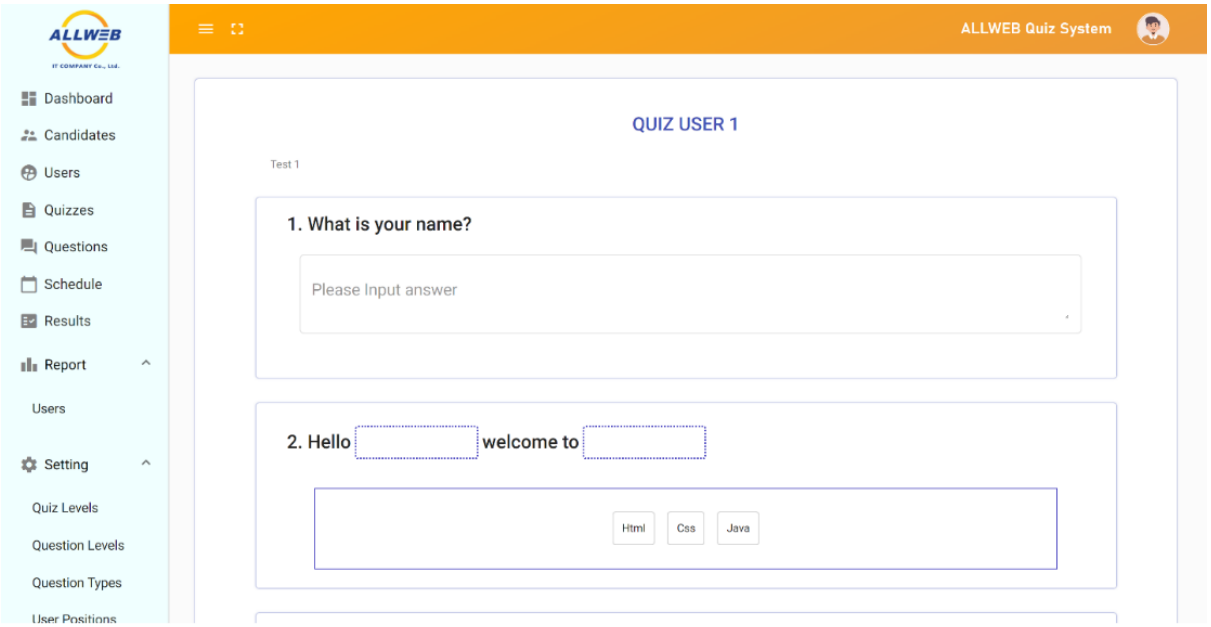

Figure 46: Quiz preview page

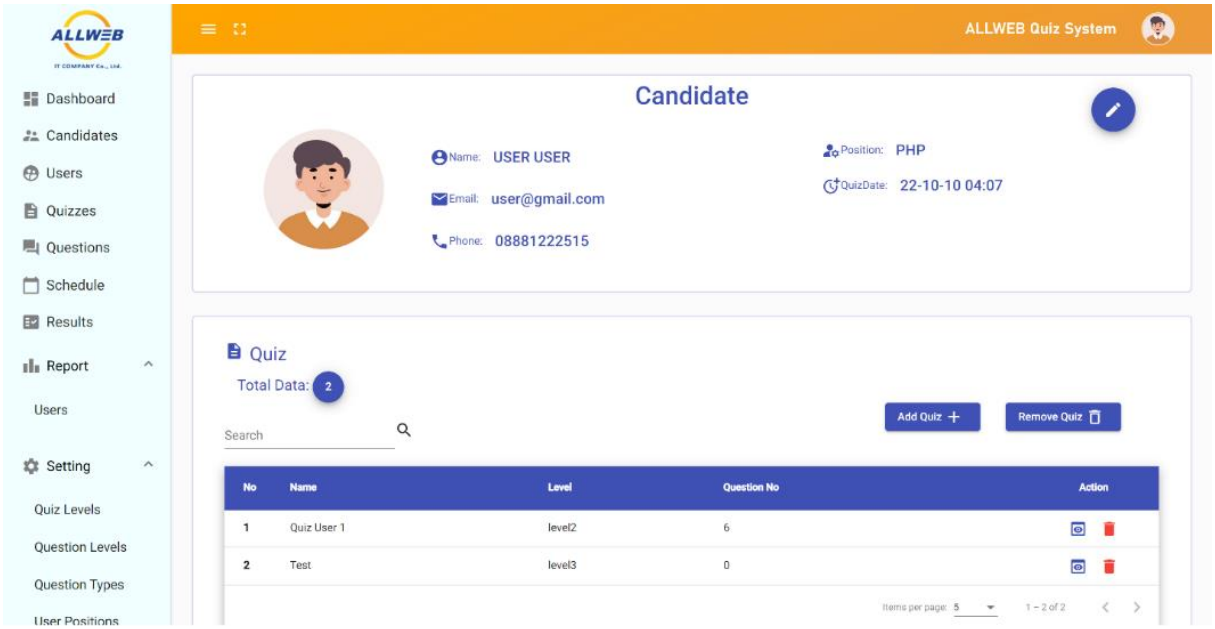

