RAJALAKSHMI
ENGINEERING COLLEGE
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QUIZ MANAGEMENT SYSTEM

CS23333 – Introduction to OOPS and JAVA Project Report

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RAJALAKSHMI ENGINEERING COLLEGE

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INTERNAL EXAMINAR

EXTERNAL EXAMINAR

ABSTRACT:

The Quiz Management System is a digital platform designed to streamline the creation, administration, and evaluation of quizzes in educational and professional settings. This system allows educators, trainers, and administrators to efficiently manage question banks, create quizzes, set time limits, and automate grading. Through user-friendly interfaces, quiz participants can engage with various question types, such as multiple-choice, true/false, and short answer questions. The system also includes robust analytics, providing insights into individual and group performance, which aids in identifying knowledge gaps and enhancing learning outcomes. Additionally, the system supports secure login, data encryption, and role-based access to ensure a safe and controlled environment. By automating quiz processes and providing detailed reporting, the Quiz Management System enhances productivity and the learning experience, making it an essential tool for modern education and training programs.

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1.1 Introduction:

The Quiz Management System makes quiz management more efficient, accurate, and accessible, transforming it into a valuable tool for modern education and training. A Quiz Management System is a digital solution developed to simplify and enhance the process of creating, conducting, and managing quizzes and assessments. In educational institutions, corporate training, and online learning platforms, quizzes play a crucial role in evaluating participants' understanding and retention of material. Traditional quiz creation and grading methods can be time-consuming, prone to errors, and challenging to scale. This system addresses these issues by automating tasks, offering real-time data, and enabling convenient access for both administrators and participants. The Quiz Management System typically includes features for question bank management, allowing educators to store and organize a wide range of questions. It supports different question formats, such as multiple-choice, true/false, and short-answer questions, ensuring flexibility to suit various topics and assessment styles. Administrators can configure quizzes by selecting questions, setting time limits, and

adjusting the difficulty level. Additionally, the system offers automated grading, reducing administrative overhead and providing participants with instant feedback.
With analytics and reporting features, the Quiz Management System offers insights into individual and group performance, helping educators and trainers pinpoint areas where learners may need additional support. Security features, like encrypted data and secure logins, protect user data and maintain the integrity of the assessment process. By digitizing and automating these functions, the Quiz Management System makes quiz management more efficient, accurate, and accessible, transforming it into a valuable tool for modern education and training.

1.2Purpose:

The primary purpose of a Quiz Management System is to facilitate the efficient creation, distribution, and evaluation of quizzes and assessments across educational and training environments. Key purposes include:

Streamlining Quiz Creation: Simplifies the development of quizzes by allowing educators and administrators to create, store, and reuse questions from a centralized question bank. It supports a variety of question formats, enabling diverse and customizable assessments.
Automating Grading and Feedback: Reduces the time and effort needed to grade assessments manually by automatically scoring responses. This enables participants to receive instant feedback, which enhances their learning experience.

1.3 Scope of the Project:

The envisioned quiz management System aims to seamlessly interact with administrators and effectively fulfil all proposed functionalities. Built on Java (JDBC) with a MYSQL database, the system ensures efficient management of user

details, reducing response time for user queries. This project addresses the complexities associated with manual data processes, storing comprehensive information about score, identification and basic details.

1.4 Software Requirement Specification:

Introduction: The quiz management system designed to manage all aspects of user data, including identification details and grade reports. Document Purpose: This SRS document outlines the software requirements for the Quiz management System covering design decisions, architectural design, and detailed design necessary for successful implementation. It offers insight into the system's structure and provides information crucial for ongoing software support. Product Scope: The Quiz Mangement System is developed for widespread use, aiming to replace outdated quiz -based evaluation systems.

Overall Description:

The Student Information System provides authorized users with seamless access to student records, streamlining the evaluation process for grade and necessary details in the academic environment. The system simplifies the work of academic supervisors, other educational faculties like teachers, counsellors and student along with parents.

Product Perspective:

Utilizing a client/server architecture, the system is designed to be compatible with the Microsoft Windows Operating System. The front end is developed using Java in Visual Code, while the backend leverages the MySQL server for efficient data management.

Product Functionality:

1. User Management

- Role-Based Access: Define roles for different users (Admin, Instructor, Student).
- User Registration & Login: Secure login and registration for new users.
- Profile Management: Allow users to update their profile details and settings.
- Permissions Control: Set specific permissions based on user roles

2. Quiz Creation and Setup

- Quiz Builder Interface: User-friendly interface for creating quizzes.
- Question Types: Support for multiple question formats such as:
  - MultipleChoice(Single/MultipleAnswers)
  - True/False
  - ShortAnswer
  - MatchingorOrdering
  - EssayorLong-Answer
- Question Bank: Store reusable questions organized by tags, topics, or difficulty.
- Randomization: Shuffle questions or answers to reduce cheating.
- Timed Quizzes: Ability to set time limits for quiz completion.
- Custom Scoring: Define scoring per question and grading rules.

3. Quiz Assignment and Scheduling

- Assign Quizzes to Users/Groups: Specify which users or groups can access each quiz.
- Availability Settings: Set start and end dates/times for when the quiz is available.
- Access Control: Restrict access by IP or location, if necessary.

4. Quiz-Taking Interface

- Interactive Quiz Player: An intuitive interface where students can answer questions.
- Progress Tracking: Show current progress and remaining time during the quiz.

