



Quizzi

<Quiz Portal>
Software Requirements Specification
Version <1.0>

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from Rajasthan Technical University, Kota

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Quiz Portal	Version: 1.0
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Revision History

Date	Version	Description	Author
26/11/24	1.0	The initial version of the Quiz Portal project, containing the basic layout of the application, along with the requirement specification. This version outlines the core features such as user authentication, exam creation, and a simple user interface. The requirements for backend integration with Spring Boot and MySQL are defined, with a focus on scalability and performance.	Archi Patidar

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 24/04/25

Table of Contents

1. Introduction	1
1.1 Purpose	1
1.2 Scope	1
1.3 Definitions, Acronyms and Abbreviations	1
1.4 References	2
1.5 Technologies to be used	2
1.6 Overview	2
2. Literature survey	2
2.1 Review of Related Work	2
2.2 Knowledge gaps	3
2.3 Comparative Analysis	4
2.4 Summary	4
3. Specific Requirements	4
3.1 Functional Requirements	4
3.2 Non- Functional Requirements	8
3.3 Hardware Requiremes	9
3.4 Software Requirements	9
3.5 Agile Methodology	9
3.6 Business Process Model	10
3.7 Supplementary Requirements	11
4. System Architecture	11
4.1 Client-Server Architecture	11
4.2 Communications Interfaces	12
5. Design and Implementation	13
5.1 Product feature	13
5.2 Data Flow diagram.....	14
5.3 E-R Diagram	14
5.4 Class Diagram	15
5.5 Use-Case Model Survey	16
5.6 Behaviours Diagrams	17
5.7 Database Diagram	18
5.8 Assumptions and Dependencies	18
6. Supporting Information	19
7. Conclusion & Future scope	20
8. Concerns / Queries / Doubts if any:	22

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 24/04/25

1. Introduction

The Software Requirements Specification (SRS) document for the "Quiz Portal" serves as a comprehensive guide delineating the functional and non-functional requirements essential for designing, developing, and deploying an innovative online examination system. This introduction provides an overview of the entire SRS, encompassing its purpose, scope, definitions, acronyms, references, technologies used, and an overview of the SRS contents.

1.1 Purpose

The primary objective of this SRS is to establish a clear and unified understanding among stakeholders, including developers, designers, project managers, domain experts in Festivals , foods, and end-users, regarding the functionalities, constraints, and objectives of the " Yum Yard " platform. By defining and documenting these requirements, this document aims to guide the development team in creating a robust, user-centric application that addresses the needs of users and enhances Ordering practices.

1.2 Scope

The "Quiz Portal" is designed as a comprehensive, integrated platform offering functionalities to manage online examinations efficiently. Key features include secure user authentication, dynamic question paper generation, exam scheduling, live monitoring, and automated result calculation.

1.3 Definitions, Acronyms and Abbreviations

- **SRS** : Software Requirements Specification
- **API** : Application Programming Interface
- **UI** : User Interface
- **DBMS** : Database Management System

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

1.4 References

This SRS references industry standards for educational systems, existing online learning platforms, and any external documents or specifications used in defining the requirements for the "Quiz Portal".

1.5 Technologies to be used

The "Quiz Portal" utilizes proven technologies and frameworks to deliver its functionalities, including:

- **Frontend:** Angular for an interactive and responsive user interface.
- **Backend:** Spring Boot for the backend server application.
- **Database:** MySQL for reliable data storage and retrieval.

1.6 Overview

This SRS document is structured systematically into distinct sections, each detailing specific facets of the "Quiz Portal". It includes an introduction to the project, system overview, detailed descriptions of functional and non-functional requirements, user interfaces, system constraints, and architectural design. The document serves as a roadmap for the development, deployment, and maintenance of the system, ensuring clarity and alignment among stakeholders.

2. Literature survey

The literature survey conducted for the "Quiz Portal" SRS involved a comprehensive review of existing research, industry practices, and technological advancements related to online examination systems, learning management platforms, and relevant technologies.

2.1 Review of Related Work

This section reviews existing online Quiz management systems to understand the current landscape:

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

Overview of Existing Systems:

Several tools are currently used for online Quiz management, particularly in educational institutions and organizations. These systems help in creating, administering, and grading exams, but each has its own set of features and limitations.

- **ExamSoft** : A secure, cloud-based exam platform known for its advanced security features, including remote proctoring and secure browser environments. It is commonly used for high-stakes testing but may be too complex or expensive for smaller institutions or organizations.
- **Quizizz** : A popular tool for creating and delivering engaging quizzes with real-time feedback and gamification elements. It is widely used in educational settings but lacks some of the advanced features required for formal examinations, such as secure authentication and proctoring.
- **ProProfs Quiz Maker** : A versatile platform that allows the creation of both simple and advanced exams with features like timed quizzes, automated grading, and detailed reporting. However, it can be costly for institutions with large user bases.