Figure 47: Candidate detail page

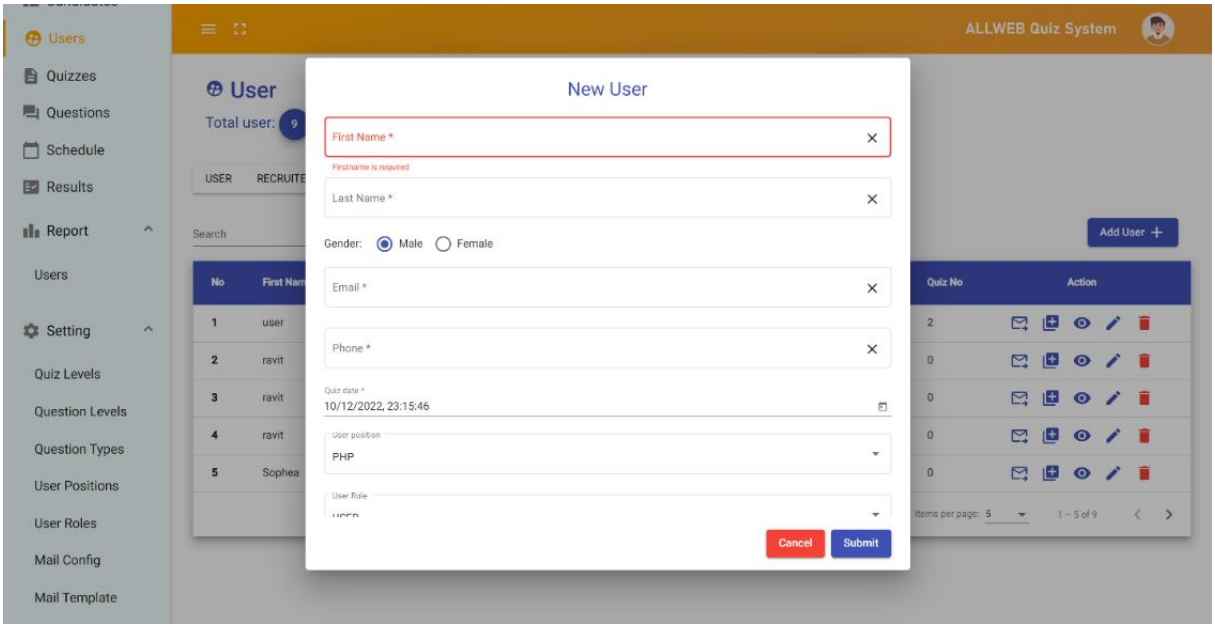

Figure 48: Create user dialog

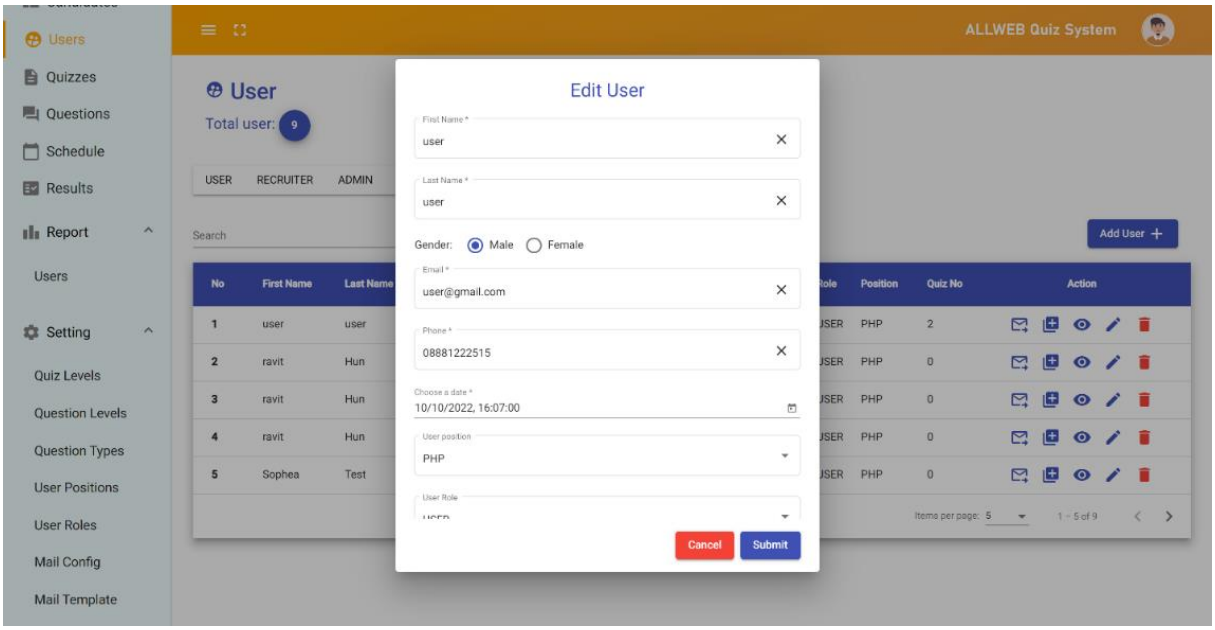

