



*Green University of Bangladesh*

*Department of Computer Science and Engineering (CSE)  
Semester: (Fall, Year: 2024), B.Sc. in CSE (Day)*

---

## Requirement Specification

---

**Exprement Name:** Requirement Specification for Quiz & Earn: A Dual-Mode Quiz App with Real-Time Rewards and Competitive Leaderboard

*Course Title: Integrated Design Project I  
Course Code: CSE-324 , Section: 213-D1*

### Students Details

Name	ID
Arman Hossain	221002624
Jannatul Ferdous	221902002
Afnan Khan Shopnil	221002570

*Lab Date: 07 Oct 2024*

*Submission Date: 14-Oct-2024*

*Course Teacher's Name: Rusmita Halim Chaity*

[For teachers use only: **Don't write anything inside this box**]

### Lab Report Status

**Marks:**

**Signature:**

**Comments:**

**Date:**

# 1 Objectives

- To learn Non-Functional Requirements.
- To learn Functional Requirements.
- To focus on Usability and Accessibility.
- To learn External Interface Requirements.
- To identify Reliability and Availability.
- To learn Product Features.

## 2 Problem Analysis

The current landscape of quiz applications reveals that many focus primarily on entertainment, lacking meaningful reward systems and a strong educational foundation. These apps often limit users to online quizzes without providing a comprehensive, competitive, and rewarding experience. Additionally, most fail to create a platform that effectively combines education, competition, and tangible rewards, leaving users with an experience that is enjoyable but ultimately financially unrewarding.

## 3 Methodology

### 3.1 Introduction

The "Quiz & Earn" project introduces a mobile application designed for the Android platform, offering an interactive quiz experience with real-time rewards. The app will be developed using Java for the frontend and PHP for backend operations, ensuring a robust and scalable architecture. It features a user-friendly interface enhanced with Lottie animations and CardView layouts, providing an engaging user experience. Additionally, the app integrates a secure payment system to facilitate cash rewards, ensuring both functionality and security for users.

### 3.2 Overall Description

#### **Product Perspective**

The "Quiz & Earn: A Dual-Mode Quiz App with Real-Time Rewards and Competitive Leader board" is a new, self-contained mobile application designed for Android platforms. It is not a follow-up to any existing product but introduces a fresh concept aimed at combining education with real-time rewards.

This application provides users with an engaging quiz experience in both online and offline modes, allowing them to participate in quizzes without needing an internet connection, while still competing for real-time rewards and leader board rankings when

online. The app is designed to be a standalone system, but it will integrate external services like payment gateways for distributing cash rewards to users and real-time databases for storing quiz data, user scores, and leaderboard statistics. Below is a simple diagram illustrating the key components:

- **Mobile Client (App):** The user interacts with the app through a friendly interface, with animations and competitive elements like a leaderboard.
- **Backend System:** Manages quiz content, real-time rewards, and leaderboard data.
- **Payment Gateway:** Interfaces with secure external services to facilitate cash rewards. Database: Stores user profiles, quiz questions, rewards history, and leaderboard data.

## Product Features

- **Dual-Mode Gameplay (Online and Offline):** Users can participate in quizzes even without internet access. When offline, quiz results are stored locally and synced with the server once the user reconnects.
- **Real-Time Rewards:** Users earn cash rewards instantly based on their quiz performance, with secure integration to payment gateways for smooth payout.
- **Competitive Leaderboard:** A global leaderboard where users can see their ranking and compete with others in real-time. Scores are updated immediately after each quiz.
- **User-Friendly Interface:** The app employs Lottie animations and CardView layouts, providing an engaging, modern experience that is both visually appealing and easy to navigate.
- **Educational Content:** The app offers quizzes across a wide range of topics, encouraging users to learn while earning rewards. It ensures that both entertainment and educational value are balanced.
- **User Authentication:** Secure user registration and login features ensure that only authorized users can access the quiz content and rewards.
- **Quiz Categories and Difficulty Levels:** Users can select quizzes based on different categories (e.g., general knowledge, science, history) and difficulty levels, providing a customizable learning experience.
- **Push Notifications:** The app sends notifications for upcoming quizzes, rewards updates, and leaderboard changes to keep users engaged.

## User Classes and Characteristics

### Three type of user can use this App

1. **Online Users:** Users who regularly participate in quizzes, aiming for rewards and leaderboard rankings. These users are likely competitive and engaged with both the educational and reward features.

- (a) **Subscription User:** In the Quiz and Earn app, users have the option to enhance their experience by purchasing one-time, weekly, or monthly subscriptions, which offer various benefits and rewards.

#### **One-Time Subscription**

- Users can make a one-time payment to unlock premium quizzes and participate in higher-reward challenges.

#### **Weekly Subscription**

- This subscription gives users access to exclusive quizzes and rewards for a duration of one week. It includes features such as enhanced leaderboard rankings and increased chances of winning real-time rewards.

#### **Monthly Subscription**

- The monthly subscription provides users with uninterrupted access to premium content for an entire month. It also offers higher potential rewards and additional perks, such as ad-free gameplay and advanced statistics tracking.

#### **Real Money Rewards**

- **Performance-Based Rewards:** Subscription users who consistently perform well in quizzes are eligible to earn real money. If a user correctly answers more than 80% of the questions in a quiz, they qualify for a cash reward.
  - **Reward Payout:** Cash rewards for users meeting the 80% correct answer threshold will be credited to their app account, which can then be withdrawn or used within the app.
2. **Offline Users:** Users who use the app occasionally, primarily for fun, and may not actively pursue leaderboard rankings or cash rewards.
  3. **Guest Users:** First-time users who no need to sing up to play quiz they can use guest mode.

