Green University of Bangladesh

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

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
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<u>**Lab Project Status**</u>

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Comments:	**Date:**

Contents

Chapter 1

Project Proposal

1   Overview

The Quiz Application supports both online and offline modes. The application is designed to address the challenges of inconsistent internet connectivity while providing a seamless experience for quiz creation, participation, and evaluation. The system integrates a user-friendly interface, secure data management, and real-time synchronization for online functionality, while ensuring offline usability through local storage. The app aims to benefit educational institutions, students, and quiz organizers by offering an efficient and reliable solution.

2   Problem Definition

The current landscape Many existing quiz applications 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.

The Quiz & Earn, addresses these issues by:

1. Making learning fun and engaging.

2. Offering tough questions in a competitive tournament to get rewards.

3. Providing users with opportunities to win real money, incentivizing continued engagement.

This way, users will get more than just a game, they will get a chance to learn, compete, earn and to engage with each other.

3   Motivation

In today's world, people are constantly overwhelmed with vast amounts of information, making it essential to find ways to make learning both fun and engaging. **Quiz & Earn: A Dual-Mode Quiz App** seeks to address this need by creating an interactive platform that combines entertainment with education. The app allows quiz enthusiasts to select topics of their choice and participate in quizzes, providing them with not only a fun learning experience but also the opportunity to win real money as a reward for their efforts.

By offering a competitive tournament mode, the app encourages users to enhance their knowledge through more challenging questions, fostering a deeper level of engagement and intellectual growth. The combination of entertainment and real-time rewards adds an exciting dimension to the app, making learning an enjoyable and financially rewarding experience. Ultimately, Quiz & Earn aims to create a platform where users are motivated to learn, compete, and succeed while having fun.

4   Objectives

- To create an easy-to-use quiz app that covers a wide range of topics, making learning fun and accessible for all users.

- To introduce a tournament mode where users can compete for real money rewards, enhancing excitement and engagement.

- To offer premium, challenging quizzes for subscribers, providing a deeper, more rewarding learning experience.

- To implement a smooth and user-friendly payment and withdrawal system for seamless transactions.

- To encourage continuous learning and personal growth by offering competitive gameplay with challenging questions.

Chapter 2

Literature Review

Quiz applications have gained popularity for their ability to combine entertainment with learning. However, most existing quiz apps like Trivia Crack and QuizUp primarily focus on entertainment without offering significant rewards or incentives for long-term engagement. Users often lose interest when there is no tangible benefit beyond the game itself [1].

Research shows that incorporating elements like leaderboards and real-time rewards increases user engagement and motivation, particularly in competitive settings [2]. Most quiz apps do not offer opportunities for users to win real money, which could be a strong incentive for sustained interaction. Additionally, the lack of a dual-mode system (casual and competitive) in existing apps leaves a gap for users who want both casual fun and challenging experiences [3].

Furthermore, many quiz apps lack offline functionality or do not offer premium content for advanced users. This limits the potential for users to engage in more challenging quizzes or tournament-style gameplay, which can improve knowledge retention and offer a more dynamic experience [4].

The Quiz & Earn app addresses these gaps by providing real-time rewards, competitive tournaments, and a dual-mode system, allowing users to engage in both casual and competitive learning environments, while also offering them the chance to earn real money.

Chapter 3

Methodology

1 Software Requirements Specification (SRS)

The **Quiz & Earn** application is designed as a dual-mode quiz platform offering users an engaging and competitive experience. The application caters to both online and offline users, with features such as real-time rewards, secure payment integration, and a global leaderboard.

Functional Requirements

1. **User Panel:**

   - Account management with secure login, password reset, and guest mode.
   - Profile updates and quiz history.
   - Participation in real-time and offline quizzes with selectable categories and difficulty levels.
   - Rewards system integrated with a leaderboard.
   - Subscription for premium features.
   - Offline mode functionality with synchronization on reconnection.

