

Java Quiz App

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CHAPTER 1

INTRODUCTION

This project is a dynamic Java-based quiz application designed to provide a user-friendly platform for learning and testing Java programming skills. The application caters to both users and administrators with distinct functionalities.

For users, the application offers various Java topics, each categorized into three levels: Beginner, Intermediate, and Advanced. Each level contains quizzes with a flexible number of questions. The questions allow either single or multiple correct answers, making the quizzes diverse and challenging. Users can participate in any quiz, any number of times, and can also view their scores for continuous learning and improvement.

On the admin side, the system allows for dynamic management of quizzes. Administrators can create new quizzes, update existing ones, and view all quizzes through an easy-to-use interface.

The project is built with a clean and intuitive UI, leveraging JSP, CSS, and JavaScript for the frontend, and Servlets and MySQL for the backend. The development was carried out in Eclipse, making use of its robust features for Java development.

This quiz app serves as an efficient educational tool for both learners and administrators, promoting interactive learning while offering comprehensive quiz management capabilities.

CHAPTER 2

DESIGN

2.1 Block Diagram

The Java Quiz App has two types of users: 'User' and 'Admin.'

For User:

1. The user opens the web application and sees a homepage that explains the website's purpose.
2. To take quizzes, the user must sign up by providing basic details.
3. After signing up, the user is redirected to the login page.
4. The user enters valid credentials on the login page to access the quiz list page.
5. On the quiz list page, the user can filter quizzes by:
 - Topic name
 - Difficulty level
 - Quiz name
6. The user can also access the dashboard, which displays all available topics for topic-wise quiz selection.
7. Upon starting a quiz, the user is presented with questions, each having a time limit set by the admin.
8. Questions may be:
 - Single-select
 - Multiple-select
9. If the user selects the correct answer:
 - It is highlighted in **green**.
10. If the user selects the wrong answer:
 - It is highlighted in **red**.
11. After selecting an answer, the user presses the **Next** button before the time runs out.
12. Upon completing all questions, the user receives:
 - A score
 - A percentage
13. The user can:
 - Retake the quiz by clicking the **Restart Quiz button**.
 - Explore more quizzes by clicking the **Explore More Quizzes** button.

For Admin:

1. The admin logs in to the website.
2. After a successful login, the admin is redirected to the admin homepage.
3. From the homepage, the admin can:
 - Insert a new topic.
 - Create a new quiz by opening the **Create Quiz** page.
 - Update an existing quiz by accessing the **Update Quiz** page.

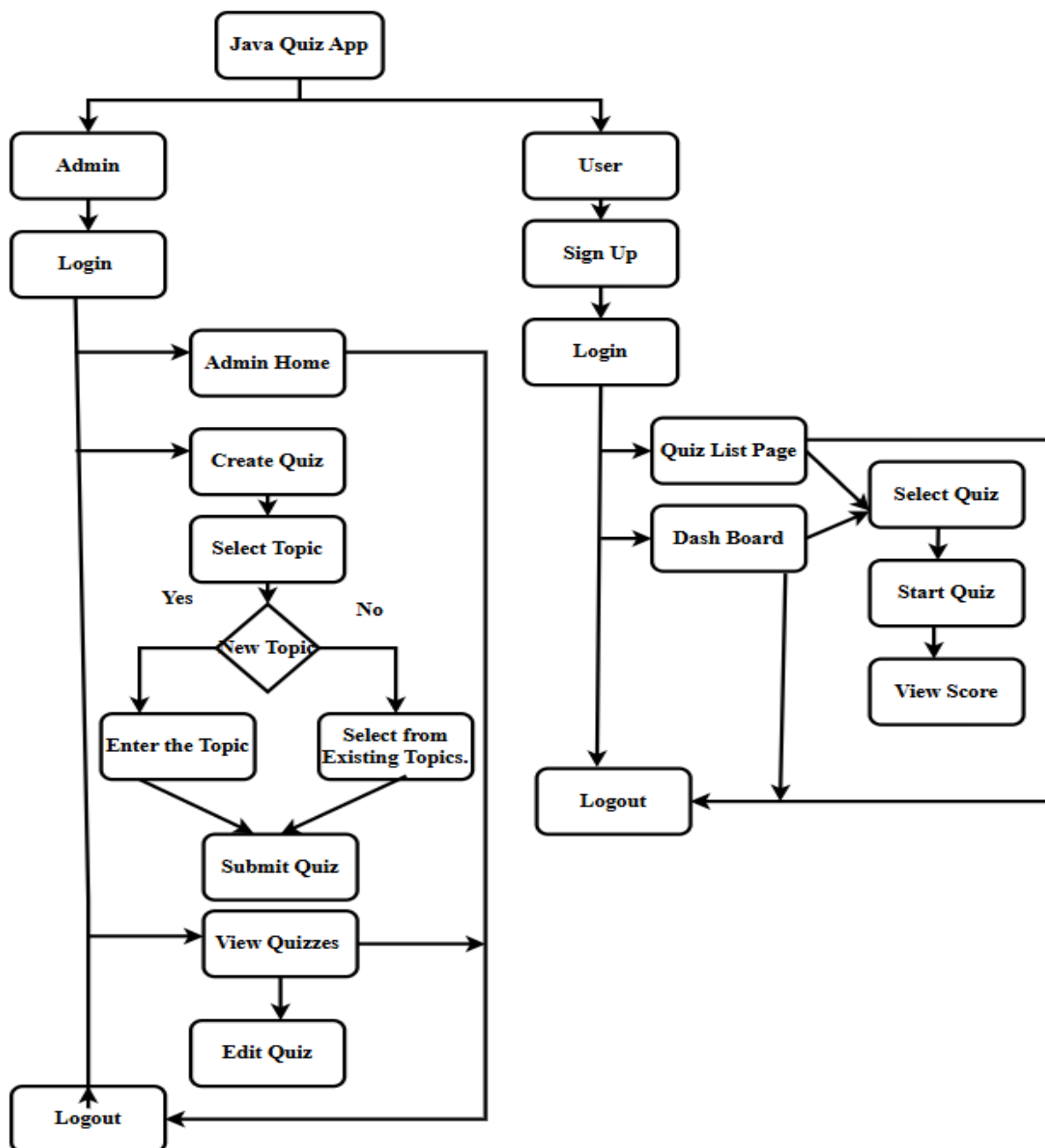


Figure (2.1): Java Quiz App Block Diagram

2.2 Database Dictionary

1.User

This is the user table. When a user provides their details during sign-up, the data is stored in this table. The **User_id** serves as the primary key.