Figure 49: Edit user dialog

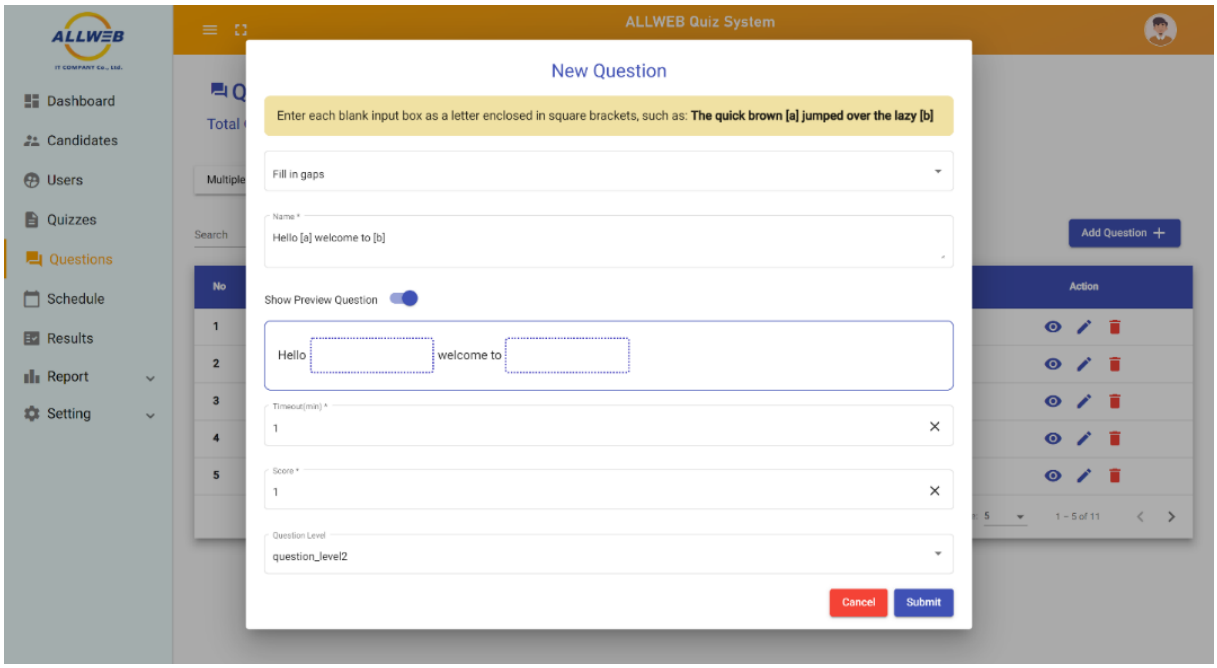

Figure 50: create question dialog