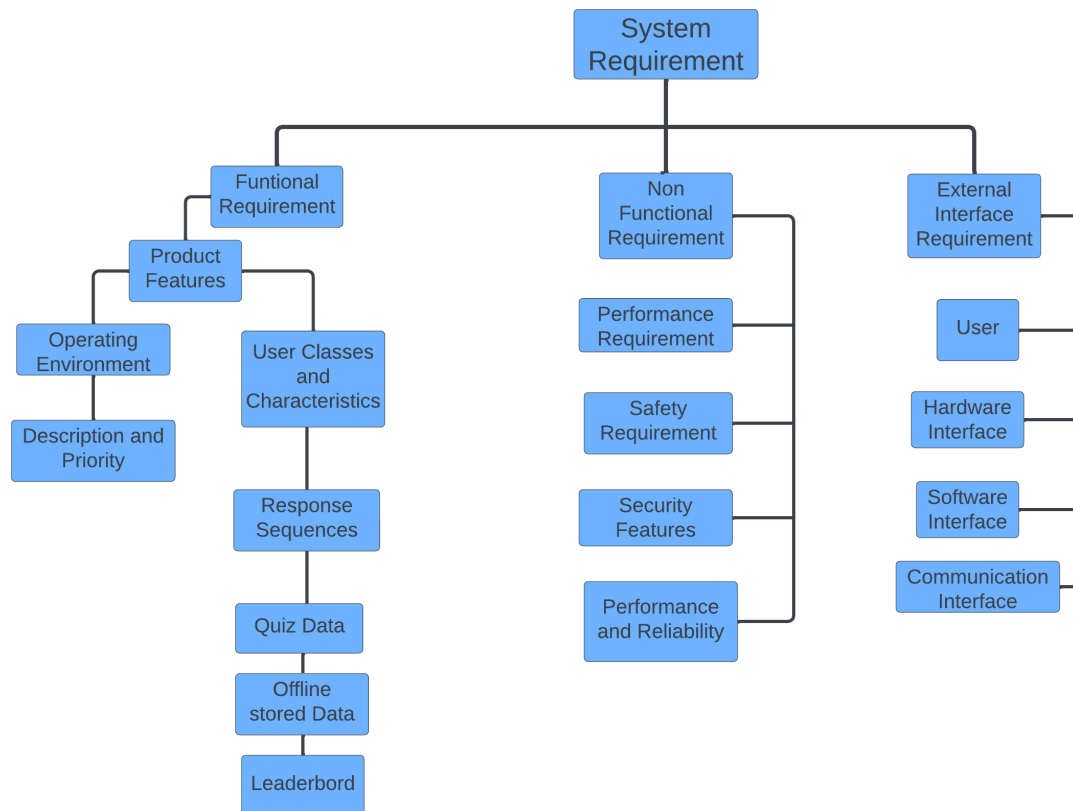2. **Admin Panel:**

   - Management of users and questions.
   - Monitoring rewards distribution and system performance.
   - Notifications for users.

3. **App Initialization:**

   - Offline mode availability when Internet access is restricted.

Non-Functional Requirements

- Secure two-step verification and integration with payment gateways.

- Quick response times and regular data backups.

- User-friendly interface following Android Material Design principles.

```
                              System
                            Requirement

    Funtional              Non                 External
    Requirement            Functional          Interface
                           Requirement         Requirement
  Product
  Features                 Performance         User
                           Requirement
Operating     User Classes                     Hardware
Environment   and          Safety              Interface
              Characteristics Requirement
Description and                                Software
Priority      Response      Security           Interface
              Sequences     Features
                                               Communication
              Quiz Data     Performance        Interface
                            and Reliability
              Offline
              stored Data

              Leaderbord
```

Figur 1.0: Software Requirements Specification

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2 Software Development Life Cycle

Agile Model Selection

The Agile methodology was chosen for the development of the *Quiz & Earn* app. This decision stems from its flexibility and iterative approach, which align with the project's dynamic requirements. Agile's emphasis on user feedback and incremental improvements supports the integration of key features such as real-time rewards, leaderboard updates, and dual-mode quizzes (learning and competitive).

SDLC Stages

1. **Planning and Requirement Analysis:** Stakeholders, market analysts, and domain experts collaborated to define the project's scope. Feasibility studies were conducted in technical, operational, and economic dimensions, ensuring the project's alignment with goals.

