Technical Documentation / Software Requirements Specification (SRS)

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1. Introduction

1.1 Purpose

This document provides a comprehensive specification of the Quiz Application. It details the functional and non-functional requirements, interfaces, and design constraints to be adhered to during development. The intended audience includes developers, project managers, and stakeholders.

1.2 Scope

The Quiz Application is a desktop-based software developed in Java using Swing for the GUI and MySQL for the database backend. The application allows users to log in using their student ID, take a quiz, and generate a PDF report of their results.

1.3 Definitions, Acronyms, and Abbreviations

- GUI: Graphical User Interface
- SRS: Software Requirements Specification
- JDBC: Java Database Connectivity

1.4 References

- Java SE Documentation: https://docs.oracle.com/javase/8/docs/
- MySQL Documentation: https://dev.mysql.com/doc/
- iText PDF Library: https://itextpdf.com/

1.5 Overview

This document is structured to cover the overall description of the Quiz Application, including specific requirements, external interfaces, system features, and other non-functional requirements.

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2. Overall Description

2.1 Product Perspective

The Quiz Application is an independent desktop application that uses a local MySQL database for storing and verifying student IDs. It provides a simple user interface for logging in, taking quizzes, and generating PDF reports.

2.2 Product Functions

- User login with student ID verification
- Quiz presentation with multiple-choice questions
- Navigation through quiz questions
- Submission of quiz answers
- Generation of a PDF report with the user's ID and quiz score

2.3 User Classes and Characteristics

- Students: The primary users who will log in, take quizzes, and receive a PDF report of their results.

2.4 Operating Environment

- Operating System: Windows, macOS, Linux
- Java Runtime Environment: JRE 8 or higher
- MySQL Database: Version 5.7 or higher

2.5 Design and Implementation Constraints

- The application is built using Java Swing for the GUI.
- The database connection is established using JDBC.
- PDF generation is handled by the iText library.

2.6 Assumptions and Dependencies

- A MySQL database named `Quiz` with a table `Students` and column `id` is available.
- External libraries (MySQL Connector/J and iText) are included in the classpath during compilation and execution.

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3. Specific Requirements

3.1 Functional Requirements

1. Login Functionality:
   - The application shall allow users to enter their student ID.
   - The application shall verify the student ID against the database.
   - If the student ID is valid, the user is granted access to the quiz.

2. Quiz Functionality:
   - The application shall present multiple-choice questions to the user.
   - The application shall allow users to navigate between questions using "Next" and "Previous" buttons.
   - The application shall store user responses for each question.

3. Submission and Scoring:
   - The application shall validate that an answer is selected before proceeding to the next question.
   - Upon submission, the application shall calculate the user's score.
   - The application shall display the user's score in a message dialog.

4. PDF Report Generation:
   - The application shall generate a PDF report with the user's ID and quiz score.
   - The PDF report shall be saved locally as `QuizResult.pdf`.

3.2 Non-Functional Requirements

- Usability: The application shall provide a user-friendly interface.
- Performance: The application shall respond to user actions within 2 seconds.
- Reliability: The application shall handle database connection errors gracefully.
- Portability: The application shall run on any operating system with JRE 8 or higher.

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4. External Interface Requirements

4.1 User Interfaces

- Login Window: Text field for student ID and a login button.
- Quiz Window: Question label, multiple-choice options (radio buttons), and navigation buttons (Next, Previous, Submit).

4.2 Hardware Interfaces

- None

4.3 Software Interfaces

- Database: MySQL database connection using JDBC.
- PDF Library: iText library for PDF generation.

4.4 Communication Interfaces

- None

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5. System Features

5.1 Login Feature

- Description: Allows users to log in using their student ID.
- Stimulus/Response Sequences:
  - User enters student ID and clicks "Login".
  - System verifies the ID against the database and grants access or shows an error message.

5.2 Quiz Feature

- Description: Presents multiple-choice questions and records user responses.
- Stimulus/Response Sequences:
  - User navigates through questions and selects answers.
  - System saves the responses and ensures validation.

5.3 Submission and Scoring Feature

- Description: Submits the quiz, calculates the score, and displays it.
- Stimulus/Response Sequences:
  - User clicks "Submit".
  - System calculates the score and shows it in a dialog.

5.4 PDF Generation Feature

- Description: Generates a PDF report with the user's ID and score.
- Stimulus/Response Sequences:
  - System generates and saves `QuizResult.pdf` after showing the score.

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6. Other Non-Functional Requirements

6.1 Performance Requirements

- The application shall load and display questions within 2 seconds.
- The login process shall complete within 3 seconds after the "Login" button is clicked.

6.2 Safety Requirements

- The application shall not store user data locally, ensuring privacy and data security.

6.3 Security Requirements

- The application shall use prepared statements to prevent SQL injection attacks.

6.4 Software Quality Attributes

- Maintainability: The code shall be modular and well-documented for easy maintenance.
- Usability: The interface shall be intuitive and easy to navigate.

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7. Appendices

- Appendix A: Database Schema
  - Table: `Students`
    - Columns: `id (VARCHAR)`