Table 2.2.1: User Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	user_id	int(10)		No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2	user_name	varchar(50)	utf8mb4_general_ci	No	None			Change Drop More
<input type="checkbox"/>	3	email	varchar(50)	utf8mb4_general_ci	No	None			Change Drop More
<input type="checkbox"/>	4	password	varchar(100)	utf8mb4_general_ci	No	None			Change Drop More
<input type="checkbox"/>	5	phone_no	varchar(50)	utf8mb4_general_ci	No	None			Change Drop More

2.Topic

Java topics will be stored in this table. An admin can create a quiz by selecting any of the topics listed in this table. If the admin wants to add a new topic, they can insert it through the corresponding page, and the topic name entered will be stored in this table. The admin can then use that topic to create a quiz. The **topic_id** is the primary key and will act as a foreign key in the quiz table.

Table 2.2.2: Topic Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1	topic_id	int(5)		No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2	topic_name	varchar(30)	utf8mb4_general_ci	No	None			Change Drop More

3.Quiz

This is the Quiz table, which contains the following attributes:

- **topic_id**: A foreign key referencing the topic table.
- **quiz_id**: The primary key, which will be used as a foreign key in the question table.
- **quiz_name**: Stores the name of the quiz.
- **difficulty**: Represents the difficulty level of the quiz.

Table 2.2.3: Quiz Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1 quiz_id	int(10)			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2 topic_id	int(10)			No	None			Change Drop More
<input type="checkbox"/>	3 quiz_name	varchar(50)	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	4 difficulty	varchar(30)	utf8mb4_general_ci		No	None			Change Drop More

4.Question_Type

The questions in a quiz can be of various types, such as single-select or multiple-select, etc. Based on the **question_type**, the admin will be able to provide the appropriate options. Here, **question_type_id** is the primary key, and it will serve as a foreign key in the question table.

Table 2.2.4: Question_Type Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1 question_type_id	int(10)			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2 type_name	varchar(50)	utf8mb4_general_ci		No	None			Change Drop More

5.Question

This table stores questions. The attributes are as follows:

- **question_id**: The primary key, which acts as a foreign key in the option and answer tables.
- **quiz_id**: A foreign key from the quiz table, indicating which quiz the question belongs to.
- **question_text**: Contains the text of the question.
- **question_type_id**: A foreign key from the question_type table, specifying the type of question.
- **time**: Indicates the time (in seconds) allocated for answering the question. This field allows the admin to set a dynamic time limit for each question, which will be visible to the user on the screen.

Table 2.2.5: Question Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1 question_id	int(10)			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2 quiz_id	int(10)			No	None			Change Drop More
<input type="checkbox"/>	3 question_text	text	utf8mb4_general_ci		No	None			Change Drop More
<input type="checkbox"/>	4 question_type_id	int(10)			No	None			Change Drop More
<input type="checkbox"/>	5 Time	int(20)			Yes	NULL			Change Drop More

6.Option

For each question, there can be any number of options. This table allows the admin to enter multiple options for a question. The attributes are as follows:

- **option_id**: The primary key, which acts as a foreign key in the answer table.
- **question_id**: A foreign key from the question table, linking the option to its corresponding question.
- **option_text**: Contains the text of the option.

Table 2.2.6: Option Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1 option_id	int(10)			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2 question_id	int(10)			No	None			Change Drop More
<input type="checkbox"/>	3 option_text	varchar(255)	utf8mb4_general_ci		No	None			Change Drop More

7.Answer

Each question may have either a single answer or multiple answers. This table stores the answers and includes the following attributes:

- **question_id**: A foreign key from the question table, linking the answer to the corresponding question.
- **option_id**: A foreign key from the option table, indicating the correct option for the question.

Table 2.2.7: Answer Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1 answer_id	int(10)			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2 question_id	int(10)			No	None			Change Drop More
<input type="checkbox"/>	3 option_id	int(10)			No	None			Change Drop More

8.Admin

This table is used to store the admin values.

Table .2.7: Admin Table

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
<input type="checkbox"/>	1 admin_id	int(5)			No	None		AUTO_INCREMENT	Change Drop More
<input type="checkbox"/>	2 user_name	varchar(50)	utf8mb4_general_ci		Yes	NULL			Change Drop More
<input type="checkbox"/>	3 password	varchar(100)	utf8mb4_general_ci		Yes	NULL			Change Drop More

CHAPTER 3

TECHNOLOGY USED

- **Java Server Pages (JSP):**

JSP is used for creating dynamic web pages and rendering the user interface. It allows embedding Java code in HTML pages to generate content dynamically based on user interactions and server-side logic.

- **Cascading Style Sheets (CSS):**

CSS is utilized to style the web pages, providing a clean and visually appealing design. It is used to define the layout, color schemes, fonts, and overall presentation of the application.

- **JavaScript:**

JavaScript is employed to enhance user interactivity and provide client-side scripting. It handles user interactions, validates form inputs, and manages dynamic content updates without requiring page reloads.

- **Servlets:**

Servlets are used for handling server-side logic. They process incoming requests, manage sessions, and interact with the database. Servlets are responsible for processing user inputs, managing quizzes, and providing data to JSP pages.

- **MySQL:**

MySQL is the relational database management system used for storing and managing application data. It holds information about users, quizzes, questions, options, and answers, ensuring data integrity and efficient retrieval.

- **Eclipse:**

Eclipse is the integrated development environment (IDE) used for developing the application. It provides tools for coding, debugging, and testing Java applications, streamlining the development process and enhancing productivity.