- Autosave Feature: Periodic saving of answers to prevent data loss.
- Resume Quiz: Allow students to resume in-progress quizzes (if permitted).

5. Grading and Feedback

- Automatic Grading: Auto-grade objective questions like MCQs and True/False.
- Manual Grading: Allow instructors to grade subjective questions, like essays.
- Feedback Mechanism: Provide immediate or delayed feedback on answers.
- Results and Score Display: Show scores and feedback after quiz completion, based on settings.

6. Reports and Analytics

- Performance Reports: Generate reports for individual or group performance.
- Question Analysis: Insight into question-level performance to identify trends (e.g., commonly missed questions).
- Export Results: Export quiz results and analytics in formats like CSV, Excel, or PDF.
- Progress Tracking: Monitor a student's performance over time across multiple quizzes.

7. Security Features

- Authentication and Access Control: Secure user login and account protection.
- Anti-Cheating Mechanisms: Include features like IP tracking, question randomization, and timer restrictions.
- Data Privacy and Security: Encrypt sensitive data and ensure compliance with data protection standards.

8. Administrative Tools

- Dashboard for Admins/Instructors: Overview of active quizzes, results, and user activity.
- Quiz Archiving and Deletion: Archive or delete quizzes and user data when necessary.
- Backup and Recovery: Regular data backup and recovery options to prevent data loss.

- NotificationsandReminders:Notifystudentsaboutquizavailability,due dates, and scores.

9. Integrations and Future Enhancements

- LearningManagementSystem(LMS)Integration:Optiontointegratewith LMSs like Canvas, Moodle, etc.
- GamificationFeatures:Leaderboards,achievements,andrewardsto motivate users.
- MobileCompatibility:Optimizedmobileinterfaceforbetteraccessibilityon smartphones and tablets.
- AI-DrivenRecommendations:Providepersonalizedsuggestionsforareasof improvement based on quiz performance.

User and Characteristics:
Qualification: Users should have at least basic educational qualifications, such as matriculation, and be comfortable with English.
Experience: Familiarity with the university mark evaluation process is advantageous.
Technical Experience: Users are expected to have elementary knowledge of computers for optimal system interaction.

User Management: Ability to support multiple user roles (Admin, Instructor, Student) with role-specific permissions.

Quiz Creation: The system should enable users to create quizzes with diverse question types (e.g., MCQ, True/False, short answer).

Question Bank: Must support a question library where questions can be stored, tagged, and reused across quizzes.

Quiz Scheduling and Access Control: Provides options to set quiz availability, deadlines, and assign quizzes to specific users or groups.

Automatic Grading: Capable of auto-grading objective question types (e.g., MCQs) and assigning scores.

Feedback and Reporting: Offers feedback to students on quiz performance and generates detailed reports for instructors.

Operating Environment:

Hardware Requirements:

- Processor: Any Processor over i3
- Operating System: Windows 8, 10, 11
- Processor Speed: 2.0 GHz
- RAM: 4GB
- Hard Disk: 500GB

Software Requirements:

- Database: MySQL
- Frontend: Java (SWING, AWT)
- Technology: Java (JDBC)

Constraints:

- System access limited to administrators.
- Delete operation restricted to administrators without additional checks for simplicity.
- Administrators must exercise caution during deletion to maintain data consistency.

Assumptions and Dependencies:

- System administrators create and confidentially communicate grade and student details to users.

Specific Requirements:

Hardware Interface:

- Screen resolution of at least 640 x 480 or above.
- Compatible with any version of Windows 8, 10, 11.

Software Interface:

a) MS-Windows Operating System
b) Visual Code using Java for designing the front end
c) MySQL for the backend
d) Platform: Java Language
e) Integrated Development Environment (IDE): NetBeans ?

Functional Requirements:

The **functional requirements** of a Quiz Management System (QMS) define the specific features and capabilities the system must provide to fulfill its purpose effectively. Here are the key functional requirements:

*User Management**

- **Role-Based Access Control:** Define and manage roles like Admin, Instructor, and Student, each with distinct permissions.
- **User Registration and Authentication:** Secure registration, login, and logout functions for users.
- **Profile Management:** Allow users to update personal information, reset passwords, and manage profile settings.
- **User Grouping:** Organize users into groups (e.g., classes or cohorts) for efficient quiz assignment.

*Quiz Creation and Management**

- **Quiz Builder:** An interface for instructors to create and format quizzes easily.
- **Question Types:** Support multiple question formats, including:
  - Multiple Choice (Single/Multiple Answers)
  - True/False
  - Short Answer
  - Matching or Ordering
  - Essay or Long-Answer
- **Question Bank:** Store, categorize, and retrieve questions from a central repository to reuse in multiple quizzes.
- **Randomization:** Enable randomization of question order and answer options to reduce cheating.
- **Timed Quizzes:** Set time limits for quiz completion with automatic submission when time expires.
- **Custom Scoring:** Define point values for each question, partial scoring, and negative marking if needed.

Quiz Assignment and Scheduling

- **Assignment Control:** Assign quizzes to individual students or groups based on user roles or classes.
- **Scheduling Options:** Set start and end times for quiz availability.

- **Access Control:** Define IP or location restrictions to control where and how quizzes can be accessed.

Quiz-TakingInterface

- **Interactive Quiz Player:** A user-friendly interface where students can answer questions and navigate through the quiz.
- **Progress Tracking:** Display current progress, completed questions, and remaining time.
- **Autosave Responses:** Periodically save responses automatically to prevent data loss.
- **Pause and Resume:** Allow students to pause and resume quizzes if permitted by the instructor.