2. **Defining Requirements:** A comprehensive Software Requirement Specification (SRS) document outlined core functionalities:

   - Dual-mode quizzes.
   - Real-time rewards system.
   - User authentication and leaderboard functionalities.

3. **Designing Product Architecture:** The design phase resulted in modular system architecture. Components include:

   - Quiz Engine.
   - Rewards System.
   - Leaderboard Module.
   - User Management Module.

4. **Development:** The application's frontend was built in Java and the backend in PHP, ensuring modularity and scalability. Lottie animations and CardView were used for an engaging interface.

5. **Testing:** Iterative testing cycles were performed to ensure feature stability, security, and adherence to SRS specifications.

6. **Deployment and Maintenance:** Deployment is planned in phases to gather real-world feedback. Maintenance strategies include regular updates and feature enhancements.

Priority	Criteria	Waterfall	V-Shape	Iterative	Spiral	Agile	Prototype
5	Well known requirement	No	No	Yes	Yes	Yes	Yes
3	Technological knowledge	Yes	Yes	No	No	No	No
5	Efficiency	Yes	Yes	Yes	No	Yes	No
6	Risk analysis	No	Yes	No	Yes	Yes	No
3	User testing ability	No	No	Yes	Yes	Yes	Yes
5	Dependability and Security	Yes	Yes	No	No	Yes	No
3	Time consuming	Yes	Yes	Yes	Yes	No	No
Total 30	Over all	16	22	16	17	24	08

Figur 2.0: Software Development Life Cycle

3   Data Flow Diagram (DFD)

Level 0 DFD

The Level 0 DFD outlines the primary entities and data flows:

- **Entities:** User Panel, Admin Panel, Leaderboard, Withdraw BDT, and Quiz Data.

- **Main Process:** Quiz Management System.

- **Data Flows:** User information flows into the system, which manages users, quizzes, rewards, and leaderboard updates.

- Secure two-step verification and integration with payment gateways.

- Quick response times and regular data backups.

- User-friendly interface following Android Material Design principles.
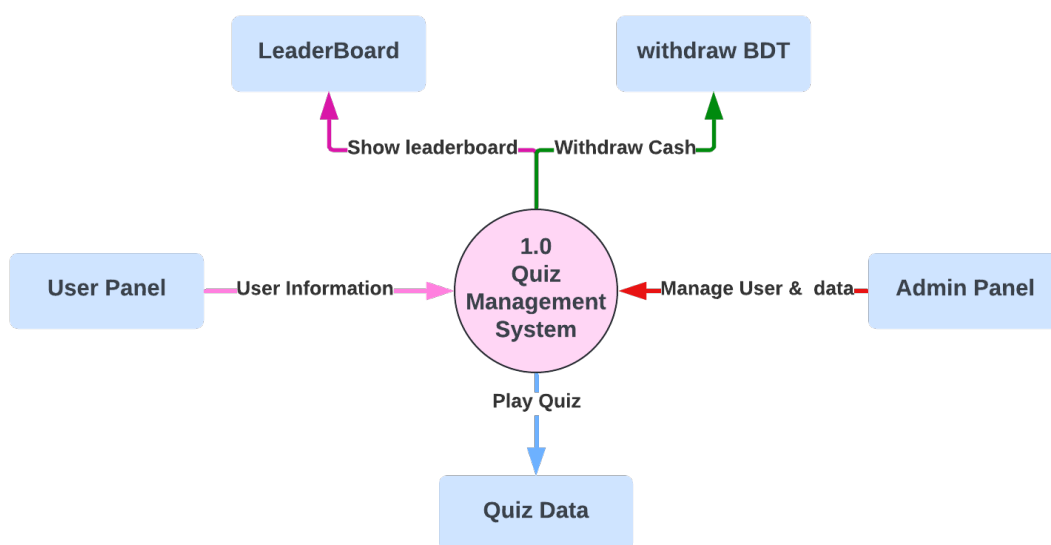
Figur 3.0: DFD Level 0

Level 1 DFD

The Level 1 DFD expands the main processes into detailed sub-processes:

- **Processes:** Admin Functions, Account Management, Quiz Participation, Offline Mode, Subscription Management, and Rewards System.