CHAPTER 4

RESULTS

4.1 Java Quiz App Home page

Below is the home page of the Java Quiz App. When a user clicks on "Get Started," they will be redirected to the signup page, where they need to register.

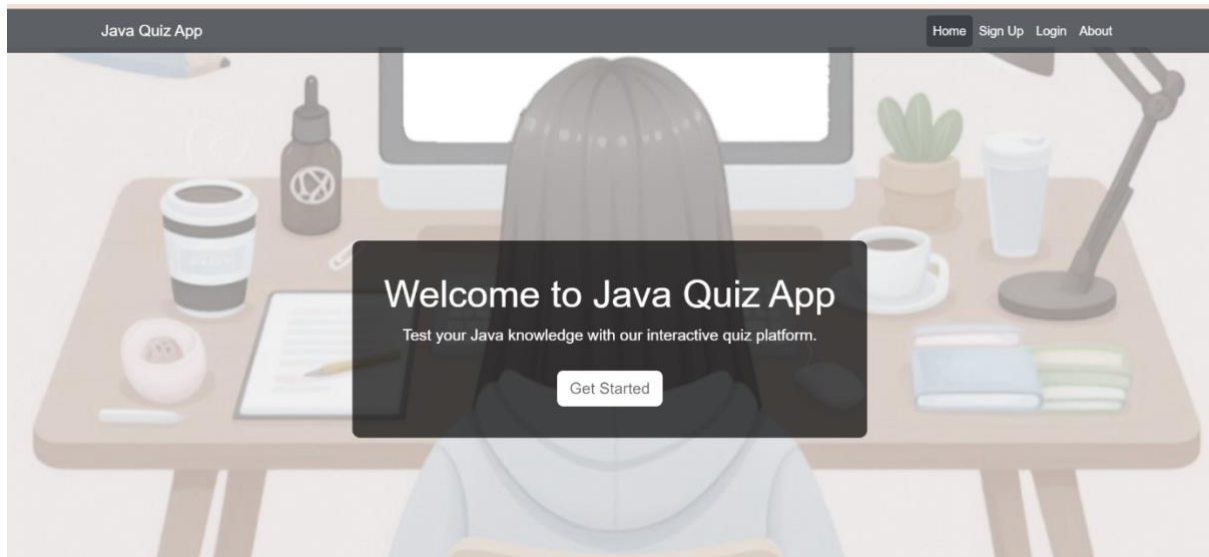


Figure (4.1): Java Quiz App Home page

4.2 Java Quiz App About page

The figure below (Figure 4.2) shows the About page of the Java Quiz App, which provides basic information about the application.

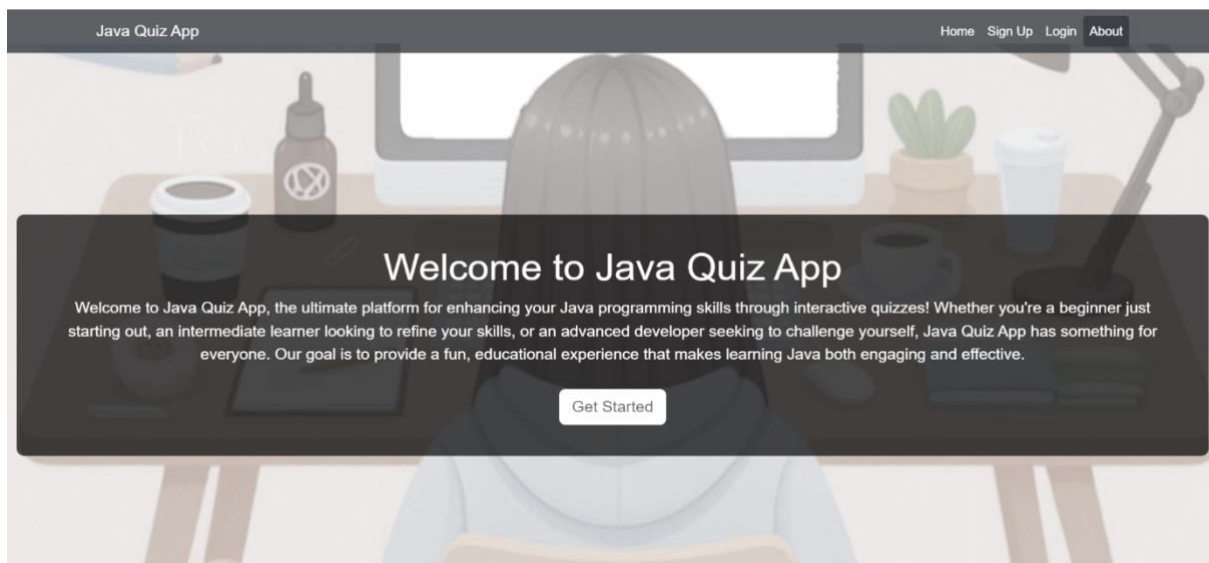


Figure (4.2): Java Quiz App About page

4.2 Java Quiz App Sign Up page

The figure below shows the Sign-Up page. On this page, users need to provide their details. There are several validations in place, such as email format, phone number format, and password validation.