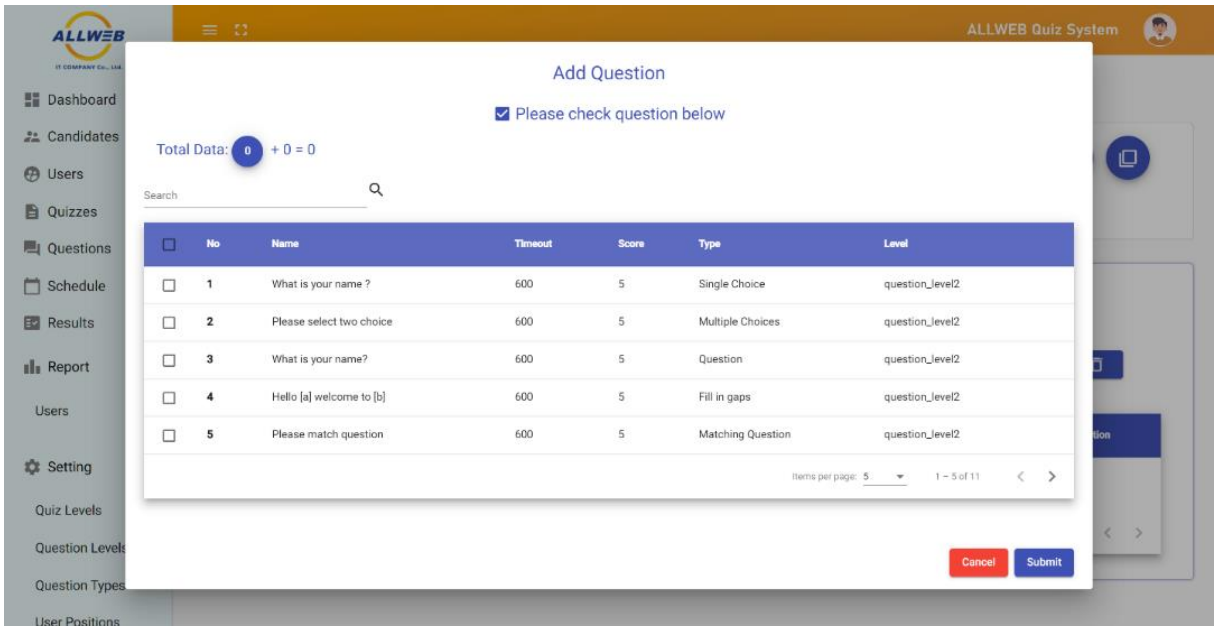

Figure 51: add question for quiz dialog

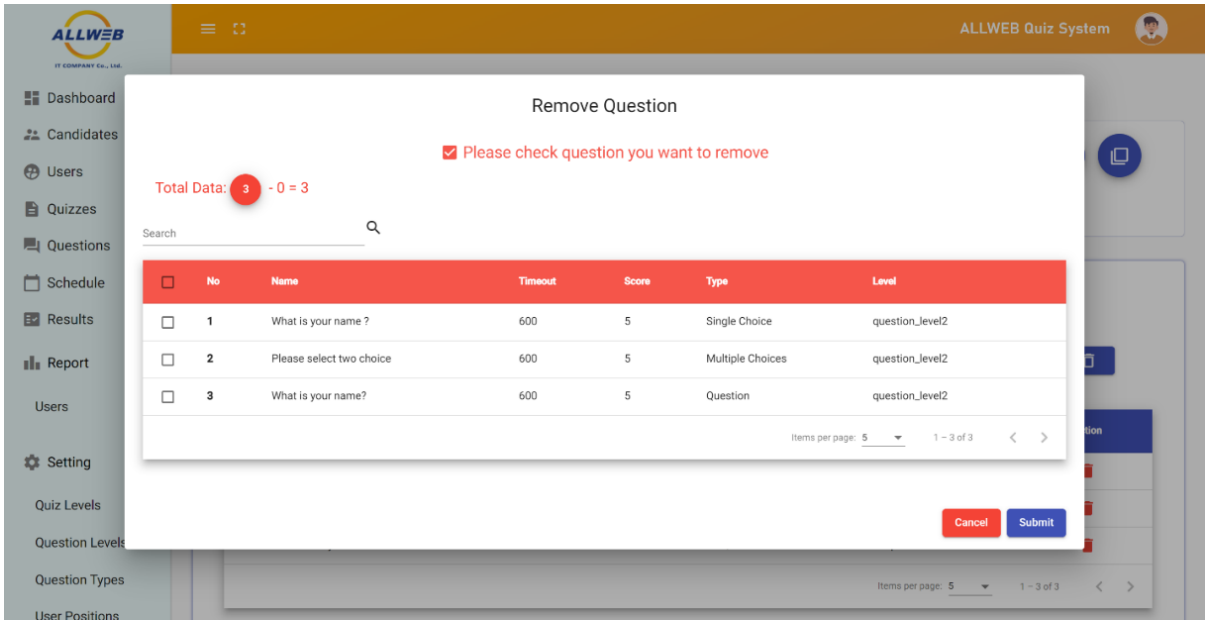