2.2 Comparative Analysis

Feature	ExamSoft	Quizizz	ProProfs Quiz Maker	Quiz Porta
Ease of Use	Complex setup, focused On high-stakes exams	Easy to use, designed for engagement	User-friendly but more basic features	Simple and intuitive interface for all users
Customization	Highly customizable, but complex for casual users	Limited customization options, especially for advanced exams	Offers some customization but lacks flexibility	Highly customizable exam creation, tailored to specific needs

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

Security	Strong security features, including remote proctoring and secure exam environments	Lacks advanced security features like proctoring	Limited security features	Robust security features, including secure browser and remote proctoring
Scalability	Excellent scalability for large institutions	Works well for small groups but may face issues with larger scales	Suitable for small to medium-sized groups	Optimized for both small and large user bases

2.3 Summary

The **Quiz Portal** is designed as a user-friendly and cost-effective solution to help educational institutions and organizations efficiently manage online exams. Unlike existing exam management systems, it prioritizes simplicity while incorporating essential features such as secure exam environments, easy exam creation, and clear reporting. The system ensures exam integrity with features like secure browsers and remote proctoring. Technologies like **Angular** for the frontend provide an intuitive user interface, making it easy for both administrators and students to interact with the system. The backend is powered by **Spring Boot** and **MySQL**, offering scalability and flexibility to manage large datasets, user profiles, and exam results effectively. By addressing the limitations of other tools, the **Quiz Portal** aims to offer a streamlined, secure, and scalable solution for managing online exams in a range of educational settings.

3. Specific Requirements

3.1 Functional Requirement

Functional requirements outline the specific functionalities and features that the "**Quiz Portal**" must provide to meet user needs and expectations.

3.1.1 Login Module

Description: The Login Module facilitates user authentication through email or student ID and password. A secure password recovery mechanism is provided for users who forget their credentials.

Key Features:

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

- Secure Authentication: Ensure strong password security and support for (2FA).
- Password Recovery: Allow users to reset passwords via email.
- Role-based Access: Admin, Teacher, Student.

3.1.2 Quiz Creation Module

Teachers can create, edit, and delete exams by selecting subjects, defining question types (e.g., multiple-choice, short answer, true/false), setting the exam duration, and including instructions for students.

Key Features:

- Dynamic Question Paper Creation: Teachers can customize the exam by choosing from a pool of questions.
- Exam Scheduling: Teachers can define the start and end dates for exams, along with any time limits.

Key Features:

- Secure Authentication: Ensure strong password security and support for (2FA).
- Password Recovery: Allow users to reset passwords via email.
- Role-based Access: Admin, Teacher, and Student roles with different access levels.

3.1.3 Student Exam Dashboard

Students have a dedicated dashboard displaying their upcoming exams, past exams, and results. They can click to begin an ongoing exam or review past exam results.

Key Features

- Upcoming and Past Exams List: A comprehensive list of exams with due dates and results.
- Access to Ongoing Exams: Students can start exams, track their time, and submit answers.

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

- **Result Viewing:** After exam completion, students can view their performance and score breakdown.

3.1.4 Question Bank Module

A centralized, categorized repository for storing exam questions, which can be reused across exams. Teachers can add, edit, or remove questions.

Key Features

- **Categorization:** Tagging questions based on subjects, difficulty level, and exam types.
- **Search Functionality:** Teachers can search for questions by keywords, difficulty, or topic.
- **Question Import/Export:** Ability to import questions from external sources or export them for archival.

3.1.5 Exam Attempt Module

Description: This module allows students to attempt exams by presenting questions in a secure, timed environment. Once completed, the system automatically grades the exam and stores the results.

Key Features

- **Timer Management:** The system displays a countdown timer for each exam.
- **Auto-grading:** Multiple-choice and true/false questions are auto-graded, and short answer questions are reviewed manually.

3.1.6 Result Analysis Module

Description: The Result Analysis Module provides detailed feedback to both students and teachers, including exam performance, accuracy, and areas for improvement.

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

Key Features:

- Individual and Group Performance: Breakdown of results at both individual and class levels.
- Question-wise Analysis: Insights into which questions were most challenging for the class.
- Exportable Reports: Results can be exported as CSV or PDF files for records and analysis.

3.1.7 Notification Module

Description: Keeps users informed about upcoming exams, registration deadlines, result announcements, and system maintenance updates.

Key Features:

- Push Notifications: Real-time exam reminders and updates.
- Email Alerts: Send automated emails for exam reminders and result releases.
- Custom Filters: Users can filter notifications based on type (exam updates, alerts, info).