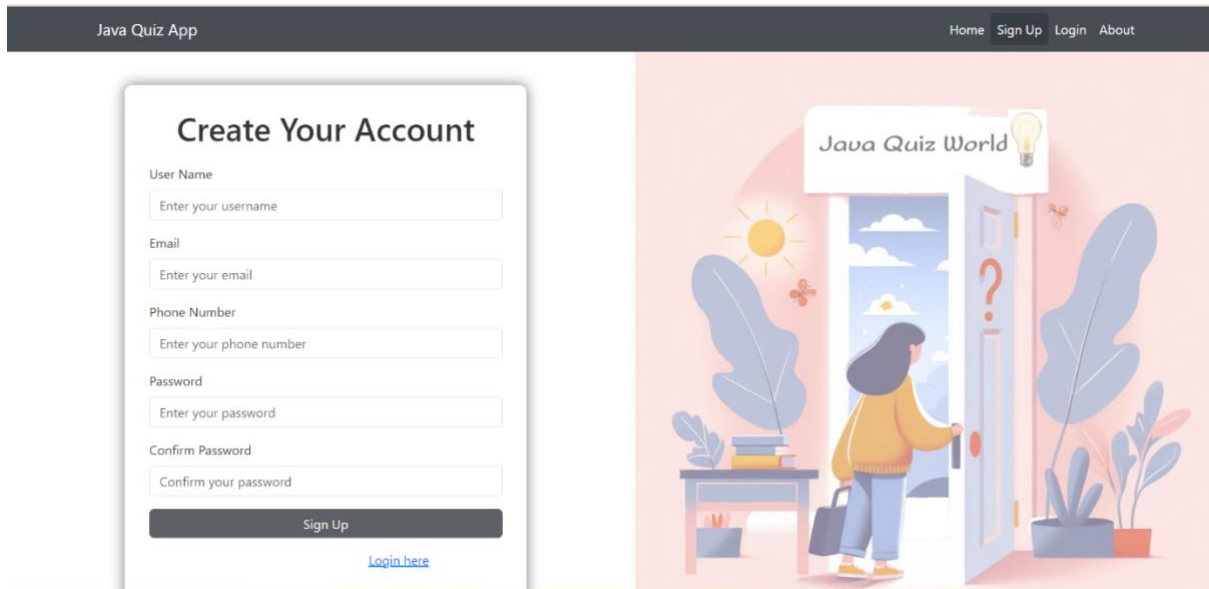


Figure (4.3): Java Quiz App Sign Up page

If you look at the figure below (Figure 4.3.1), it shows a message for the password: "Password must be at least 6 characters long, contain at least one number, and one special character." Figure 4.3.2 illustrates the "Passwords do not match" message, which appears when the confirm password does not match the entered password.

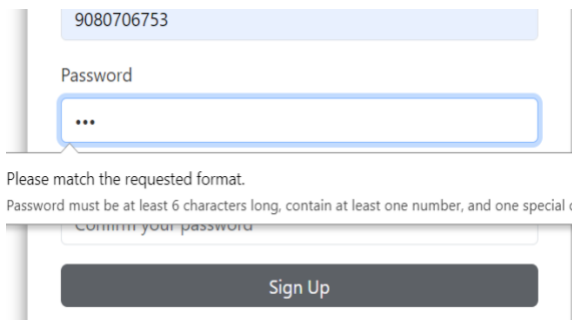
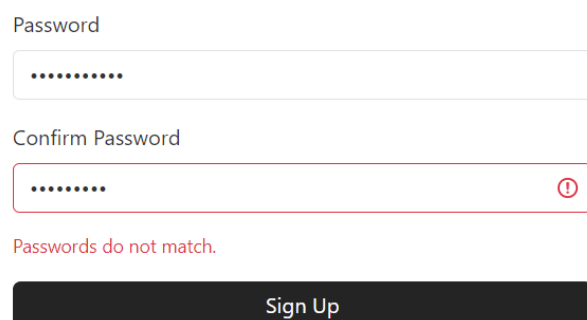
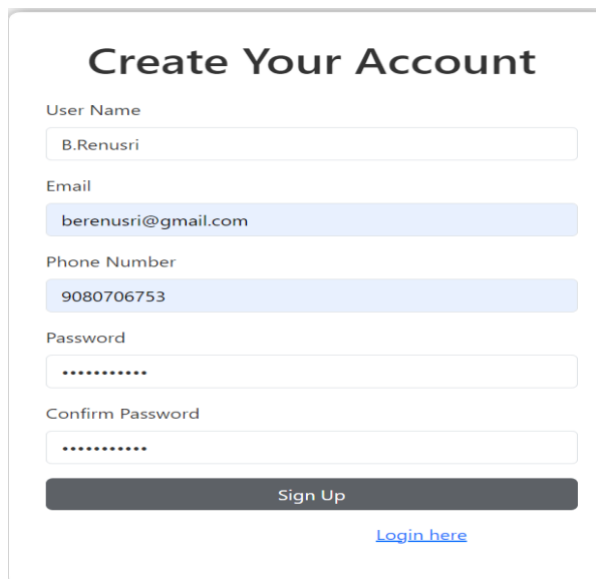


Figure (4.3.1): password validation



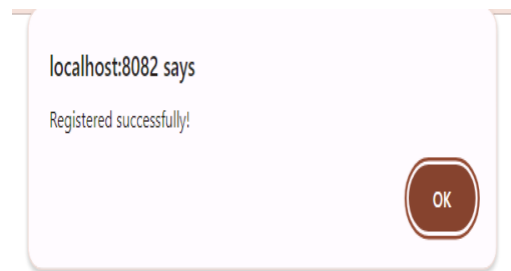
Figure(4.3.2):password not match

After entering valid values, as shown in Figure 4.3.3, when the user clicks on "Sign Up," an alert message, as shown in Figure 4.3.4, will appear. The user is then redirected to the login page.



The image shows a web form titled "Create Your Account". It contains five input fields: "User Name" with the value "B.Renusri", "Email" with "berenusri@gmail.com", "Phone Number" with "9080706753", "Password" with masked characters "*****", and "Confirm Password" also with "*****". Below the fields is a dark "Sign Up" button and a blue link "Login here".

Figure(4.3.3):Giving values in Sign up page.



Figure(4.3.4):Registered Successfully.

4.4 Java Quiz App Login page

The figure below (Figure 4.4) shows the login page, where users need to enter valid credentials. If a user provides incorrect information, a message will appear, as shown in Figure 4.4.1, stating "Invalid username or password." After entering valid credentials, the user will be redirected to the Quiz List page.