Figure 52: remove question from quiz dialog

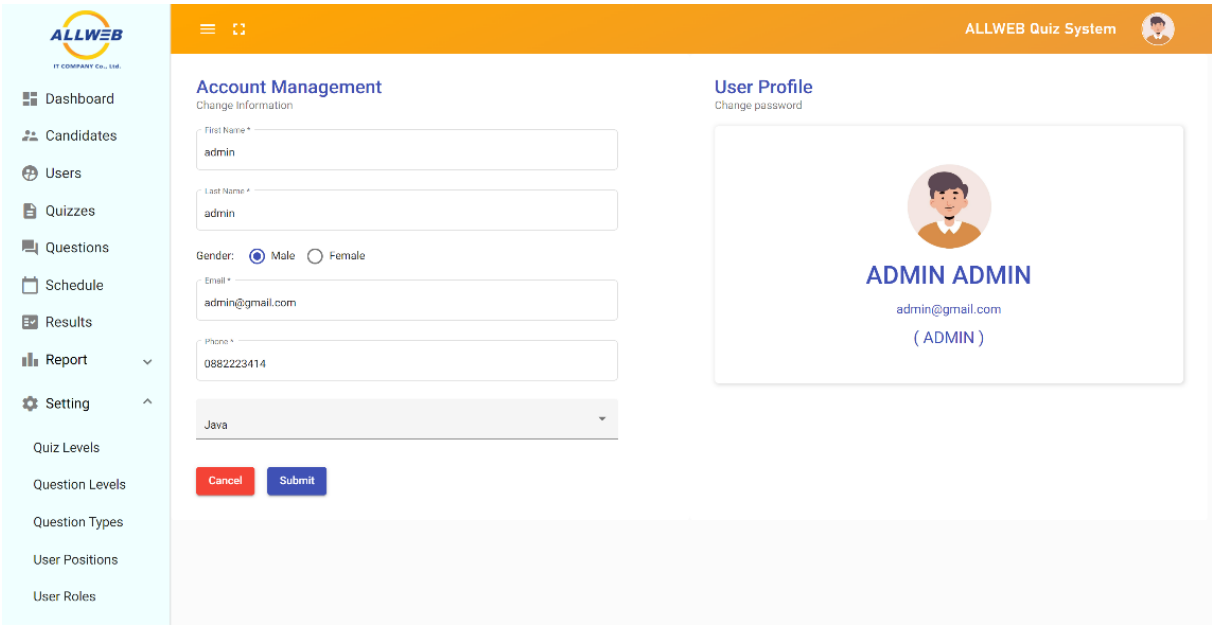

Figure53: Edit profile page