Grading and Feedback

- **Automatic Grading:** Auto-grade objective question types like multiple-choice and true/false.
- **Manual Grading:** Allow instructors to grade subjective responses like essays.
- **Instant and Delayed Feedback:** Provide feedback immediately upon quiz completion or at a later time, as configured by the instructor.
- **Score Display:** Display scores and performance summaries after the quiz, based on instructor preferences.

6. **Reporting and Analytics**

- **Performance Reports:** Generate individual, class, and quiz-level reports on performance, accuracy, and completion times.
- **Question Analysis:** Analyze questions to identify commonly missed or frequently answered questions.
- **Export Data:** Export quiz results and analytics in formats like CSV, PDF, or Excel for external analysis.

Non-functional Requirements:

The **non-functional requirements** of a Quiz Management System outline the quality attributes that ensure the system's usability, reliability, performance, and maintainability. Here's a breakdown of the non-functional requirements for a Quiz Management System:

1. **Performance**

- **Response Time:** The system should provide real-time responses with minimal delay, especially during quiz creation, question selection, and quiz-taking processes.
- **Scalability:** The system should handle a large number of concurrent users, particularly during peak times, without significant performance degradation.
- **Load Management:** Should efficiently manage server load during high-traffic periods (e.g., multiple users taking a quiz simultaneously).

2. **Reliability**

- **System Availability:** Ensure high availability of the system, ideally 99.9% uptime, to accommodate users from different time zones.

- **Data Accuracy:** Ensure the accuracy of quiz scores, feedback, and reports without data loss or corruption.
- **Fault Tolerance:** The system should have measures in place to recover from hardware or software failures without impacting data integrity.
- **Backup and Recovery:** Regular data backup and recovery mechanisms should be implemented to prevent data loss.

3. **Usability**
- **Ease of Use:** The user interface should be intuitive, with simple navigation, clear instructions, and tooltips to assist users.
- **Accessibility:** The system should comply with accessibility standards (e.g., WCAG 2.1) to support users with disabilities.
- **Device Compatibility:** The system should be compatible with various devices (PCs, tablets, and smartphones) and work on major browsers (Chrome, Firefox, Safari, etc.).
- **Responsive Design:** Adapt to different screen sizes to provide an optimal experience across devices.

4. **Security**
- **Authentication and Authorization:** Use secure authentication (e.g., two-factor authentication) and role-based access controls to protect user data.
- **Data Encryption:** Sensitive data (e.g., user credentials, quiz results) should be encrypted both at rest and in transit.
- **Data Privacy:** Ensure compliance with data protection regulations (e.g., GDPR) to safeguard user information.
- **Audit Logging:** Maintain a log of user actions (e.g., login, quiz submission) for tracking purposes and security audits.
- **Anti-Cheating Measures:** Implement features like question randomization, time restrictions, and IP tracking to prevent cheating.

5. **Maintainability**
- **Modular Architecture:** The system should be built in a modular way to allow easy updates and feature expansions.
- **Code Documentation:** Provide thorough documentation of code, system architecture, and configuration to aid future development.
- **Error Handling:** Robust error-handling mechanisms should be in place, with clear messages for users when errors occur.
- **Testing and QA:** Regular testing of features, including unit, integration, and system testing, should ensure quality and minimize bugs.

6. **Scalability**
- **Horizontal Scalability:** Allow the addition of servers to manage increased loads when user volume grows.
- **Database Scaling:** Support database scaling to store large volumes of data, such as quiz records and user profiles, without performance loss.

- **Elasticity:** Dynamically allocate resources during peak demand to maintain performance.

7. **Interoperability**
- **LMS Integration:** The system should support integration with Learning Management Systems (LMS) like Moodle or Canvas.
- **APIs:** Provide APIs to allow third-party applications to access and interact with the quiz data.
- **Data Export and Import:** Enable exporting and importing data in common formats (e.g., CSV, PDF) for analysis or record-keeping.

8. **Portability**
- **Cross-Platform Compatibility:** The system should work seamlessly on different operating systems (Windows, macOS, Linux).
- **Cloud Deployability:** The system should be easily deployable on cloud platforms (e.g., AWS, Azure) for scalability and reliability.