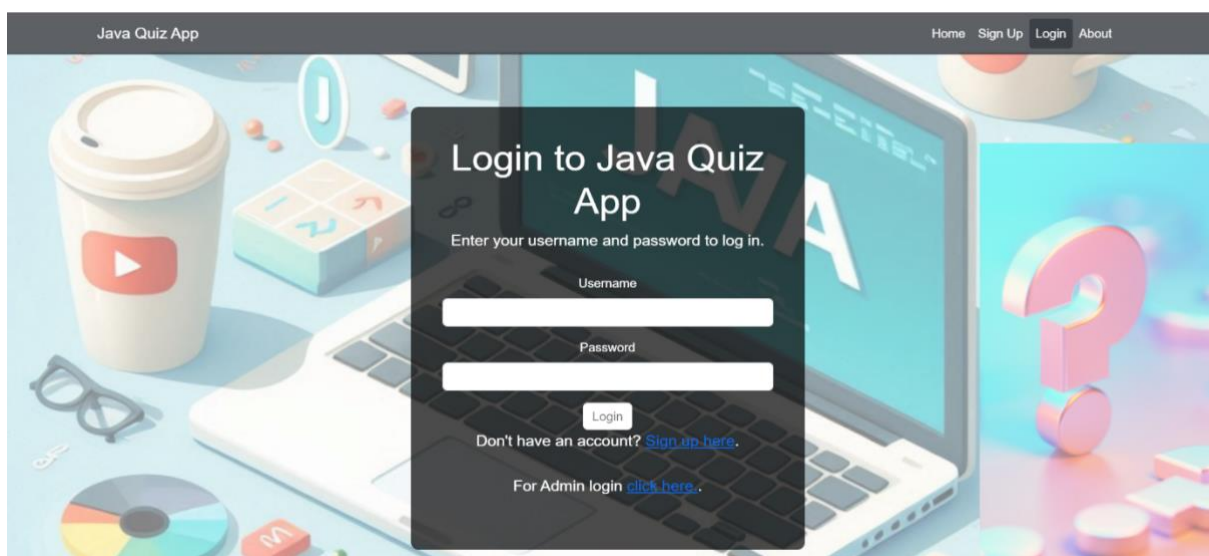


Figure (4.4): Java Quiz App Login page

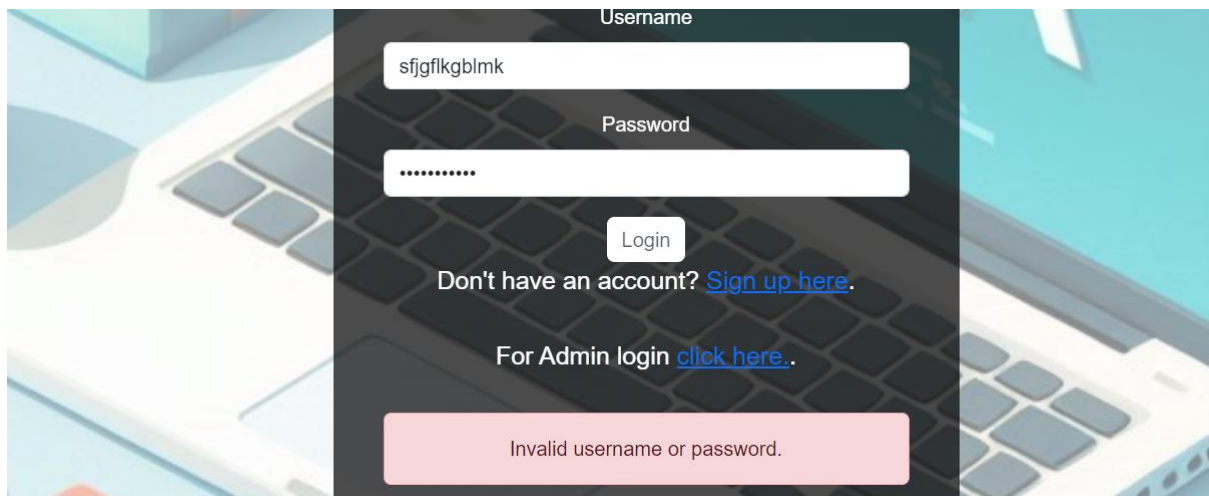


Figure (4.4.1): Invalid user Name or Password

4.5 Java Quiz App Quiz List page

After a successful login, the user will be redirected to the page shown below. It contains a list of all available quizzes. Users can filter quizzes by quiz name, topic name, and difficulty, as shown in Figure 4.5. When the user clicks on "View Quiz," the quiz will begin.

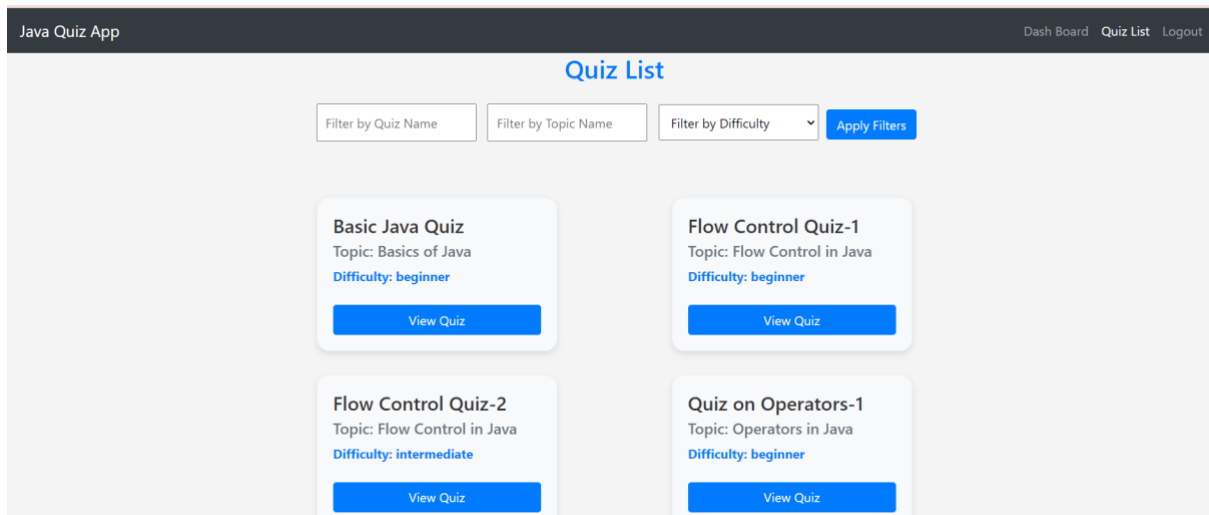


Figure (4.5): Java Quiz App Quiz List page

4.6 Java Quiz App Dash board page

The figure (4.6) shows the dashboard page, where all the topics are displayed along with the three difficulty levels: Beginner, Intermediate, and Advanced. When a user selects any quiz under a specific topic and difficulty level, they will be redirected to that particular quiz.