3.1.8 Security and Proctoring Module

Ensures the integrity of the exam environment by preventing cheating. This includes features like webcam monitoring, screen capture prevention, and browser lockdown during the exam.

Key Features:

- Webcam Monitoring: Teachers or proctors can monitor students during the exam via live webcam feeds.
- Browser Lockdown: Prevents students from accessing unauthorized resources during the exam.

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

- Session Logging: Tracks user activity, including time spent on each question and attempts to open new tabs.

3.1.9 Admin Dashboard

The admin dashboard allows administrators to manage users, track exam statistics, and generate reports for system management.

Key Features:

- User Management: Admins can add/remove users, assign roles, and manage user privileges.
- Exam Statistics: View real-time statistics on exam participation and success rates.
- Reporting: Generate reports on exam results, user activity, and performance metrics.

3.2 Non Functional Requirements

Non-functional requirements define the qualities and characteristics that the system must possess, such as performance, security, and usability.

3.2.1 Performance

- System Response Time: The system should generate exam results within 5 seconds of exam completion.
- Scalability: The system should be able to scale horizontally to support a growing user base and increased traffic, especially during peak exam periods.

3.2.2 Security

- Secure Authentication: The system shall use strong password policies and Two-Factor Authentication (2FA) for all users.
- Access Control: Role-based access control shall be implemented to restrict access to sensitive data based on user roles (Admin, Teacher, Student).

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

- **Secure Exam Environment:** Use secure methods like browser lockdown and webcam monitoring to ensure exams are conducted fairly.

3.2.3 Usability

- **Intuitive UI/UX:** The user interface shall be simple, intuitive, and accessible, following established UI/UX best practices.
- **Cross-Platform Accessibility:** The portal shall be compatible with major web browsers (Chrome, Firefox, Safari) and mobile devices (Android, iOS).
- **Multilingual Support:** The system should support multiple languages to ensure accessibility for users from diverse backgrounds.

3.2.4 Reliability

- **Uptime:** The system should have a minimum uptime of 99.9%.
- **Backup and Recovery:** Daily backups shall be taken, and a robust recovery plan shall be in place to restore the system in case of failure.
- **Fault Tolerance:** The system shall be designed to continue operating even in the case of partial failure, with automatic failover mechanisms in place.

3.3 Hardware Requirements

The hardware requirements outline the necessary infrastructure for deploying and running the "Quiz Portal".

3.3.1 Server Infrastructure

- **Minimum of dual-core processors with 8 GB RAM** for backend server operations.
- **Sufficient storage capacity (500 GB SSD or higher)** to handle user data, exam content, and results.

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

3.3.2 Mobile Devices

- The mobile application must be compatible with Android devices (version 7.0 and above) and iOS devices (version 11 and above).
- Users should be able to access the portal via web browsers on desktop computers and laptops.

3.4 Software Requirements

Software requirements detail the necessary software components and dependencies for the " Quiz Portal."

3.4.1 Backend Technologies

- Spring Boot framework for backend API development.
- MySQL for relational data storage and management.

3.4.2 Frontend Technologies

- Angular for building the user interface, ensuring a responsive design that works on both desktop and mobile devices.
- Bootstrap for styling and layout management.

3.4.3 Third-Party Integrations

- Email Services: Integration with SMTP servers for automated email notifications (exam reminders, results, etc.).
- Video Streaming API: Integration with a third-party service (like WebRTC) for secure webcam monitoring during exams.
- Cloud Storage: Integration with cloud storage services (e.g., AWS S3) for storing backup data and exam files.

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

3.5 Agile Methodology

The " Quiz Portal " project follows the Agile development methodology, focusing on flexibility, iterative development, and continuous improvement.

3.6 Business Process Model

3.6.1 Login Module

- Input: User credentials (email or ID, password).
- Process: Validate user credentials and role-based access.
- Output: Redirect to the appropriate dashboard or show error message.

3.6.2 Exam Creation Module

- Input: Teacher inputs exam details (subject, questions, time).
- Process: Store the exam data in the database and schedule it for students.
- Output: Confirmation of exam creation, and notification sent to students.

3.7 Supplementary Requirements

3.7.1 Scalability

- The system must be designed to scale horizontally, adding new servers as the user base grows.

3.7.2 Security Measures

- The system must comply with industry standards for data protection and exam integrity, such as GDPR and FERPA.

3.7.3 Performance Optimization

- Load balancing and CDN (Content Delivery Network) integration to ensure fast and reliable access for all users.

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

4. System Architecture

4.1 Client-Server Architecture

The **Quiz Portal** employs a client-server architecture to deliver efficient, centralized exam management and secure access for diverse users. This architecture ensures a clear separation of responsibilities between the client side (frontend interface) and the server side (backend processing and database management).