- **Data Stores:** Quiz Data, User Data, Offline Quiz Data, and Subscription Data.

- **Data Flows:** Includes login validation, quiz data handling, and reward synchronization.

- Secure two-step verification and integration with payment gateways.

- Quick response times and regular data backups.

- User-friendly interface following Android Material Design principles.
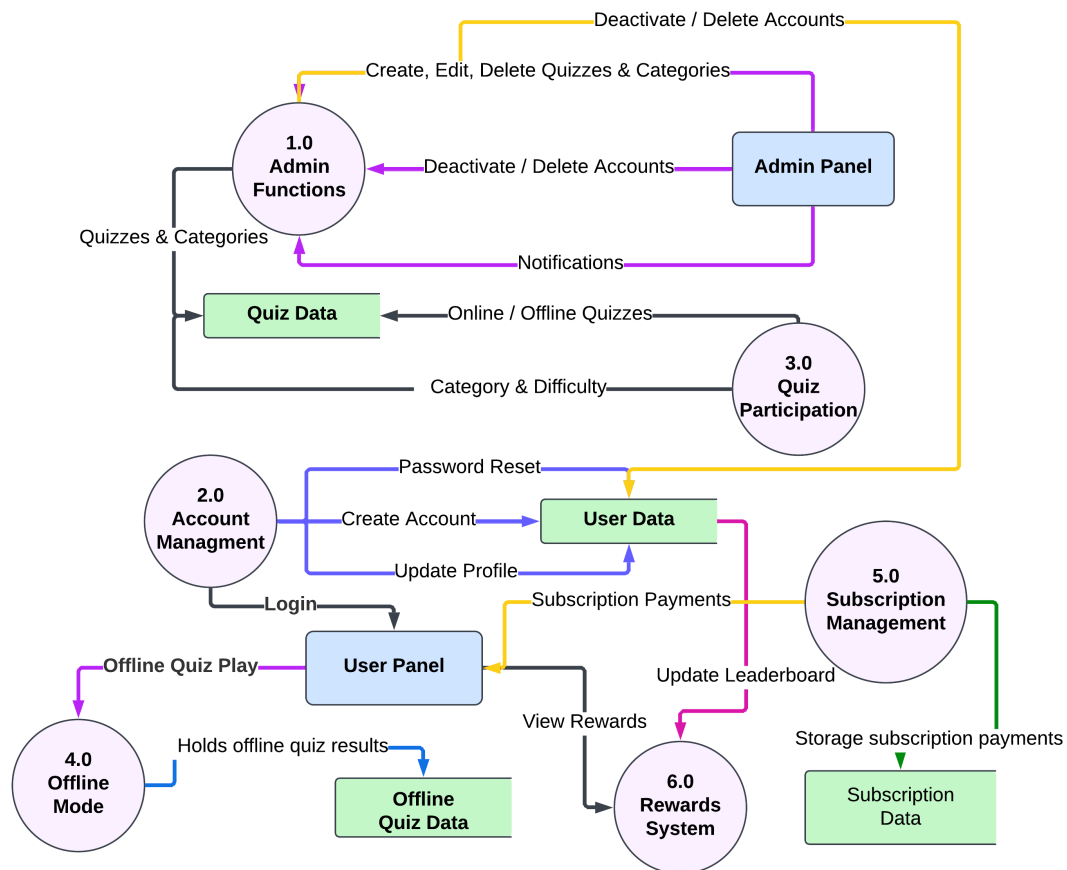
Figur 3.1: DFD Level 1

4   UML Use Case Diagram

The UML Use Case Diagram represents interactions between system actors and functionalities:

Actors

- **Online User:** Engages in quizzes, views the leader board, and manages accounts.

- **Guest User:** Limited to participation in quiz without account creation.

- **Admin:** Manages quizzes, notifications, and data backups.