Figure (4.6): Java Quiz App Dash board page

4.7 Questions in Quiz

As shown in the figure below, the quiz questions will be displayed. When a user selects the correct option, it will be highlighted in green, as shown in Figure 4.7.1. If the user selects the wrong option, it will be highlighted in red, as shown in Figure 4.7.2. After selecting an option, the user must click the "Next" button before the time runs out. The time is dynamically set by the admin for each question.

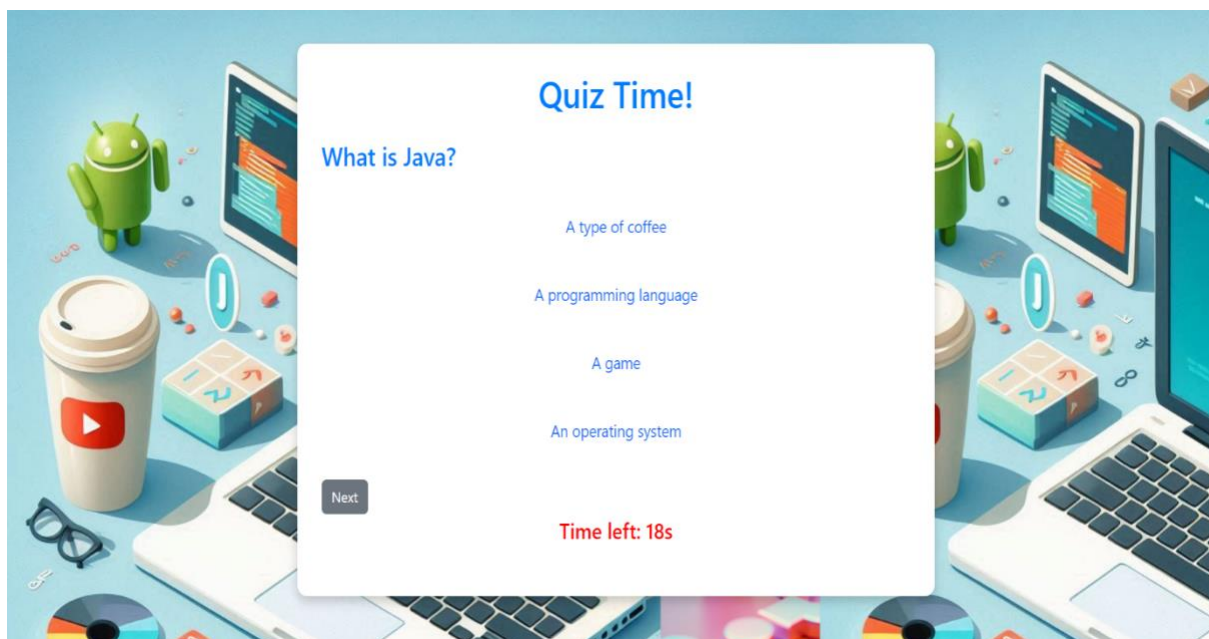


Figure (4.7): A question in quiz

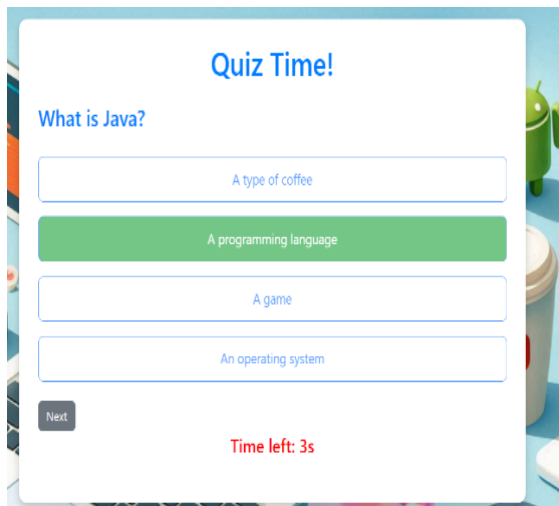


Figure (4.7.1): Correct answer representation

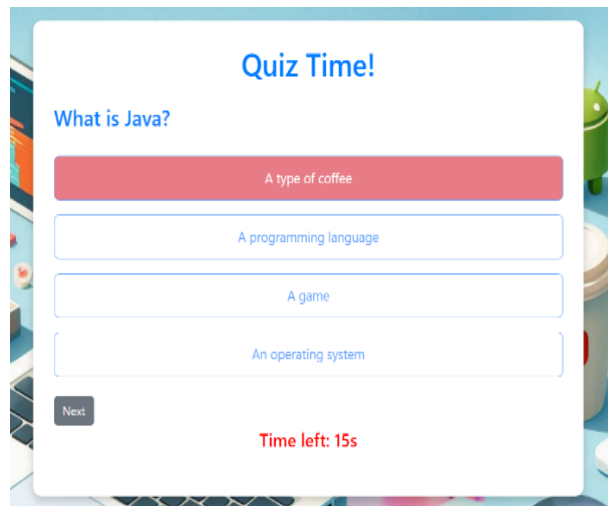


Figure (4.7.2): Wrong Answer representation

4.8 Quiz Result page

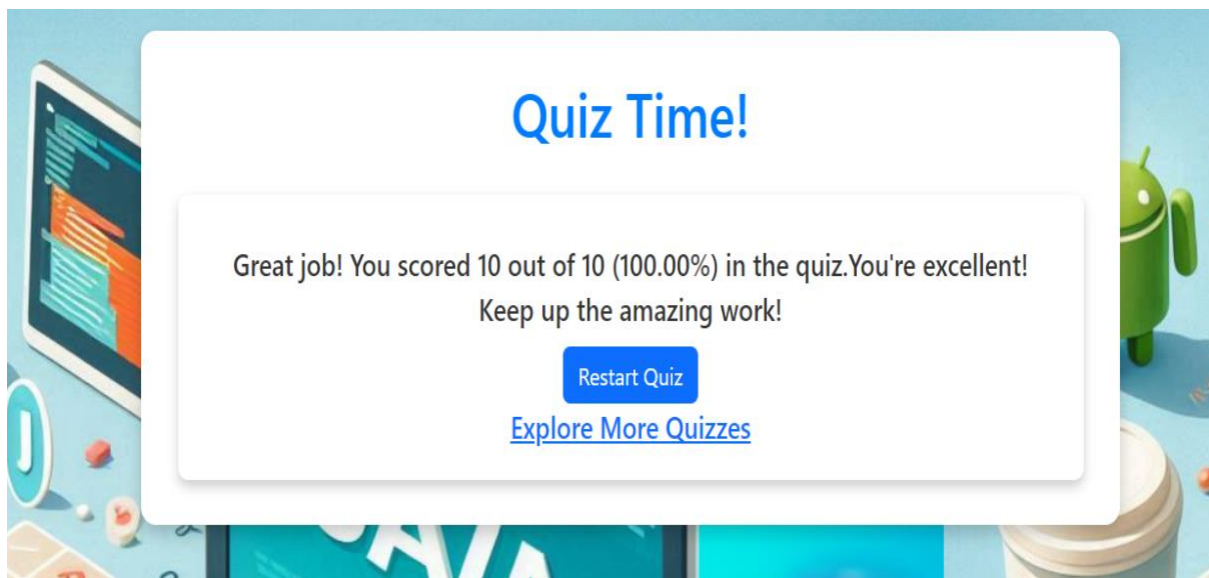


Figure (4.8): Quiz Result page