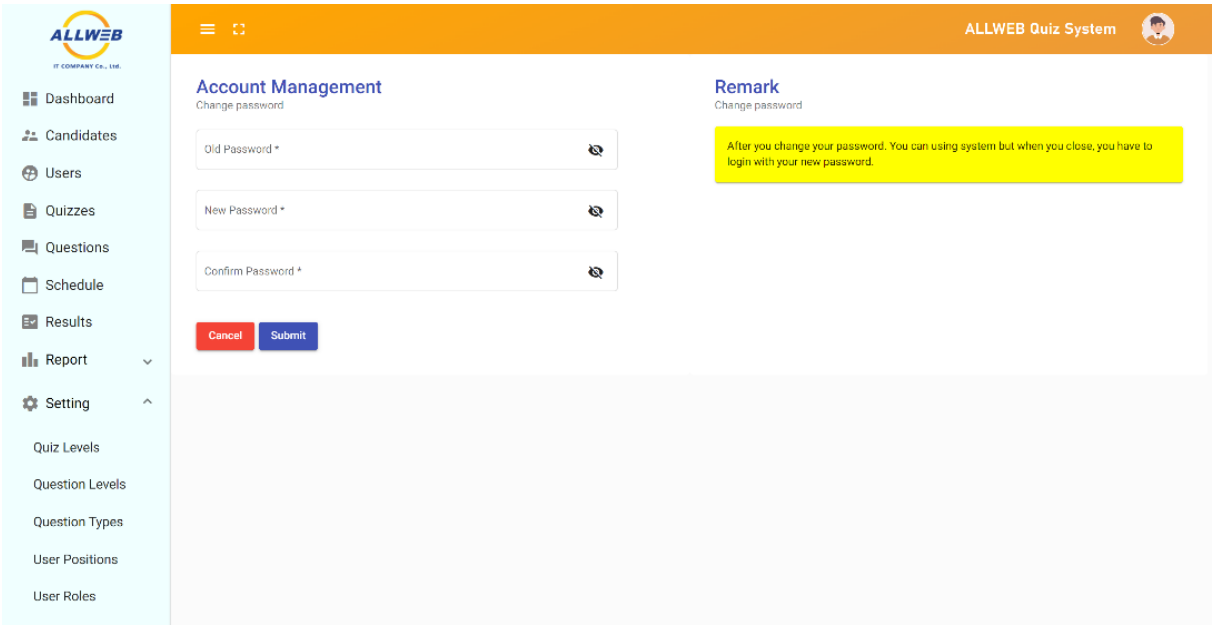

Figure 54: Change password page

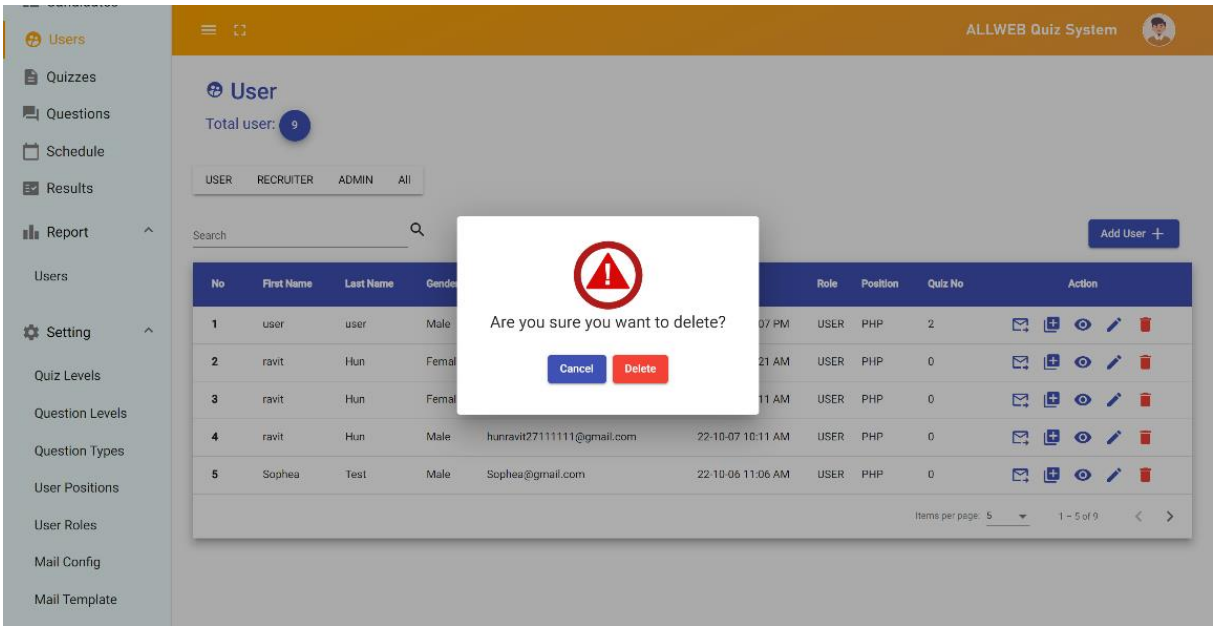

Figure 55: Confirm delete dialog