Use Cases

- Log In

- Quiz Participation

- Notification

- Withdraw Cash

- Data Backup

- Quiz Management

Sub-use cases: Sub-use cases such as OTP verification and credential check are included for secure access.
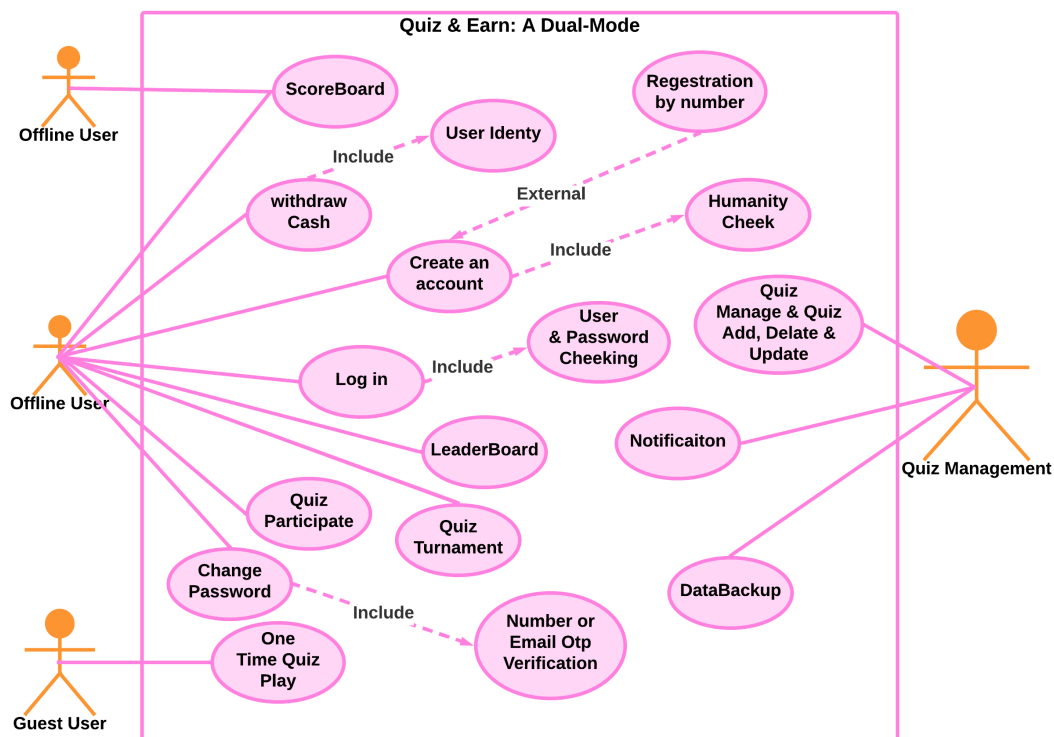

Figure 4.0: Use Case Diagram

5   UML Sequence and Communication Diagram

Purpose

The UML Sequence Diagram visualizes dynamic interactions in the system, highlighting message exchanges among key actors and objects during runtime. The Communication Diagram complements this by emphasizing relationships between system components.

Sequence Diagram Components

Actors:

- **User:** Initiates interactions (e.g., quiz selection, reward requests).

  Objects:

- **Quiz Frontend:** Manages user interactions.

- **Database:** Verifies credentials, updates scores.

- **Payment Gateway:** Handles reward withdrawals.

  Messages:

- Login verification, quiz participation, answer submission, reward processing, and logout.

Sequence Flow

1. User logs in.

2. The system verifies credentials via the database.

3. The user selects a quiz; the quiz engine fetches questions.

4. Answers are submitted and validated in real-time.

5. Rewards are credited based on performance and processed by the payment gateway.

6. User logs out.

Communication Diagram

The communication diagram illustrates object collaboration. Key relationships are established between:

- User ↔ Quiz Frontend: Initiates actions.

- Frontend ↔ Database: For data retrieval and updates.