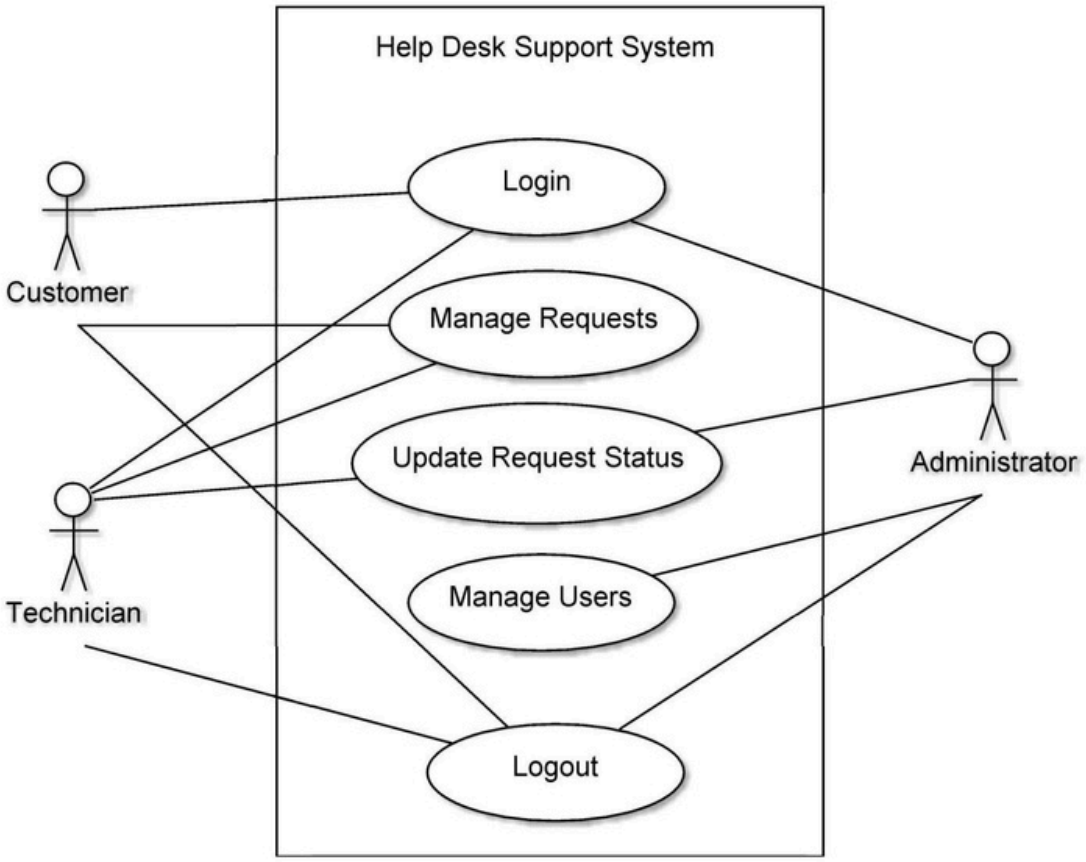
9. **Legal and Compliance**
- **Compliance with Educational Standards:** The system should follow educational technology standards, where applicable.
- **Data Protection Compliance:** Adhere to data protection and privacy regulations such as GDPR or CCPA, ensuring user data is handled securely and responsibly.

10. **Localization and Internationalization**
- **Multilingual Support:** The system should support multiple languages to accommodate users from different regions.
- **Time Zone Support:** Allow scheduling and display of quizzes according to the user's time zone.

These non-functional requirements ensure that the Quiz Management System is efficient, reliable, and user-friendly, enhancing the user experience and maintaining high standards of data security and system performance.

