**Documentation of MathQuizApp**

**Overview**

MathQuizApp is a Java-based console application that provides a platform for users to practice basic math problems. The application supports features like score tracking, database storage for past scores, and interactive quizzes with real-time feedback.

**Features**

1. **Interactive Quiz:**
   * Users can answer randomly generated math problems.
   * Problems include basic arithmetic operations (+, -, \*).
2. **Score Tracking:**
   * Tracks the number of questions answered and the number of correct answers.
   * Calculates the score percentage.
3. **Database Integration:**
   * Stores scores in a SQLite database.
   * Displays a summary of all past scores.
4. **Menu Interface:**
   * Offers options to start a quiz, view score summaries, view past scores, and exit the application.

**Application Components**

**1. Class Variables**

* **correctAnswers** (int): Tracks the number of correct answers.
* **totalQuestions** (int): Tracks the total number of questions answered.
* **connection** (Connection): Manages the connection to the SQLite database.

**2. Constructor**

* **MathQuizApp()**:
  + Initializes the SQLite database connection.
  + Calls initializeDatabase() to set up the required database schema.

**3. Methods**

**Database Management**

* **initializeDatabase()**:
  + Creates the Scores table if it doesn’t already exist.
  + Table schema:
    - id: Primary key (auto-increment).
    - totalQuestions: Total number of questions answered.
    - correctAnswers: Number of correct answers.
    - percentage: Score percentage.
    - timestamp: Time of score entry.
* **saveScoreToDatabase()**:
  + Saves the current session’s score to the Scores table.
* **viewAllScores()**:
  + Retrieves and displays all past scores from the database.
  + Outputs the data in a tabular format.

**Quiz Functionality**

* **displayMenu()**:
  + Provides a menu-driven interface for the application.
  + Options:
    1. Start Quiz
    2. View Score Summary
    3. View All Past Scores
    4. Exit
* **startQuiz()**:
  + Prompts the user to specify the number of questions.
  + Generates random math problems.
  + Validates user answers and updates correctAnswers and totalQuestions.
* **viewScoreSummary()**:
  + Displays a summary of the current session’s performance.

**Utility Methods**

* **getRandomOperator()**:
  + Returns a random operator from the set {+, -, \*}.
* **calculateAnswer(int num1, int num2, char operator)**:
  + Computes the result of a math problem based on the given operator.
* **closeDatabaseConnection()**:
  + Safely closes the SQLite database connection.

**4. Main Method**

* **main(String[] args)**:
  + Creates an instance of MathQuizApp.
  + Calls displayMenu() to start the application.

**Database Details**

* Database Name: MathQuizDB.db
* Table Name: Scores
* Schema:
* CREATE TABLE IF NOT EXISTS Scores (
* id INTEGER PRIMARY KEY AUTOINCREMENT,
* totalQuestions INTEGER,
* correctAnswers INTEGER,
* percentage REAL,
* timestamp DATETIME DEFAULT CURRENT\_TIMESTAMP
* );

**Sample Output**

**Menu**

Welcome to the Math Quiz Application!

Menu:

1. Start Quiz

2. View Score Summary

3. View All Past Scores

4. Exit

Enter your choice:

**Quiz Interaction**

Starting the quiz...

Enter the number of questions: 2

Question 1: 7 + 5 = ?

Your answer: 12

Correct!

Question 2: 3 \* 4 = ?

Your answer: 13

Wrong! The correct answer is 12

Quiz completed!

**View Scores**

All Past Scores:

ID Total Questions Correct Answers Percentage Timestamp

1 5 3 60.00 2025-01-16 12:00:00

2 2 2 100.00 2025-01-16 12:05:00

**Error Handling**

1. Invalid database connection errors are logged to the console.
2. User inputs are validated to prevent runtime crashes (e.g., handling non-numeric inputs).

**Conclusion**

MathQuizApp is a simple and interactive tool to improve basic math skills. Its database integration ensures persistent score tracking, making it ideal for practice and self-assessment.