**Class Diagram Explanation:**

**1. Question Class:**

- Attributes:

- questionID (unique identifier for each question)

- questionText (text of the question)

- choices (a list or array of Choice objects)

- Methods:

- getQuestionText()

- getChoices()

**2. Choice Class:**

- Attributes:

- choiceText (text of the choice)

- isCorrect (boolean indicating if this is the correct answer)

- Methods:

- getChoiceText()

- checkIfCorrect()

**3. UserProgress Class:**

- Attributes:

- userID (unique identifier for each user)

- currentQuestionIndex (index of the current question the user is on)

- score (current score of the user)

- Methods:

- updateCurrentQuestionIndex()

- updateScore()

- getUserScore()

**Database Schema Explanation:**

**1. Questions Table:**

- Columns: QuestionID Primary Key, QuestionText

- Each row represents a unique question.

**2. Choices Table:**

- Columns: ChoiceID Primary Key, QuestionID, ChoiceText, IsCorrect

- Each row represents a choice associated with a question. QuestionID is a foreign key linking to the Questions table.

**3. UserProgress Table:**

- Columns: UserID Primary Key, CurrentQuestionIndex, Score

- Each row tracks the progress of a user through the quiz.

Additional Many-to-Many Table: UserResponses

**4. UserResponses Table:**

- This table acts as a junction table between UserProgress and Questions.

- Columns: UserID, QuestionID, ChoiceID, IsCorrect, ResponseTimestamp

- UserID and QuestionID together make up the primary key of this table.

- ChoiceID references the choice selected by the user.

- IsCorrect is a boolean indicating whether the user's choice was correct.

- ResponseTimestamp records the time when the user answered the question.

**Relationships and Data Flow:**

- UserProgress to UserResponses: One-to-Many relationship. Each record in UserProgress can be linked to multiple entries in UserResponses, representing each question answered by the user.

- Questions to UserResponses: One-to-Many relationship. Each Question can be linked to multiple responses in UserResponses, representing answers from different users.

This design allows for tracking each user's responses to individual questions, including whether their answers were correct, and provides a means to reconstruct a user's entire quiz session. It's more normalized and efficient for querying and reporting purposes.

- Question and Choice: One-to-Many relationship. Each Question can have multiple Choices, but each Choice is associated with only one Question.

**- Flow of Data during the Quiz:**

**1. User Starts the Quiz:**

- A new instance of UserProgress is initiated for the user.

- The user's progress, including the current question index and score, is tracked in the UserProgress table.

**2. Displaying a Question:**

- The application fetches a question based on the currentQuestionIndex from the Questions table.

- The associated choices for the question are retrieved from the Choices table.

**3. User Submits an Answer:**

- The user selects a choice and submits their answer.

- The application records the response in the UserResponses table, including:

- UserID (linking to the user's progress)

- QuestionID (identifying the question answered)

- ChoiceID (the choice selected by the user)

- IsCorrect (whether the selected choice was correct)

- ResponseTimestamp (the time of submission)

**4. Updating User Progress:**

- If the answer is correct, the user's score in UserProgress is incremented.

- The currentQuestionIndex in UserProgress is incremented to move to the next question.

**5. End of the Quiz:**

- Once all questions have been answered or the user ends the quiz, the final score is displayed.

- The UserProgress table reflects the user's completion of the quiz.

**6. Review and Analytics:**

- The UserResponses table can be used for detailed analytics and review.

- It allows for analysis of individual responses, question difficulty, and user performance over time.