2 System Flow Diagram:

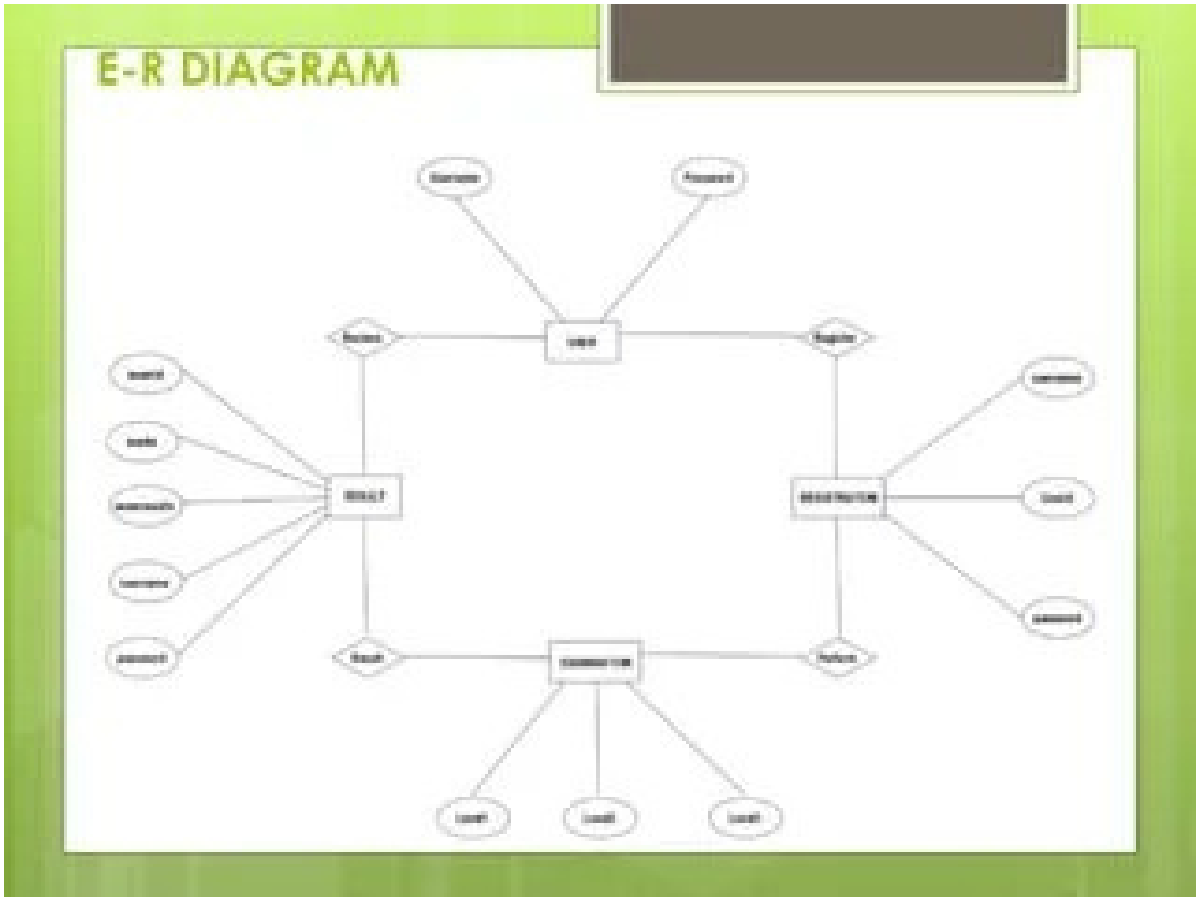
2.1. Use Case Diagram



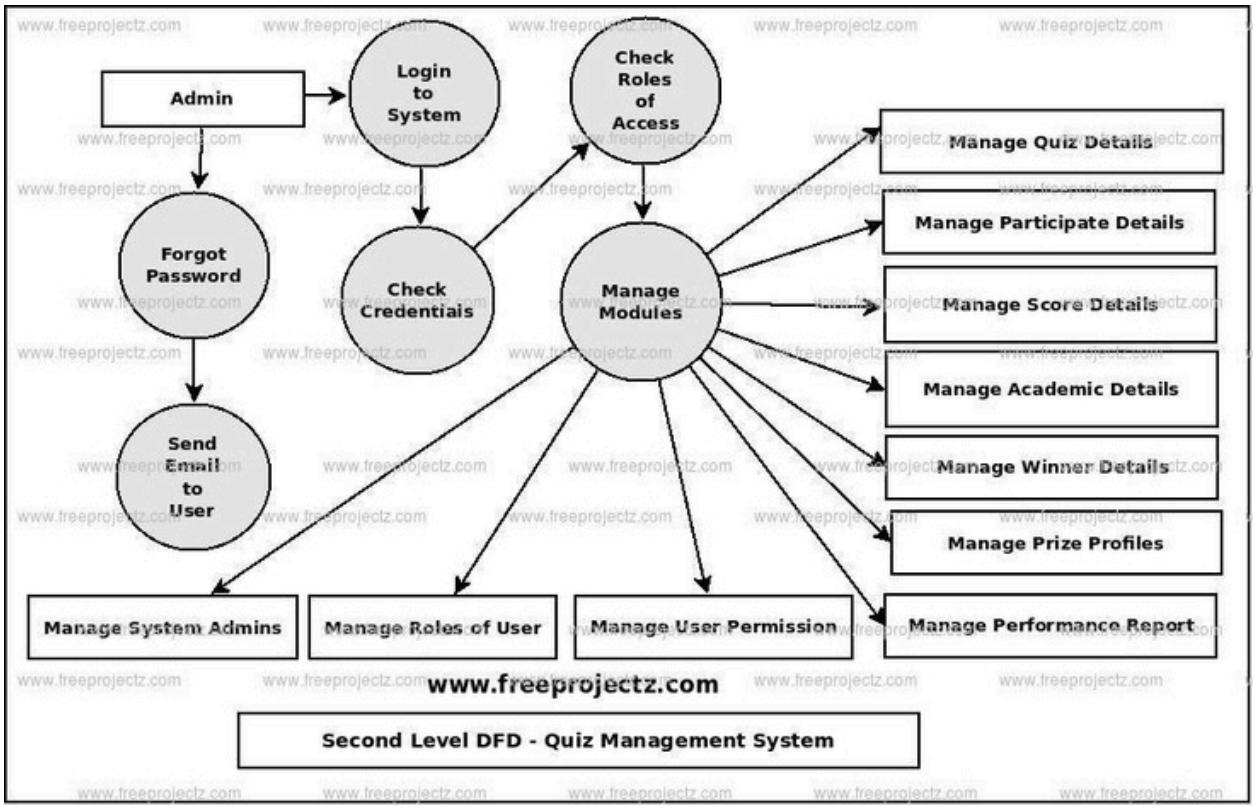
2.2. Entity - Relationship Diagram

E-R (Entity Relationship) Diagram is used to represent the relationship between entities in table.

ENTITY RELATIONSHIP DIAGRAM FOR ADMIN



2.3 DataFlow Diagram



3 Module Description:

A **Quiz Management System** can be divided into several key modules, each responsible for specific functionalities. Here's an overview of the main modules, along with their descriptions:

1. **User Management Module**
- **Description:** Manages all user-related functions, including registration, login, profile updates, and user role assignments.
- **Key Functions:**
  - Role-based access (Admin, Instructor, Student)
  - User authentication and authorization
  - Profile management (view, edit personal info)
  - Group management to organize users by classes or cohorts

2. **Quiz Creation and Management Module**
- **Description:** Enables instructors to create, edit, and manage quizzes and associated questions.
- **Key Functions:**
  - Quiz builder with a user-friendly interface
  - Support for multiple question types: MCQ, true/false, short answer, essay
  - Question bank to store and organize reusable questions
  - Question randomization and ordering
  - Quiz metadata settings (time limits, scoring rules, pass/fail criteria)

3. **Question Bank Module**
- **Description:** Centralized repository for storing and organizing questions that can be used across quizzes.
- **Key Functions:**
  - Add, edit, and delete questions
  - Organize questions by categories, tags, topics, or difficulty levels
  - Search and filter options to easily locate questions
  - Question import/export capabilities for external backup or transfer