- **Client Side (Frontend):** The client side is developed using **Angular**, along with **HTML** and **CSS**, offering an intuitive and responsive user interface. It is accessible across devices such as desktops, tablets, and mobile phones, ensuring a seamless experience for all users.
- **Server Side (Backend):** The backend is built using **Spring Boot**, handling the core business logic, authentication, and data processing. It provides APIs for functionalities such as user authentication, quiz creation, exam monitoring, and result generation.
- **Database:** The **MySQL database** is used for storing structured data, including user profiles, quiz data, exam results, and activity logs. It ensures data consistency, reliability, and quick retrieval for a seamless user experience.
- **Security and Role-Based Access Control:** The system implements **Role-Based Access Control (RBAC)** to restrict data access based on user roles (administrator, teacher, or student). This ensures that only authorized users can access or modify sensitive information such as exam content and results.

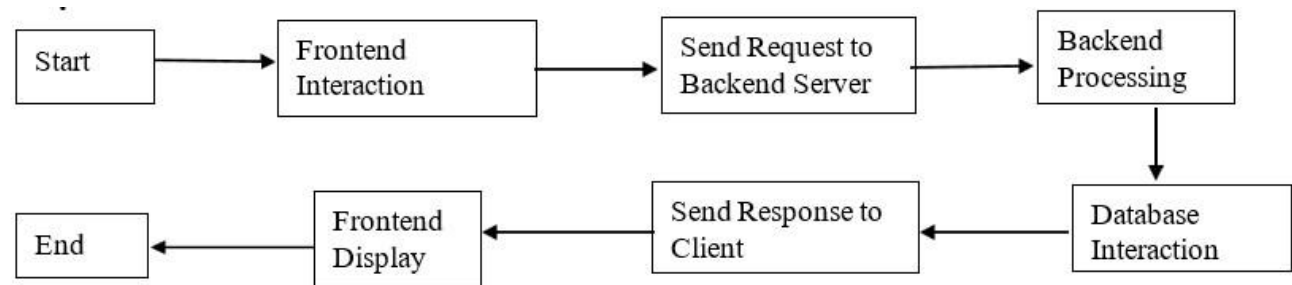


Figure 4.1: Client-Server Architecture

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

4.2 Communication Interfaces

The communication interfaces of the **Quiz Portal** facilitate secure and efficient data exchange between the client and server, ensuring seamless interactions for all users. The primary communication protocols and interfaces are as follows:

- **HTTP/HTTPS Protocols** : The Quiz Portal employs **HTTP/HTTPS protocols** for secure communication between the client and server. All API requests from the frontend to the backend are sent over **HTTPS** , ensuring data encryption during transit, safeguarding against unauthorized access or interception. HTTPS also guarantees data integrity and authentication between the client and server.
- **RESTful API** : The backend server provides a **RESTful API interface** for handling client requests. The API adheres to standard REST principles for **CRUD operations** (Create, Read, Update, Delete), ensuring consistent and efficient communication. Endpoints support functionalities such as:
 1. User login and registration.
 2. Quiz creation and management.
 3. Exam monitoring and result generation.
- **Authentication Interface:** The Exam Portal uses **Spring Security** for authentication. Users receive a **JWT (JSON Web Token)** upon login, which is included in subsequent requests for secure authentication. The server validates the token to ensure that only authenticated users can access protected resources and functionalities.

5. Overall Description

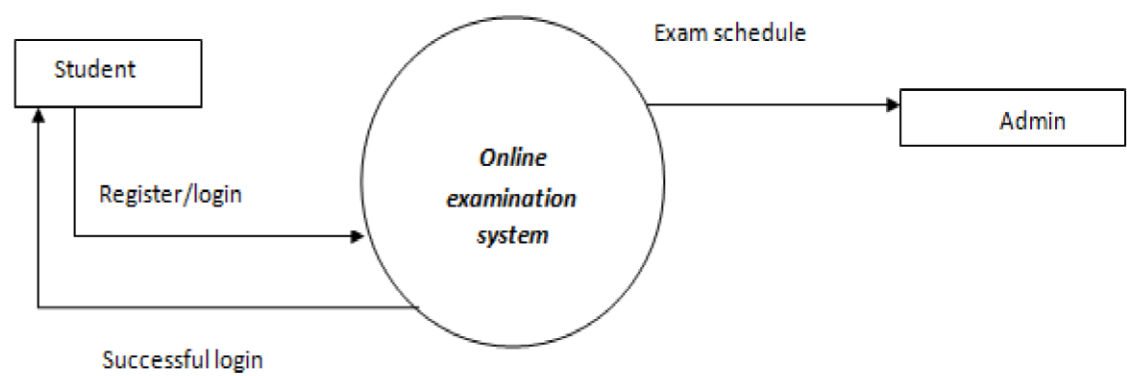
5.1 Product feature

The **Quiz Portal** simplifies online exam management with key features like **Role-Based Access Control (RBAC)** for secure access, user-friendly **Quiz Creation** , and **Real-Time Monitoring** tools. It offers **Performance Analytics** , **Multilingual Support** , and a **Responsive UI** for diverse user needs. Scalable, secure, and compliant with data regulations,