#### **Operating Environment**

- **Hardware:** Android-based smartphones and tablets.
- **Operating System:** Android 8.0 (Oreo) and above.
- **Software Components:** Integrates with payment gateways for reward distribution, and requires access to a real-time database for leaderboard and quiz data management.

#### **Design and Implementation Constraints**

- **Language:** The app will be developed in Java (for frontend) and PHP (for back-end).
- **Hardware Limitations:** Optimized for mid-range Android devices with limited memory to ensure smooth performance.
- **Security Considerations:** Secure payment integration and user authentication are critical to prevent fraud and ensure privacy.
- **Design Standards:** Must follow Android design guidelines and implement secure coding practices for payment systems and data storage.

### 3.3 System Features

#### Description and Priority

This feature allows users to participate in quizzes both online and offline. When offline, quiz results are stored locally and synced with the server when an internet connection is re-established.

## Response Sequences

- User selects a quiz in offline mode.
- The system allows the user to take the quiz, stores the results locally.
- Once online, the system prompts the user to sync the results with the server.
- Server updates the leaderboard and rewards the user accordingly.

## Functional Requirements:

- The app must store quiz data locally when offline and sync it once online.
- The app must alert users when their offline data has been successfully synced.
- The leaderboard must be updated in real-time once sync occurs.
- If syncing fails, the app should retry until a connection is established or notify the user of the issue.

## 3.4 External Interface Requirements

### User Interfaces

- **Logical Characteristics:** The app will have a clean, user-friendly interface with intuitive navigation. Lottie animations and CardView layouts will be used to enhance visual appeal. Standard buttons such as "Start Quiz," "Leaderboard," and "Rewards" will appear on all major screens. Error messages will be displayed clearly with actionable suggestions (e.g., "Please check your internet connection").
- **GUI Standards:** The design will follow Android Material Design guidelines for consistency and accessibility.
- **Screen Layout Constraints:** Buttons and UI elements will be sized for easy touch interactions on mobile devices. Key screens will include the quiz selection screen, quiz interface, leaderboard, and reward page.
- **Sample Elements:**
  1. **Quiz Screen:** Multiple-choice questions with answer options, "Submit" and "Next" buttons.
  2. **Leaderboard Screen:** Real-time rankings with user scores displayed.

### Hardware Interfaces

- **Supported Devices:** Android smartphones and tablets running Android 8.0 (Oreo) and above.

- **Data/Control Interactions:** The app will use touch-screen interactions for navigation and store data locally when offline. The device's internet connection will be required for syncing data and accessing real-time features such as leaderboard updates and rewards processing.
- **Communication Protocols:** Data will be transferred via HTTPS for security during online sessions.

## Software Interfaces

- **Operating System:** Android 8.0 (Oreo) and above.
- **Payment Gateway Integration:** The app will integrate with external payment APIs (e.g., Stripe, PayPal) to facilitate real-time rewards distribution. Secure API calls will handle transactions.
- **Database:** A real-time database (e.g., Firebase) will store quiz questions, user data, scores, and leaderboard rankings. Data synchronization will occur automatically when the device connects to the internet.
- **Libraries:** External libraries for Lottie animations, CardView, and secure user authentication (e.g., Firebase Authentication) will be used.
- **Data Sharing:** Quiz data, leaderboard rankings, and user performance stats will be shared between the app's front-end and back-end components via APIs and stored in the database for real-time access.

## Communications Interfaces

- **Network Protocols:** The app will communicate using HTTPS to ensure secure data transfer between users and the server. Real-time data syncing for leaderboard updates and quiz submissions will be supported.
- **Message Formatting:** JSON format will be used for communication between the app and the backend server.
- **Security/Encryption:** All communications will be encrypted using SSL/TLS protocols to protect user data and ensure secure transactions, especially for rewards distribution.
- **Data Transfer Rates:** The app will support high-speed data transfers to ensure minimal lag in quiz responses and leaderboard updates.
- **Synchronization:** The app will synchronize user data, leaderboard rankings, and quiz results in real-time.

## Nonfunctional Requirements

### Performance Requirements

- **Response Time:** Quiz questions must load within 2 seconds, and leaderboard updates should occur in real-time.

- **Server Load:** The system should handle up to 10,000 concurrent users with no performance degradation.
- **App Size:** The APK file size should not exceed 50MB to accommodate users with limited storage.

### Safety Requirements

- **Data Integrity:** Safeguards will be in place to prevent any data corruption or loss, particularly during transactions and leaderboard updates.
- **Fraud Prevention:** Secure user authentication and anti-cheating mechanisms will be implemented to maintain fairness in the rewards and leaderboard system.
- **Compliance:** The app must comply with legal regulations for user privacy and data protection, such as GDPR.

### Security Features [1]

- **Two-Step Verification:** Implement two-step verification for user accounts to enhance security during login and transactions.
- **Password Change Management:** Allow users to change their passwords securely, with strong password policies enforced.
- **Humanity Check:** Integrate CAPTCHA or other bot detection mechanisms to prevent automated access and ensure fair play.
- **Secure Payment Gateway:** Use a secure, PCI-compliant payment gateway for processing subscriptions and withdrawals.

### Performance and Reliability

- **Response Time:** The app should load within 2 seconds and provide feedback (e.g., score updates, rewards) within 1 second after quiz submission.
- **Scalability:** The app should support up to 10,000 concurrent users without significant performance degradation.
- **Data Backup:** Implement regular data backups to prevent loss of user data and quiz results in case of system failures.



# References

- [1] Daniel Hoffman and Jonathan Smith. Security best practices in mobile application development: A critical review. *Journal of Cybersecurity*, 4(1):45–60, 2018.