Schema Database Design

AI Quiz Hub - Entity Relationship Design

Overview

This document describes the database schema for the AI Quiz Hub application. The system uses PostgreSQL as the database and Django ORM for data management.

Entity Relationship Diagram

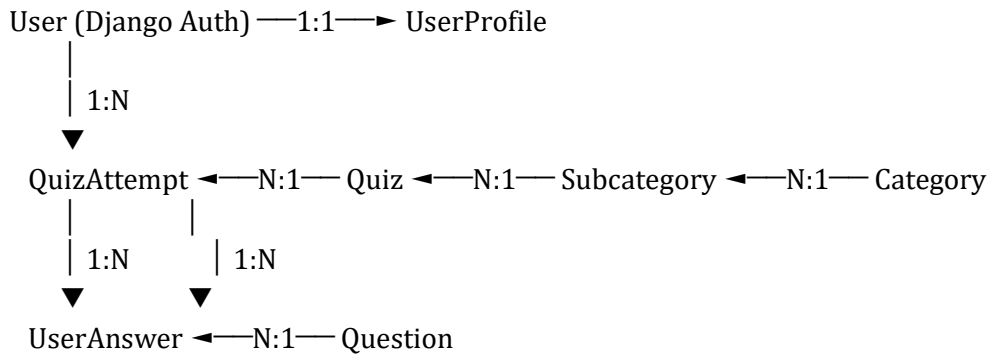The following diagram shows the relationships between all entities in the system:

```
User (Django Auth) ──1:1──▶ UserProfile
     │
     │ 1:N
     ▼
QuizAttempt ◀──N:1── Quiz ◀──N:1── Subcategory ◀──N:1── Category
     │         │
     │ 1:N     │ 1:N
     ▼         ▼
UserAnswer ◀──N:1── Question
```

Table Definitions

1. User (Django Built-in)

Column	Type	Constraints	Description
id	Integer	PK, Auto	Primary key
username	VARCHAR(150)	Unique, Not Null	Username
email	VARCHAR(254)		Email address
password	VARCHAR(128)	Not Null	Hashed password
first_name	VARCHAR(150)		First name
last_name	VARCHAR(150)		Last name
is_active	Boolean	Default: True	Account active status
is_staff	Boolean	Default: False	Staff access
date_joined	DateTime	Auto	Registration date

2. UserProfile

Column	Type	Constraints	Description
id	Integer	PK, Auto	Primary key
user_id	Integer	FK(User), Unique	One-to-one with

			User
is_quiz_admin	Boolean	Default: False	Admin privileges
avatar	URL(500)	Nullable	Avatar URL
avatar_file	Image	Nullable	Uploaded avatar
bio	Text(500)		User biography
preferred_difficulty	VARCHAR(20)	Default: medium	Easy/Medium/Hard
preferred_category_id	Integer	FK(Category), Nullable	Favorite category
questions_per_quiz	Integer	Default: 10	5/10/15/20
theme	VARCHAR(10)	Default: light	Light/Dark/Auto
email_notifications	Boolean	Default: True	Email preferences
current_streak	Integer	Default: 0	Current quiz streak
longest_streak	Integer	Default: 0	Best streak ever
last_quiz_date	Date	Nullable	Last quiz taken
total_points	Integer	Default: 0	Accumulated points

3. Category

Column	Type	Constraints	Description
id	Integer	PK, Auto	Primary key
name	VARCHAR(100)	Unique, Not Null	Category name
description	Text		Category description
icon	VARCHAR(50)	Default: book-open	Feather icon name

4. Subcategory

Column	Type	Constraints	Description
id	Integer	PK, Auto	Primary key
name	VARCHAR(100)	Not Null	Subcategory name
description	Text		Description
category_id	Integer	FK(Category), Not Null	Parent category

5. Quiz

Column	Type	Constraints	Description
id	Integer	PK, Auto	Primary key
title	VARCHAR(200)	Not Null	Quiz title
difficulty	VARCHAR(20)	Not Null	easy/medium/hard
subcategory_id	Integer	FK(Subcategory), Not Null	Topic
time_limit	Integer	Default: 600	Time in seconds
created_at	DateTime	Auto	Creation timestamp

6. Question

Column	Type	Constraints	Description

id	Integer	PK, Auto	Primary key
quiz_id	Integer	FK(Quiz), Not Null	Parent quiz
question_text	Text	Not Null	Question content
option_a	VARCHAR(500)	Not Null	First option
option_b	VARCHAR(500)	Not Null	Second option
option_c	VARCHAR(500)	Not Null	Third option
option_d	VARCHAR(500)	Not Null	Fourth option
correct_answer	CHAR(1)	Not Null	A/B/C/D
explanation	Text		Answer explanation
order	Integer	Default: 0	Question order

7. QuizAttempt

Column	Type	Constraints	Description
id	Integer	PK, Auto	Primary key
user_id	Integer	FK(User), Not Null	Quiz taker
quiz_id	Integer	FK(Quiz), Not Null	Quiz taken
score	Integer	Default: 0	Correct answers
total_questions	Integer	Default: 0	Total questions
status	VARCHAR(20)	Default: in_progress	in_progress/completed
started_at	DateTime	Auto	Start time
completed_at	DateTime	Nullable	Completion time
current_question	Integer	Default: 0	Progress tracker
time_remaining	Integer	Nullable	Seconds left

8. UserAnswer

Column	Type	Constraints	Description
id	Integer	PK, Auto	Primary key
attempt_id	Integer	FK(QuizAttempt), Not Null	Quiz attempt
question_id	Integer	FK(Question), Not Null	Question answered
selected_answer	CHAR(1)	Nullable	A/B/C/D or null
is_correct	Boolean	Default: False	Answer correctness

Relationships Summary

Relationship	Type	Description
User -> UserProfile	1:1	Each user has one profile
Category -> Subcategory	1:N	Category contains many subcategories
Subcategory -> Quiz	1:N	Subcategory contains many quizzes
Quiz -> Question	1:N	Quiz contains many questions
Quiz -> QuizAttempt	1:N	Quiz has many attempts
User -> QuizAttempt	1:N	User has many attempts

QuizAttempt -> UserAnswer	1:N	Attempt has many answers
Question -> UserAnswer	1:N	Question has many answers
UserProfile -> Category	N:1	User prefers one category