- Database ↔ Payment Gateway: To process rewards securely.
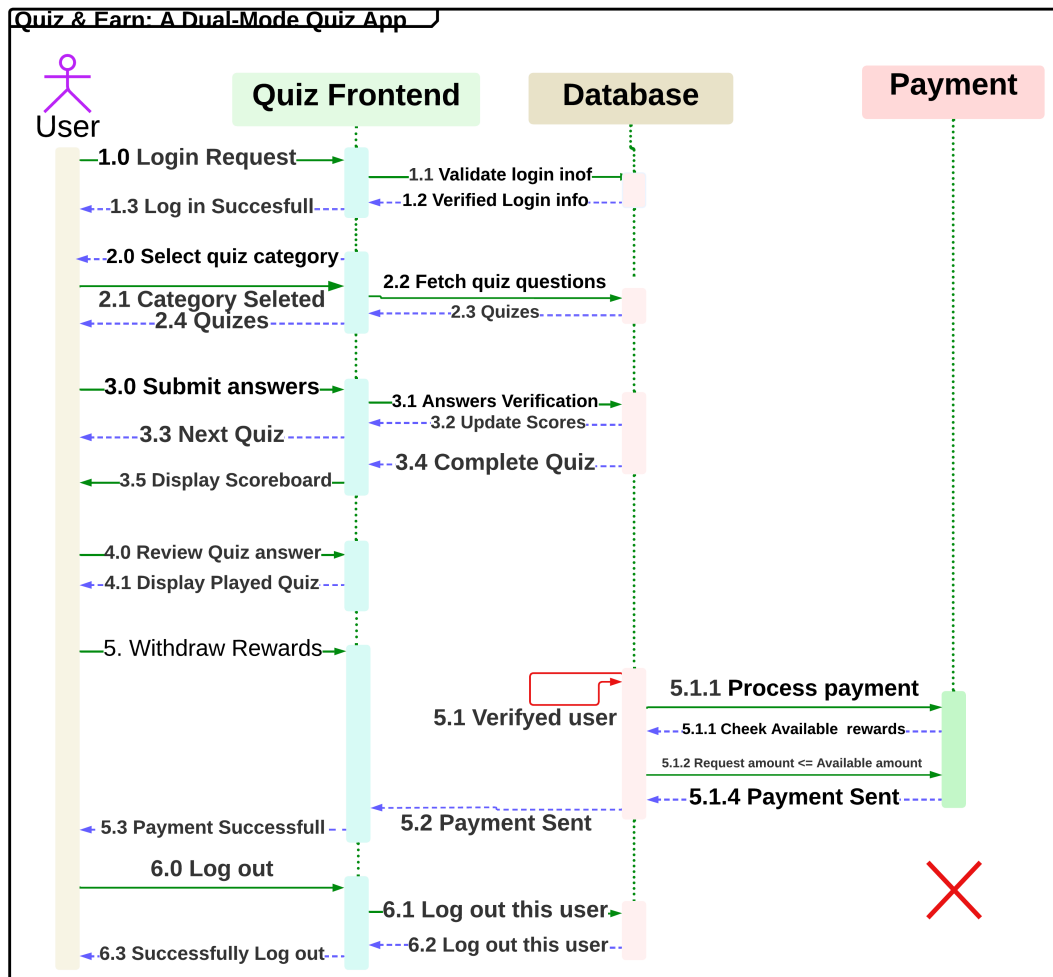
Figur 5.0: Sequence Diagram-

6   UML Class Diagram

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Key Classes and Relationships

Authentication:

- **Methods:** `verifyOTP(), validateCredentials().`

- **Purpose:** Ensures secure login and user validation.

User:

- **Base class with attributes for personal details.**

Derived Classes:

- **OfflineUser:** Accesses the scoreboard.

- **OnlineUser:** Participates in quizzes and manages rewards.

- **GuestUser:** Attempts quizzes without registration.

Quiz Management:

- **Admin functionality to add, update, or delete quizzes.**

Quiz:

- **Attributes:** Title, description, reward.

- **Methods:** startQuiz(), submitAnswer(), endQuiz().

Leaderboard:

- **Methods to update scores and fetch top ranks.**

Notification:

- **Sends updates to users about rewards or system events.**

Withdraw:

- **Attributes for tracking reward withdrawals.**

- **Methods:** confirmWithdraw(), cancelWithdraw().

