**Database Mechanics for Quiz Game**

**Objective:**

To track user scores, progress through difficulty levels, and maintain a leaderboard for the quiz game. The database will store user data, quiz results, and allow for easy retrieval of questions based on difficulty levels.

**Tables Overview**

1. **Users Table**  
   This table stores user account information, such as their username, email, and the date they registered. Each user is assigned a unique ID (user\_id), which is used to link their quiz results and progress to the scores, leaderboard, and difficulties tables.
   * **Purpose**: Identify and store information about players.
   * **Key Columns**:
     + user\_id: Unique identifier for each user.
     + username: User’s chosen name.
     + email: User’s email (unique).
     + created\_at: Timestamp of when the account was created.
2. **Scores Table**  
   This table records the user's score after each quiz attempt. It tracks which user took the quiz, how many questions were answered, the score achieved, and the difficulty level of the quiz.
   * **Purpose**: Track the scores for each user after every quiz attempt.
   * **Key Columns**:
     + score\_id: Unique identifier for each score record.
     + user\_id: Links to the user who completed the quiz.
     + score: The user's score on the quiz.
     + total\_questions: The total number of questions in the quiz.
     + difficulty\_level: The difficulty level (Beginner, Intermediate, or Advanced) of the quiz.
     + quiz\_date: Timestamp of when the quiz was completed.
3. **Leaderboard Table**  
   This table stores the highest scores for each user across the different difficulty levels. It helps generate a leaderboard for the game, showing the best players for each difficulty.
   * **Purpose**: Maintain the highest scores for each user and difficulty level.
   * **Key Columns**:
     + leaderboard\_id: Unique identifier for each leaderboard entry.
     + user\_id: Links to the user with the highest score.
     + highest\_score: The highest score achieved by the user.
     + difficulty\_level: The difficulty level associated with the highest score (Beginner, Intermediate, Advanced).
4. **Difficulties Table**  
   This table tracks the progress of each user through the different difficulty levels. It marks whether the user has completed a difficulty level (e.g., Beginner) and is eligible to move on to the next one.
   * **Purpose**: Track user progress across different difficulty levels.
   * **Key Columns**:
     + difficulty\_id: Unique identifier for each difficulty level entry.
     + user\_id: Links to the user.
     + level: The difficulty level (Beginner, Intermediate, Advanced).
     + completed: Boolean indicating whether the user has completed the level.
5. **Questions Table**  
   This table stores the quiz questions, options, and the correct answer. Each question is associated with a difficulty level, and this structure helps to filter questions based on the selected difficulty.
   * **Purpose**: Store all quiz questions, options, and answers categorized by difficulty level.
   * **Key Columns**:
     + question\_id: Unique identifier for each question.
     + question\_text: The actual question text.
     + correct\_answer: The correct answer to the question.
     + options: The available options for the question (stored as JSON format).
     + difficulty\_level: The difficulty level of the question (Beginner, Intermediate, Advanced).
6. **User Progress Table (Optional)**  
   This table optionally stores how each user answers individual questions (whether correct or incorrect), which can help track user performance more granularly.
   * **Purpose**: Track individual user progress, including their answers to each question.
   * **Key Columns**:
     + progress\_id: Unique identifier for each progress entry.
     + user\_id: Links to the user.
     + question\_id: Links to the question answered by the user.
     + answer: The answer chosen by the user.
     + is\_correct: Boolean indicating if the user’s answer was correct.

**Game Mechanics and Operations**

1. **User Registration**
   * When a user registers for the quiz game, their information (username, email) is stored in the users table.
2. **Quiz Progression**
   * **Start the Quiz**: The game will fetch random or difficulty-specific questions from the questions table based on the selected difficulty level (Beginner, Intermediate, Advanced).
   * **Answering Questions**: After answering each question, the user’s progress is recorded (if tracking individual question answers) in the user\_progress table. The system checks if the answer is correct and updates the score accordingly.
3. **Score Recording**
   * After completing the quiz, the user's score is recorded in the scores table, including the total number of questions answered and the score obtained.
4. **Leaderboard**
   * At the end of the quiz, the system checks if the score is higher than the user’s previous highest score in the leaderboard table. If it is, the table is updated with the new highest score.
5. **Difficulty Progression**
   * Upon completing all the questions for a specific difficulty (e.g., Beginner), the system updates the difficulties table to mark the level as completed for the user, allowing them to progress to the next level (Intermediate).
6. **Question Randomization and Difficulty**
   * The questions are retrieved from the questions table based on the selected difficulty. Questions can be randomized to ensure varied gameplay experiences.
7. **Tracking and Updating Progress**
   * The user\_progress table (if used) allows tracking of answers and correctness, which can be useful for providing personalized feedback or adjusting difficulty for the user.

**Key Game Features**

1. **Score Calculation**: Each quiz attempts scores are tracked and can be displayed on a user profile or as a part of the leaderboard.
2. **Difficulty Levels**: Users must complete all questions in a given difficulty level before moving to the next level.
3. **Leaderboard**: Displays the top users and their highest scores for each difficulty level, providing a competitive aspect to the game.
4. **Progress Tracking**: The game allows for tracking user progress on individual questions, giving insight into areas of improvement.

This system ensures a structured and scalable way of managing user data, quiz results, and progression through the game while maintaining a fair and engaging leaderboard for competitive play.