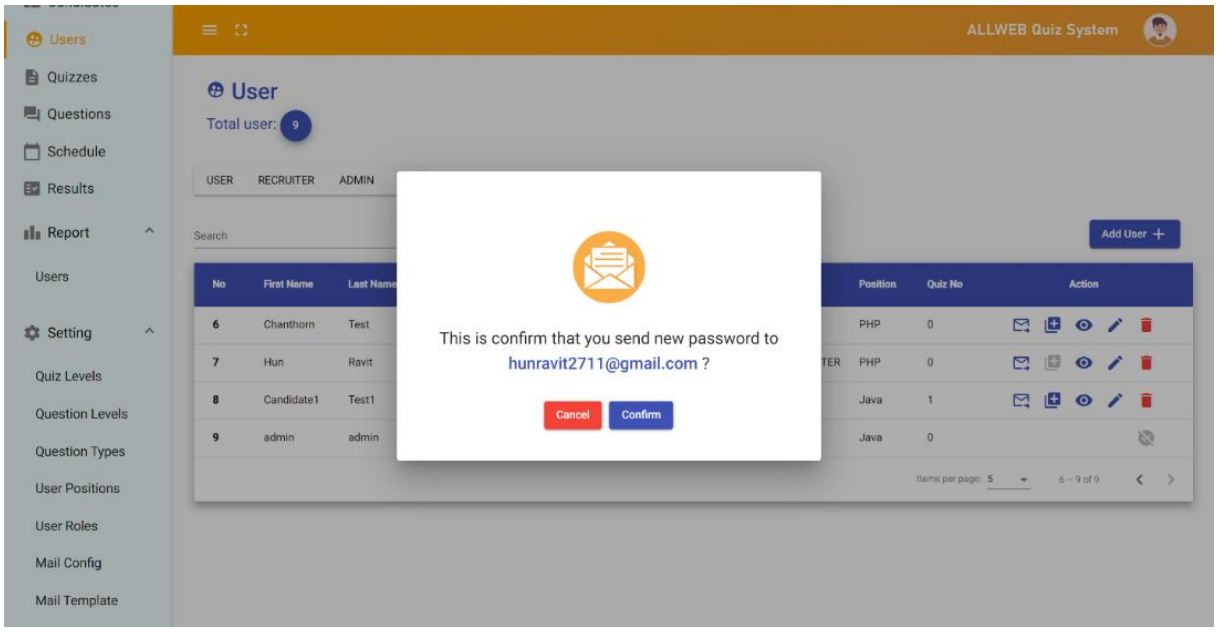

Figure 56: Confirm mail send dialog

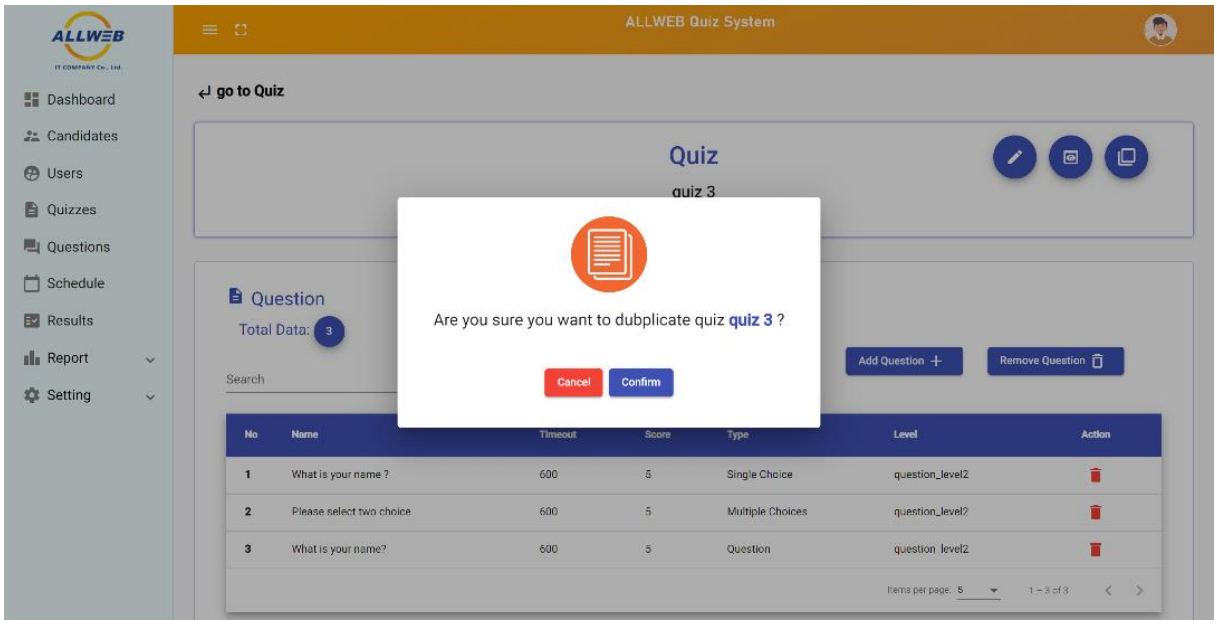