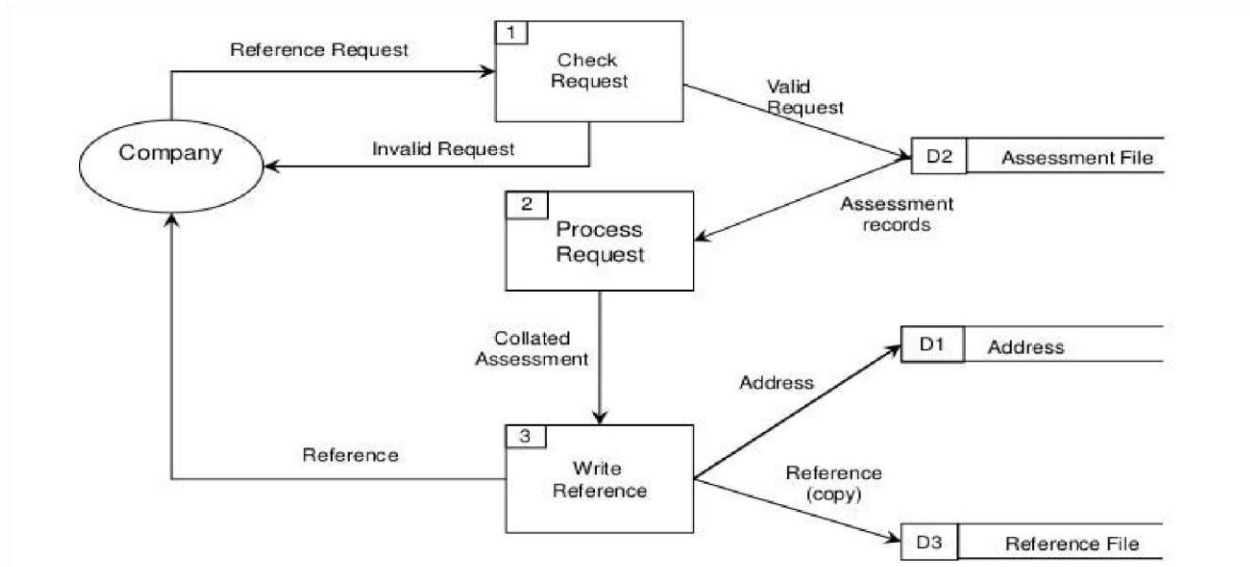
Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

the platform supports seamless integration with external tools, ensuring adaptability and growth for future educational requirements.