4. **Quiz Assignment and Scheduling Module**
- **Description:** Allows instructors or admins to assign quizzes to specific users or groups and set quiz availability.
- **Key Functions:**
  - Assign quizzes to individual users, groups, or classes
  - Schedule start and end dates/times for quiz access
  - Restrict access by IP address or device type, if required
  - Enable prerequisites, such as completion of previous quizzes

5. **Quiz-Taking Module**
- **Description:** Interface for students to access, start, and submit quizzes.
- **Key Functions:**
  - User-friendly quiz player interface with navigation tools

    - Timer display and countdown functionality
    - Option to save progress and resume later (if allowed)
    - Autosave answers periodically to prevent data loss
    - Submission confirmation and final review before submission

6. **Grading and Feedback Module**
  - **Description:** Handles automated and manual grading, along with providing feedback to students.
  - **Key Functions:**
    - Automatic grading for objective question types (MCQs, true/false)
    - Manual grading interface for subjective questions (e.g., essay)
    - Calculation of final scores based on scoring rules
    - Immediate or delayed feedback options, as per quiz settings
    - Display of correct answers and explanations (if enabled)

7. **Reporting and Analytics Module**
  - **Description:** Generates detailed reports and analytics on quiz and user performance.
  - **Key Functions:**
    - Individual performance reports for students
    - Class or group performance summaries for instructors
    - Question analysis to evaluate question difficulty and effectiveness
    - Progress tracking and history of user scores
    - Data export options (CSV, PDF) for external analysis

8. **Security and Compliance Module**
  - **Description:** Ensures data protection, compliance with standards, and the integrity of quiz-taking.
  - **Key Functions:**
    - Role-based access control and permissions management
    - Data encryption for sensitive data, such as user credentials and quiz results
    - Anti-cheating mechanisms like IP tracking, question randomization, and time limits
    - Compliance with data privacy laws (e.g., GDPR) to protect user data
    - Audit logs to track system activities and user actions

9. **Notifications and Alerts Module**
  - **Description:** Manages notifications and alerts for both instructors and students.
  - **Key Functions:**
    - Email and in-app notifications for quiz assignments, due dates, and results
    - Reminders for upcoming quizzes or approaching deadlines
    - Feedback alerts when grades or comments are available

10. **System Administration Module**
  - **Description:** Allows administrators to oversee and manage system operations, configurations, and maintenance.

- **Key Functions:**
  - Dashboard to monitor active quizzes, system usage, and user activity
  - System settings configuration (time zones, grading options)
  - Backup and restore options to ensure data integrity
  - Analytics on system usage for optimizing resource allocation

Each of these modules contributes to a comprehensive Quiz Management System, supporting both core quiz functionalities and essential system-level needs such as security, reporting, and user management.

4.1 Implementation of Design:

- Home/Login page:

4.2 Database Design:

1. **Entity-Relationship Diagram (ERD)**

Here’s a simplified ERD structure (text-based) for clarity:

- **User** (Admin, Instructor, Student)
- **Quiz**
- **Question**
- **QuizQuestion** (a linking table between Quiz and Question for reusability)
- **QuizAssignment** (links quizzes to specific users)
- **Response** (stores students' answers)
- **Result** (stores calculated scores)

2. **Database Tables**

1. **User**
  - `user_id` (PK): Unique identifier for each user.
  - `username`: Username for login.
  - `password_hash`: Hashed password for security.
  - `email`: Email address of the user.
  - `role`: Role of the user (e.g., "Admin," "Instructor," "Student").
  - `created_at`: Timestamp of account creation.
  - `last_login`: Timestamp of the last login.

2. **Quiz**
  - `quiz_id` (PK): Unique identifier for each quiz.
  - `title`: Name of the quiz.
  - `description`: Brief description of the quiz.
  - `total_score`: Total score possible on the quiz.
  - `time_limit`: Time limit for completing the quiz (in minutes).
  - `created_by` (FK to `User.user_id`): User ID of the quiz creator.
  - `created_at`: Timestamp of quiz creation.
  - `updated_at`: Timestamp of the last update to the quiz.

3. **Question**
  - `question_id` (PK): Unique identifier for each question.
  - `text`: The question text.
  - `question_type`: Type of question (e.g., "MCQ," "True/False," "Short Answer").

- `correct_answer`: Correct answer for auto-graded questions.
- `points`: Points awarded for the correct answer.
- `created_at`: Timestamp of question creation.

4. **QuizQuestion**
- `quiz_question_id` (PK): Unique identifier for each quiz-question entry.
- `quiz_id` (FK to `Quiz.quiz_id`): The ID of the quiz.
- `question_id` (FK to `Question.question_id`): The ID of the question.
- `order`: Sequence order of questions in the quiz.

5. **AnswerOption**
- `option_id` (PK): Unique identifier for each answer option.
- `question_id` (FK to `Question.question_id`): The ID of the question it belongs to.
- `option_text`: Text of the answer option.
- `is_correct`: Boolean indicating if the option is correct.

6. **QuizAssignment**
- `assignment_id` (PK): Unique identifier for each quiz assignment.
- `quiz_id` (FK to `Quiz.quiz_id`): ID of the assigned quiz.
- `user_id` (FK to `User.user_id`): ID of the student assigned to take the quiz.
- `assigned_at`: Timestamp of when the quiz was assigned.
- `due_date`: Date by which the quiz should be completed.
- `completed_at`: Timestamp of quiz completion (if applicable).