Figure 57: confirm dubplicate quiz dialog

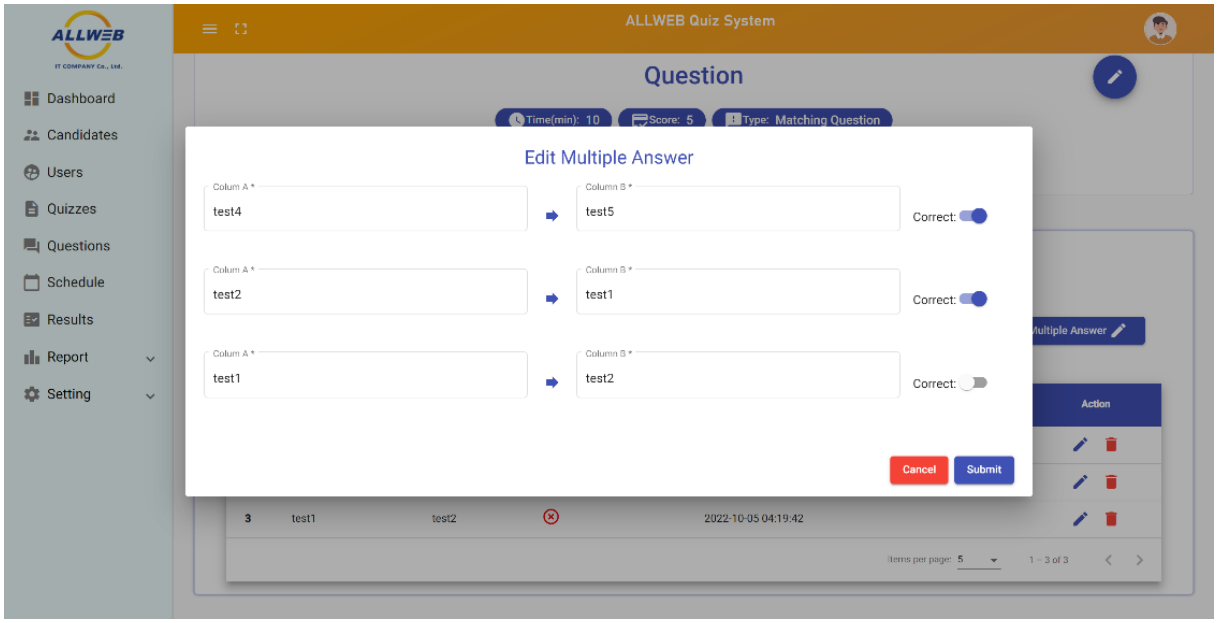

Figure 58: Edit multiple answer