4.9 Admin Home Page

The figure below (Figure 4.9) shows the admin home page, which is displayed after a successful login. From this page, the admin can insert a new topic by clicking the "Insert Topic" button. If the admin wants to insert a quiz, they can click the "Get Started" button or use the "Create Quiz" link in the navigation bar.

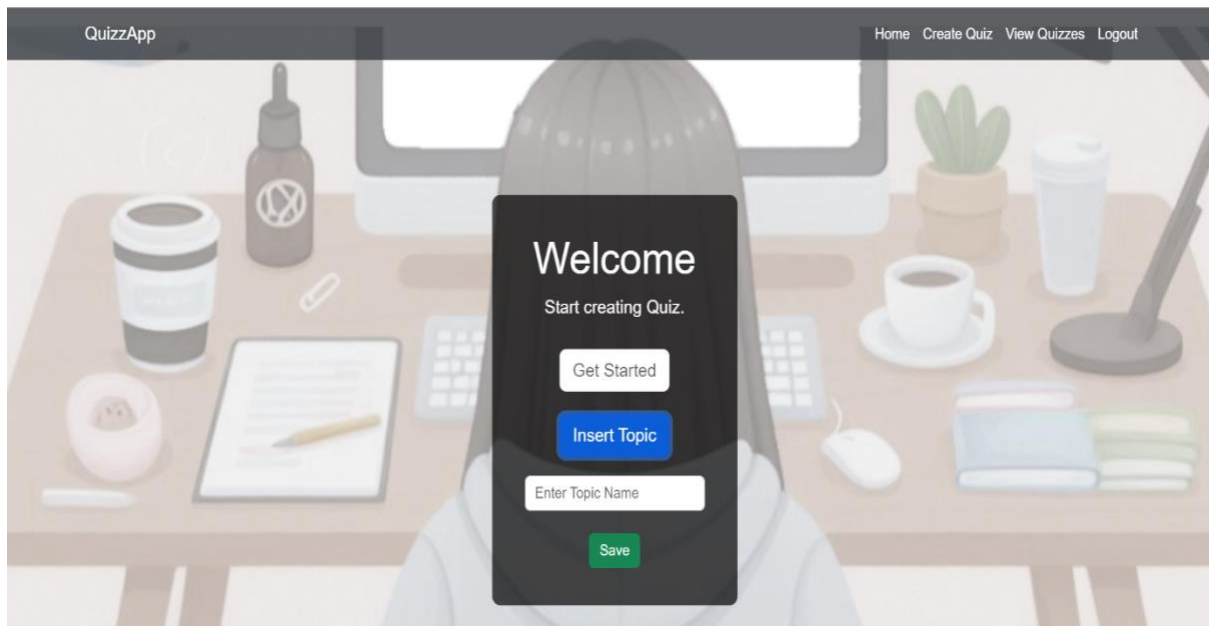


Figure (4.9): Admin Home Page

4.10 Create Quiz Page

This page allows the admin to create a quiz. As shown in Figure 4.10.1, the admin can select any of the topics present in the database. If a new topic is needed, it should be added from the home page. The admin can also select the difficulty level of the quiz, as shown in Figure 4.10.2. After entering the topic, quiz name, and difficulty, an "Add Question" button will appear, as shown in Figure 4.10.3.