7. **Response**
- `response_id` (PK): Unique identifier for each response entry.
- `assignment_id` (FK to `QuizAssignment.assignment_id`): ID of the assigned quiz taken.
- `question_id` (FK to `Question.question_id`): ID of the question answered.
- `answer_given`: The answer provided by the user.
- `is_correct`: Boolean indicating if the answer is correct (for auto-graded questions).
- `submitted_at`: Timestamp of answer submission.

8. **Result**
- `result_id` (PK): Unique identifier for each quiz result.
- `assignment_id` (FK to `QuizAssignment.assignment_id`): The assignment ID of the completed quiz.
- `total_score`: Total score obtained by the user.
- `percentage`: Percentage score.
- `graded_at`: Timestamp of when the quiz was graded.
- `feedback`: Instructor’s feedback (if applicable).

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3. **Relationships**

- **User - Quiz**: A one-to-many relationship where one user (Instructor/Admin) can create multiple quizzes.
- **Quiz - Question**: A many-to-many relationship (resolved by `QuizQuestion` table) where a quiz can have multiple questions, and a question can appear in multiple quizzes.
- **User - QuizAssignment**: A many-to-many relationship (resolved by `QuizAssignment` table) where a quiz can be assigned to multiple students, and each student can have multiple assigned quizzes.
- **Question - AnswerOption**: A one-to-many relationship where a question can have multiple answer options (applicable for MCQ).
- **QuizAssignment - Response**: A one-to-many relationship where each quiz assignment can have multiple responses (one per question).
- **QuizAssignment - Result**: A one-to-one relationship where each completed quiz assignment has one result.

This database design captures the primary entities and relationships needed for a Quiz Management System, supporting core functionalities such as quiz creation, question management, quiz assignments, and result tracking.

4.3 Implementation of Code:

```
    importjavax.swing.*;
import java.awt.*;
import java.awt.event.*;
import java.sql.*;
public class QuizManagementSystem extends JFrame {
    private JTextField questionField, option1Field, option2Field, option3Field,
option4Field, answerField;
    private JButton addButton, viewButton;
```