5.2 Data Flow diagram



LEVEL-0 DFD



5.3 E-R Diagram

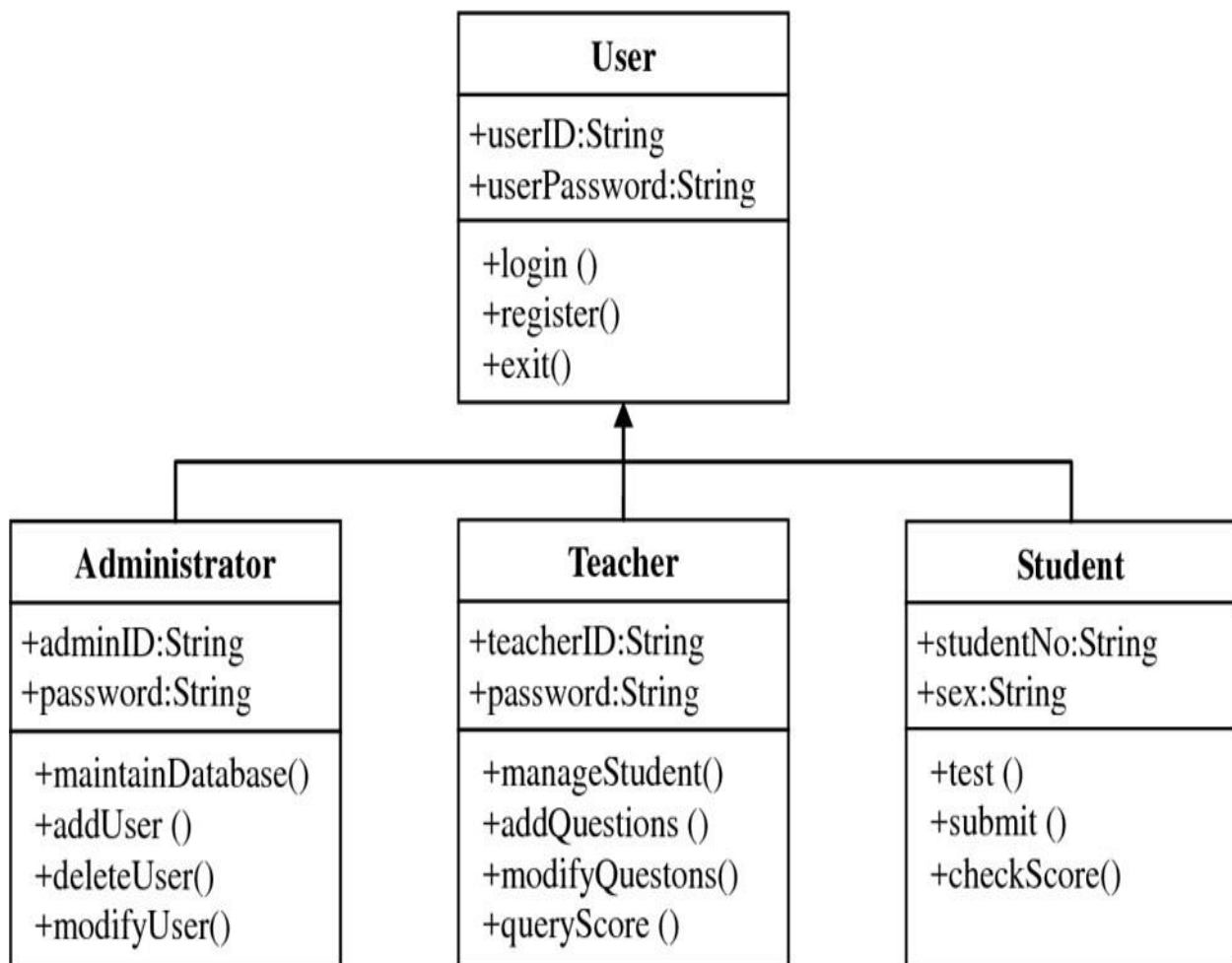
Quiz Portal ER diagram illustrates the relationships between various entities, including Users, Quizzes, Questions, Results, and Roles.

Entities:

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

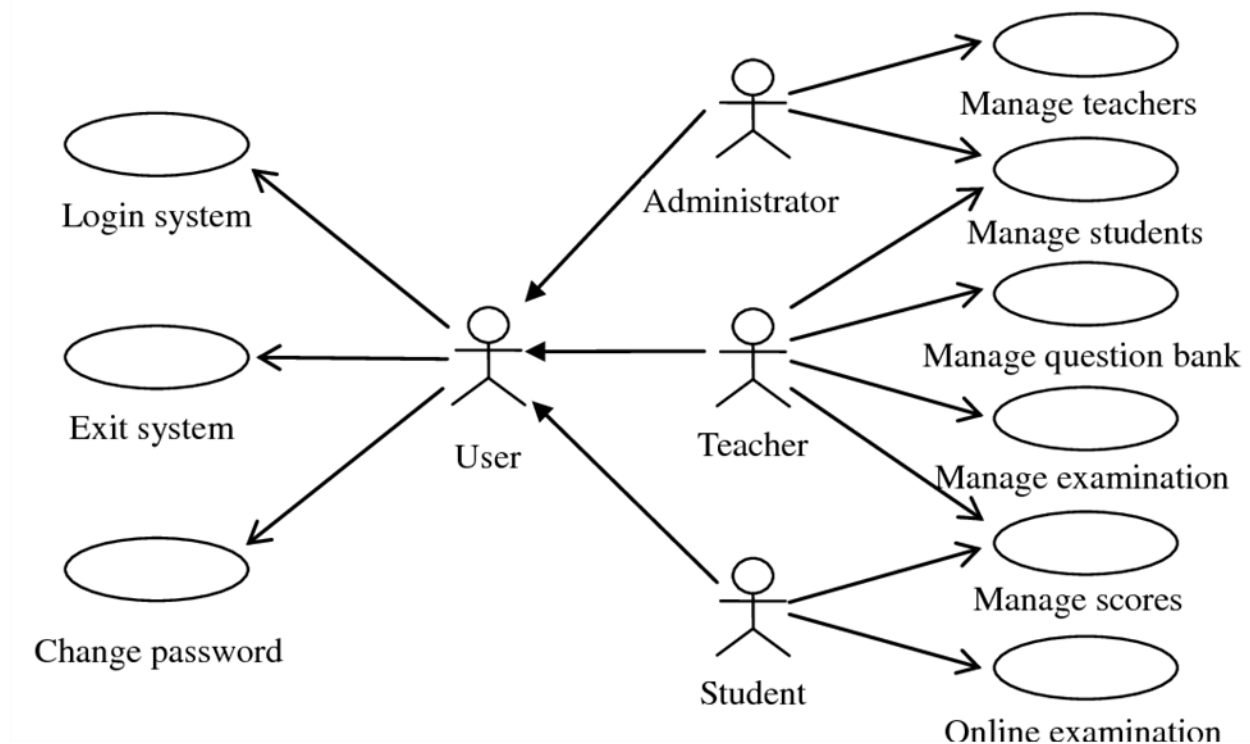
1. **User:** Attributes include userID, name, email, password, role.
2. **Quiz:** Attributes include quizID, title, description, maxScore, timeLimit.
3. **Question:** Attributes include questionID, options, correct options, correctAnswer, marks.