Figure (4.10): Create Quiz Page

Create a Quiz

Select Topic:

Select a topic

Select a topic

Basics of Java

Flow Control in Java

Operators in Java

Strings in Java

Arraya in Java

OOPS in Java

Inheritance in Java

Abstraction in Java

Polymorphism in Java

Encapsulation in Java

Methods in Java

Constructors in Java

Interfaces in Java

Figure (4.10.1): Selecting topic

Create a Quiz

Select Topic:

Inheritance in Java

Quiz Name:

Java Inheritance Quiz-1

Select Difficulty:

Select difficulty

Select difficulty

Easy

Medium

Hard

Figure (4.10.2): Selecting difficulty

Create a Quiz

Select Topic:

Quiz Name:

Select Difficulty:

Figure (4.10.3): Add Question

When the "Add Question" button is clicked, fields will appear to enter the question, options, and time. If the question type is single selection, radio buttons will be provided to select one correct option, as shown in Figure 4.10.4. If the question type is multiple selection, checkboxes will be provided to select multiple correct options, as shown in Figure 4.10.5. To remove a question, the admin can use the "Remove Question" button.

Question Type:

Select question type
☒ Single Selection
☐ Multiple Selection

Options:

Correct Options:

☐ A way to create new classes from existing classes

☐ A way to duplicate classes

☐ A way to protect data in a class

☐ A method to override functionality

Figure (4.10.4): Single Selective Question type

Question type:

Multiple Selection

Question:

What is a superclass in Java?

Options:

A class that cannot be extended

Add More Options

A class that is inherited by another class

A class that has no constructor

Correct Options:

☐ A class that cannot be extended

☐ A class that is inherited by another class

☐ A class that has no constructor

Time (in seconds):

Enter time in seconds

Figure (4.10.4): Multi Selective Question type

After entering all the questions and clicking on "Submit Quiz," an alert will appear with the message "Quiz inserted successfully!" as shown in Figure 4.10.5.

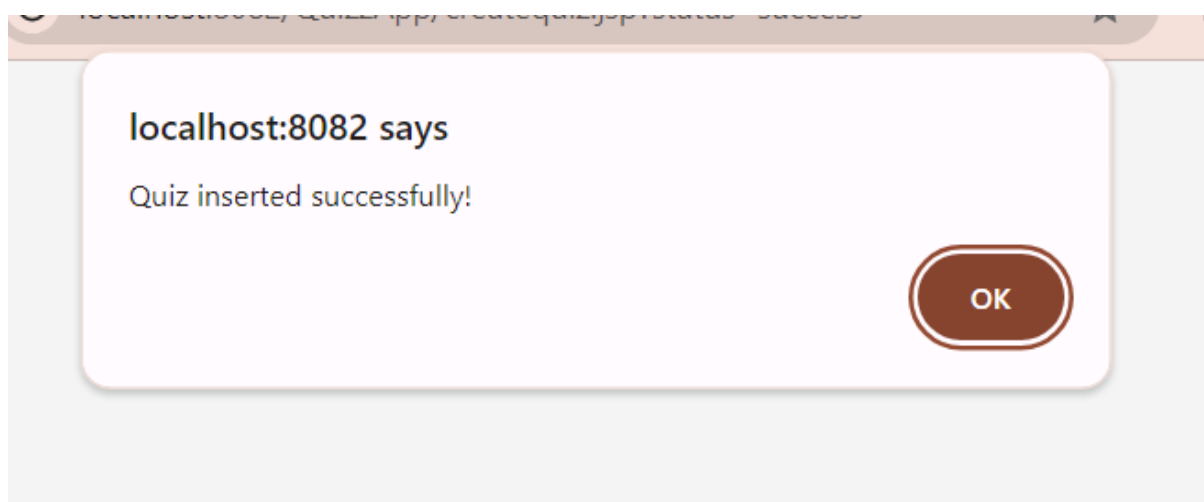


Figure (4.10.5): Quiz Inserted successfully

4.11 Admin viewing quiz

The admin can view a quiz based on its ID, as shown in Figure 4.11. To edit questions, the admin can click on the "Edit" button, as depicted in Figure 4.11.1.

Java Quiz App

[Home](#)
[Create Quiz](#)
[View Quizzes](#)
[Logout](#)

Quiz Details - 1

Quiz ID: 1

Basic Java Quiz

Question ID: 1

Question Text: What is Java?

Type Name: single selection

Time (seconds): 20

Options:

Option ID: 1

Option Text: A type of coffee

Is Correct: No

Option ID: 2

Option Text: A programming language

Is Correct: Yes

Option ID: 3

Option Text: A game

Is Correct: No

Figure(4.11): Admin viewing quiz

Is Correct: No

Edit

Edit Question

Question Text:

What is Java?

Type Name:

single selection

Time (seconds):

20

Edit Options:

Option Text:

A type of coffee

☒ Correct Option

Option Text:

A programming language

☒ Correct Option

Option Text:

Figure (4.11.1): Admin editing quiz

Chapter 5

Conclusion

The Java Quiz App is a dynamic and user-friendly application designed to facilitate learning and testing of Java programming skills. It serves both users and administrators with distinct functionalities tailored to their needs.

For users, the application provides a comprehensive platform to explore Java topics categorized into Beginner, Intermediate, and Advanced levels. Users can engage with diverse quizzes featuring single-select and multiple-select questions, each with a time limit set by the admin. The ability to participate in quizzes multiple times and view scores enhances continuous learning and self-improvement.

Administrators benefit from robust management features that allow for the creation, updating, and viewing of quizzes through an intuitive interface. The ability to dynamically manage quiz content and topics ensures that the application remains relevant and effective for users.

Built using JSP, CSS, and JavaScript for the frontend and Servlets and MySQL for the backend, the project leverages Eclipse for development, ensuring a reliable and efficient development process. The clean and intuitive UI, combined with comprehensive quiz management capabilities, makes the Java Quiz App a valuable educational tool for both learners and administrators.

Chapter 6

REFERENCES

- **ChatGPT:**
Provided assistance and guidance throughout the project development.
- **Microsoft Edge Copilot:**
Assisted with various aspects of web development and content creation.
- **Microsoft Bing Image Generator:**
Utilized for generating images used on the website.
- **Gemini:**
Contributed to the overall project research and development.
- **Block Box:**
Supported in coding and troubleshooting throughout the project.
- **Stack Overflow:**
Served as a valuable resource for resolving technical queries and programming issues.