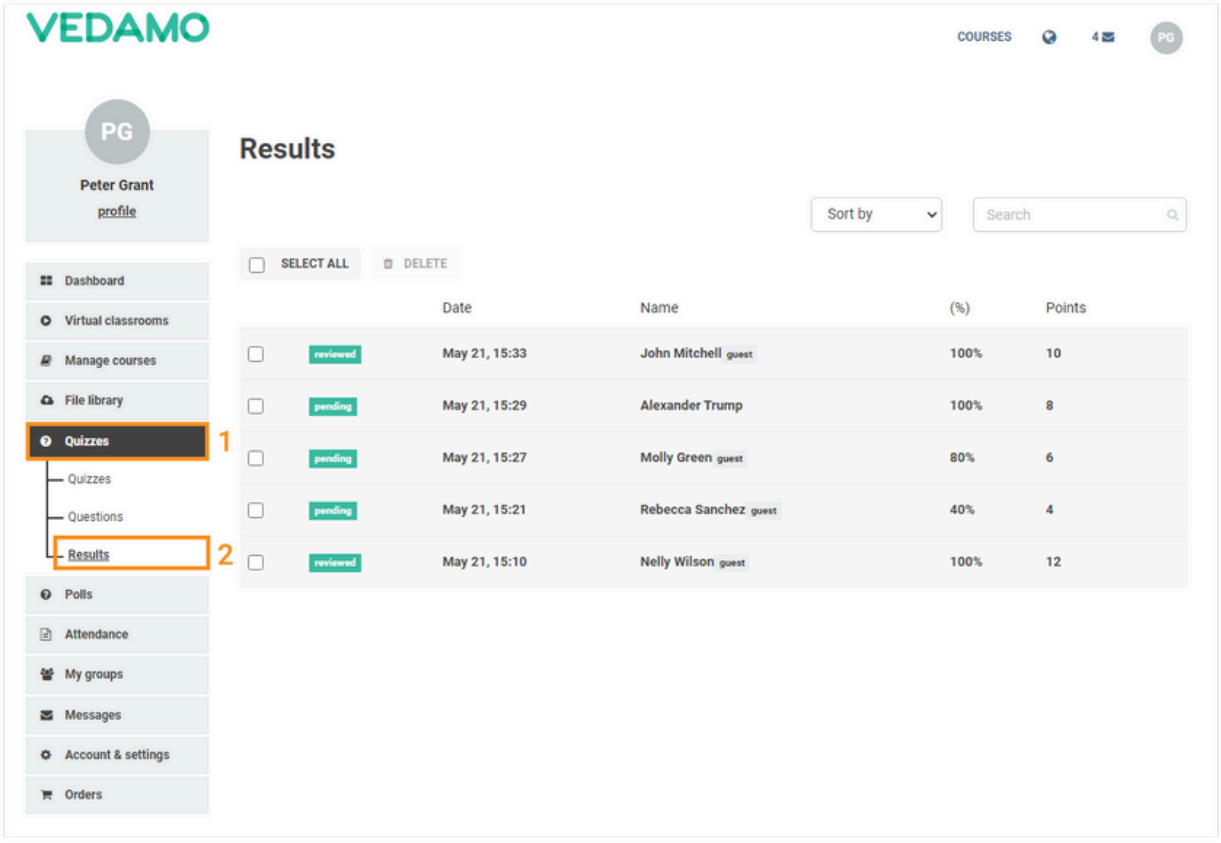
```
    private Connection connection;

    public QuizManagementSystem() {
        // Set up the GUI
        setTitle("Quiz Management System");
        setSize(600, 400);
        setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        setLocationRelativeTo(null);
        setLayout(new GridLayout(8, 2, 5, 5));

        // Connect to Database
        connectToDatabase("");

        // Initialize Fields
        JLabel questionLabel = new JLabel("Question:");
        questionField = new JTextField();

        JLabel option1Label = new JLabel("Option 1:");
        option1Field = new JTextField();

        JLabel option2Label = new JLabel("Option 2:");
        option2Field = new JTextField();

        JLabel option3Label = new JLabel("Option 3:");
        option3Field = new JTextField();

        JLabel option4Label = new JLabel("Option 4:");
        option4Field = new JTextField();

        JLabel answerLabel = new JLabel("Answer:");
        answerField = new JTextField();

        addButton = new JButton("Add Question");
        viewButton = new JButton("View Questions");

        //    Add    components    to    frame
        add(questionLabel);  add(questionField);
        add(option1Label);    add(option1Field);
        add(option2Label); add(option2Field);
```

```
        add(option3Label);  add(option3Field);
        add(option4Label);  add(option4Field);
        add(answerLabel);    add(answerField);
        add(addButton); add(viewButton);

        // Button Action Listeners
        addButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                addQuestion();
            }
        });

        viewButton.addActionListener(new ActionListener() {
            public void actionPerformed(ActionEvent e) {
                viewQuestions();
            }
        });
    }

    private void connectToDatabase() {
        try{
            connection =
DriverManager.getConnection("jdbc:mysql://localhost:3306/QuizDB", "root",
"password");
            System.out.println("Database connected successfully.");
        } catch (SQLException e) {
            e.printStackTrace();
            JOptionPane.showMessageDialog(this, "Database connection failed!");
        }
    }

    private void addQuestion() {
        String question = questionField.getText();
        String  option1  =  option1Field.getText();
        String  option2  =  option2Field.getText();
        String  option3  =  option3Field.getText();
        String  option4  =  option4Field.getText();
        String answer = answerField.getText();
```

```
        try{
            String query = "INSERT INTO Questions (question, option1, option2,
option3, option4, answer) VALUES (?, ?, ?, ?, ?, ?)";
            PreparedStatement     pst     =     connection.prepareStatement(query);
            pst.setString(1,       question);       pst.setString(2,       option1);
            pst.setString(3,       option2);       pst.setString(4,       option3);
            pst.setString(5,       option4);       pst.setString(6,       answer);
            pst.executeUpdate();   JOptionPane.showMessageDialog(this,   "Question
            added successfully!"); clearFields();




        } catch (SQLException e) {
            e.printStackTrace();
            JOptionPane.showMessageDialog(this, "Failed to add question.");
        }
    }

    private void viewQuestions() {
        try{
            String query = "SELECT * FROM Questions";
            Statement stmt = connection.createStatement();
            ResultSet rs = stmt.executeQuery(query);

            StringBuilder questionsList = new StringBuilder("Questions:\n\n");
            while (rs.next()) {
                questionsList.append("Q:
").append(rs.getString("question")).append("\n")
                              .append("1:
").append(rs.getString("option1")).append("\n")
                              .append("2:
").append(rs.getString("option2")).append("\n")
                              .append("3:
").append(rs.getString("option3")).append("\n")
                              .append("4:
").append(rs.getString("option4")).append("\n")
                              .append("Answer:
").append(rs.getString("answer")).append("\n\n");
```

```
            }

            JTextArea textArea = new JTextArea(questionsList.toString());
            textArea.setEditable(false);
            JScrollPane scrollPane = new JScrollPane(textArea);
            scrollPane.setPreferredSize(new Dimension(500, 400));

            JOptionPane.showMessageDialog(this, scrollPane, "All Questions",
JOptionPane.INFORMATION_MESSAGE);
        } catch (SQLException e) {
            e.printStackTrace();
            JOptionPane.showMessageDialog(this, "Failed to retrieve questions.");
        }
    }

    private void clearFields() {
        questionField.setText("");
        option1Field.setText("");
        option2Field.setText("");
        option3Field.setText("");
        option4Field.setText("");
        answerField.setText("");
    }

    public static void main(String[] args) {
        SwingUtilities.invokeLater(() -> {
            new QuizManagementSystem().setVisible(true);
        });
    }
}
```

4.4 Output Screen:



Conclusion:

In conclusion, a Quiz Management System provides an efficient, centralized solution for creating, managing, and evaluating quizzes, enhancing the learning experience for both instructors and students. By automating various aspects of the quiz process, such as question selection, grading, and feedback, the system simplifies administrative tasks and reduces errors, making it easier for instructors to focus on content quality and student engagement.

With features like role-based access control, question banks, automated grading, and real-time analytics, the system offers a scalable platform that meets the demands of modern educational environments. Additionally, integrating security, data privacy, and compliance ensures that user information is protected, making it a reliable tool for both institutions and organizations.

Overall, the Quiz Management System empowers educators to deliver assessments more effectively, supports students in their learning journey, and provides actionable insights into learning outcomes, making it a valuable asset in education and training.

Reference links:

- **Java Database Connectivity with MySQL - javatpoint**
  https://www.javatpoint.com/example-to-connect-to-the-mysql-database

- https://www.geeksforgeeks.org/establishing-jdbc-connection-in-java/