5.4 Class Diagram



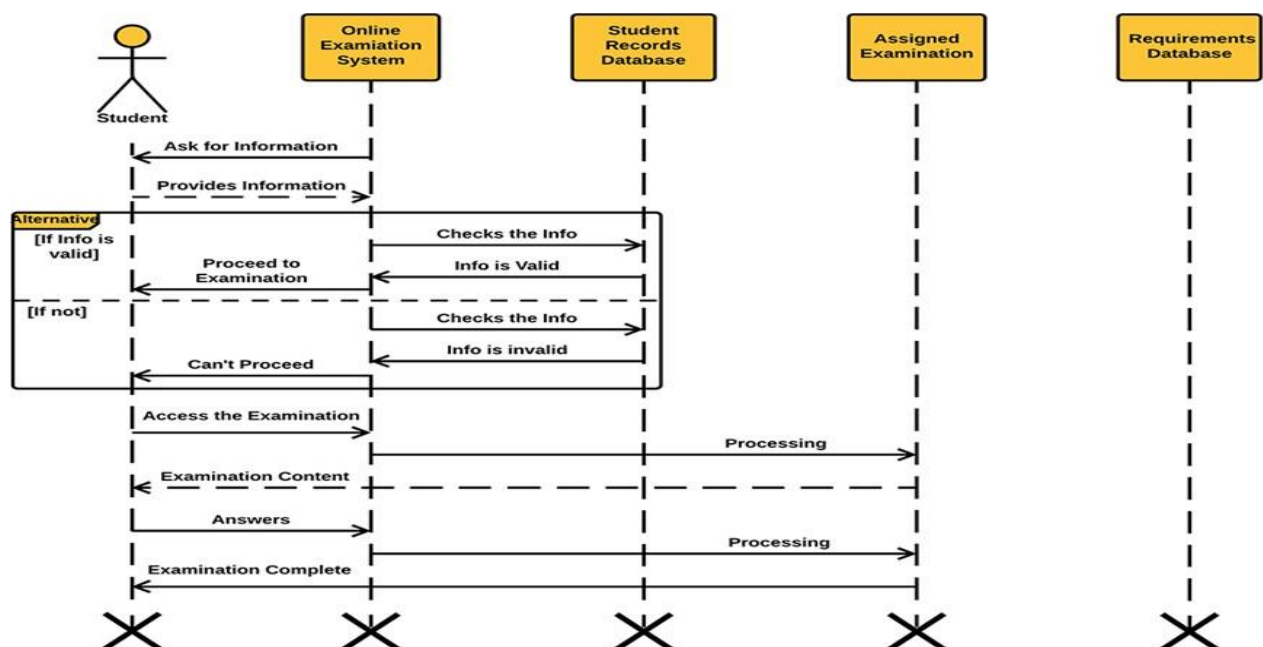
Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