Relationships

Inheritance: The User subclass handles specific functionalities for different user types (e.g., OfflineUser, OnlineUser, GuestUser).

Aggregation: QuizManagement aggregates quizzes.

Association: The User class interacts with Leaderboard, Notification, and Withdraw.
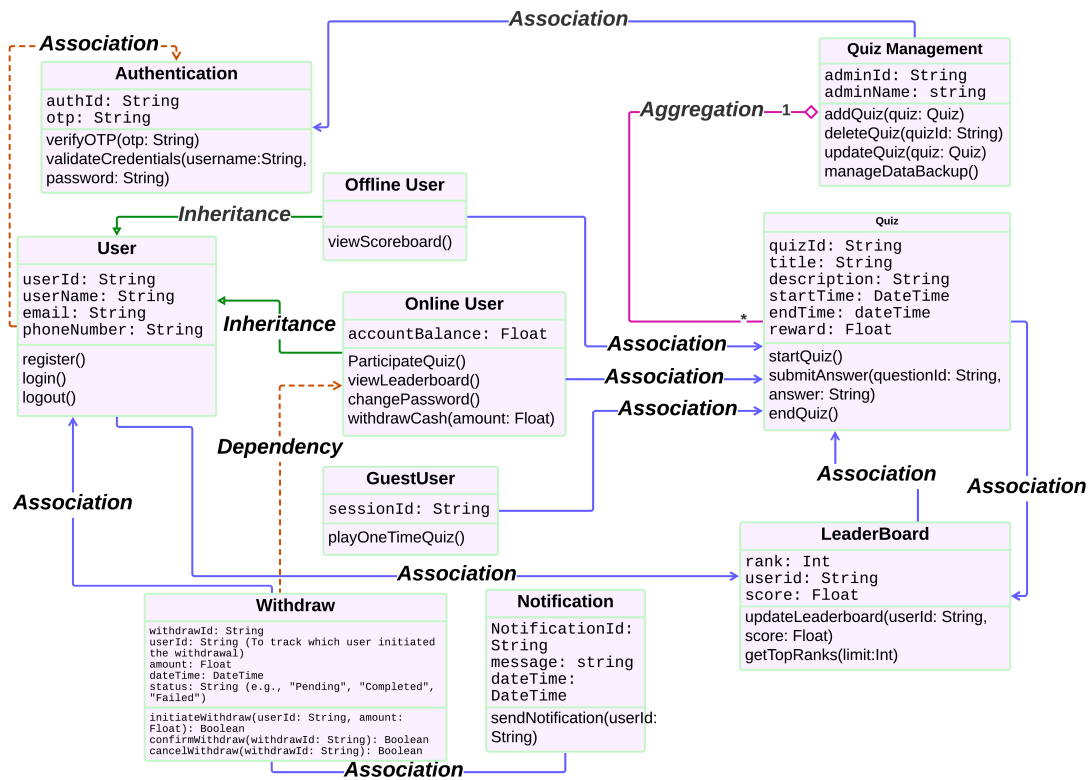
Figur 6.0: Class Diagram

Chapter 4

Conclusion

1 Discussion

The Quiz & Earn app transforms learning by combining education, entertainment, and financial rewards. With offline access, dual mode functionality, real-time rewards, and competitive leaderboards, it ensures inclusivity and engagement for users in all areas. By offering an educational alternative to addictive games, the app fosters intellectual growth and continuous learning, making a lasting impact on education and entertainment.

2 Limitation

Platform Limitation: The app is currently available only on Android, excluding iOS users.

3 Future Work

1. **Cross-platform Support:** Developing an iOS version of the app to expand its user base and increase market penetration.

2. **Secure Blockchain Payments:** Exploring blockchain technology to ensure more secure and transparent reward transactions.

3. **Marketing and Partnerships:** Partnering with educational institutions and organizations to integrate the app into their learning programs, creating a broader impact.

References

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[4] S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From game design elements to gamefulness: Defining 'gamification'," in *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, pp. 9–15, ACM, 2011.