5.6 Use-Case Model



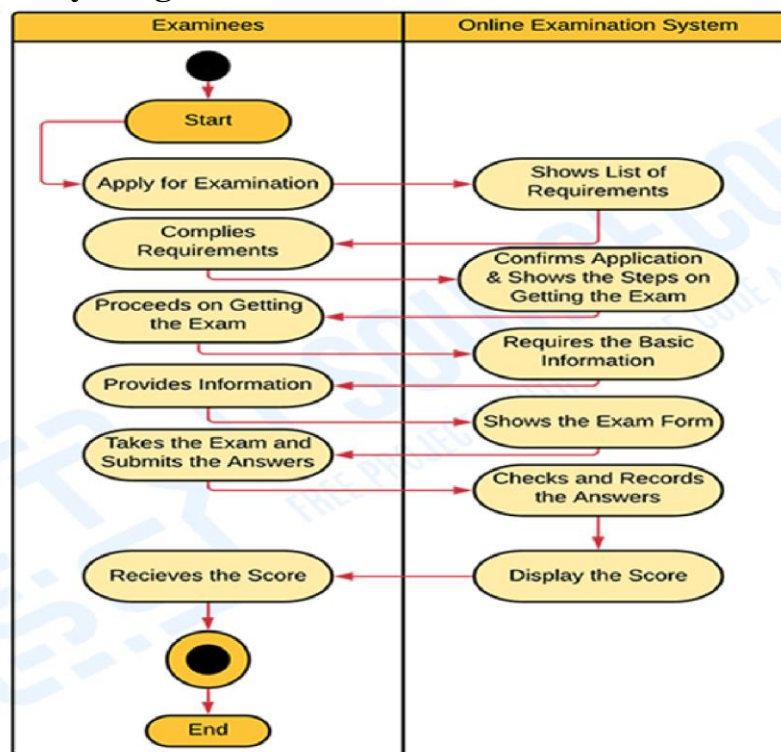
5.7 Behaviours Diagrams

5.7.1 Sequence Diagram:-



Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

5.7.2 Activity Diagram:-



5.9 Assumptions and Dependencies

5.9.1 Assumptions:

1. User Accessibility:

All users (students, teachers, and administrators) will have access to stable internet connections and compatible devices to use the portal.

2. Technological Stack:

The platform assumes the availability of the chosen technological stack, including Spring Boot for the backend, Angular for the frontend, and MySQL as the database.

3. Compliance with Standards:

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

The system will operate under standard data protection regulations such as GDPR and adhere to best practices for secure online examination systems.

4. Server Infrastructure:

Adequate server resources will be available to handle the expected user load during peak usage times, such as exam sessions.

5. User Proficiency:

Teachers and administrators will possess basic technical proficiency to navigate the portal and utilize its features effectively.

5.10.1 Dependencies:

1. Database Management:

The system depends on the MySQL database for storing user data, quiz content, and performance records.

2. Third-Party Tools:

The portal's functionality may rely on third-party libraries or services for notifications, analytics, or integration with external LMS platforms.

3. Browser Compatibility:

The system's performance is dependent on the proper functioning of modern web browsers such as Chrome, Firefox, or Edge.

6. Concerns and Future Scope

6.1 Conclusion

1.Summary of Achievements:

Accomplishments :

- Successfully implemented a robust and user-friendly platform for conducting online exams.
- Integrated features such as role-based access control, quiz creation, real-time exam monitoring, and performance analytics.

Key Objectives:

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

- Addressed the primary goal of simplifying the examination process by automating tasks like quiz management, grading, and reporting.
- Ensured a secure environment for online exams with authentication and data protection mechanisms.

Challenges Overcome:

- Tackled concurrency issues during simultaneous exam submissions by optimizing database operations and server load handling.
- Overcame initial hurdles in implementing seamless integration between the backend (Spring Boot) and the frontend (Angular).

2.Impact:

Benefits to Farmer :

- Empowered educators with tools to create and evaluate exams efficiently, saving time and effort.
- Enabled students to access exams remotely, ensuring flexibility and convenience.
- Provided detailed performance insights to students, helping them identify areas for improvement.

Contribution to Education:

- Promoted a digital transformation in traditional examination systems, fostering greater accessibility and inclusivity.

6.2 Future Scope

1. Potential Enhancements:

- **New Features:** Implement advanced analytics to provide insights into student performance, question difficulty levels, and overall exam trends.

Quiz Portal	Version: 1.0
Software Requirements Specification	Date: 26/11/24

- **Technological Upgrades:** Upgrade to the latest versions of Spring Boot and Angular to leverage performance improvements and new features.

2. Research and Development:

- **AI Integration:** Implement predictive analytics to suggest areas of improvement for students based on their performance history.
- **IoT Integration:** Explore using IoT devices for proctoring solutions, such as webcam monitoring and environment analysis during online exams.
- **Mobile App Enhancement:** Add support for push notifications to inform users about upcoming exams, deadlines, and results.

3. Community Engagement and Partnerships:

- **Collaborations:** Partner with educational institutions, online learning platforms, and certification bodies to broaden the portal's reach.
- **Community Growth:** Introduce a student community hub for peer-to-peer interaction, knowledge sharing, and exam preparation tips.

4. Conclusion of Future Scope:

- **Vision and Direction:** The Exam Portal is envisioned to evolve into a comprehensive and user-friendly platform that simplifies online examinations for students, teachers, and administrators.

6. Concerns / Queries

- How can we efficiently handle user authentication and role-based access (e.g., student, admin, teacher)?
- How do we design the database schema to accommodate scalable quiz storage and retrieval?

Technological Queries:

- What are the best practices for securing REST APIs in Spring Boot to protect sensitive data (e.g., user credentials, quiz content)?

