QuizVerse - A Quiz Preparation Application

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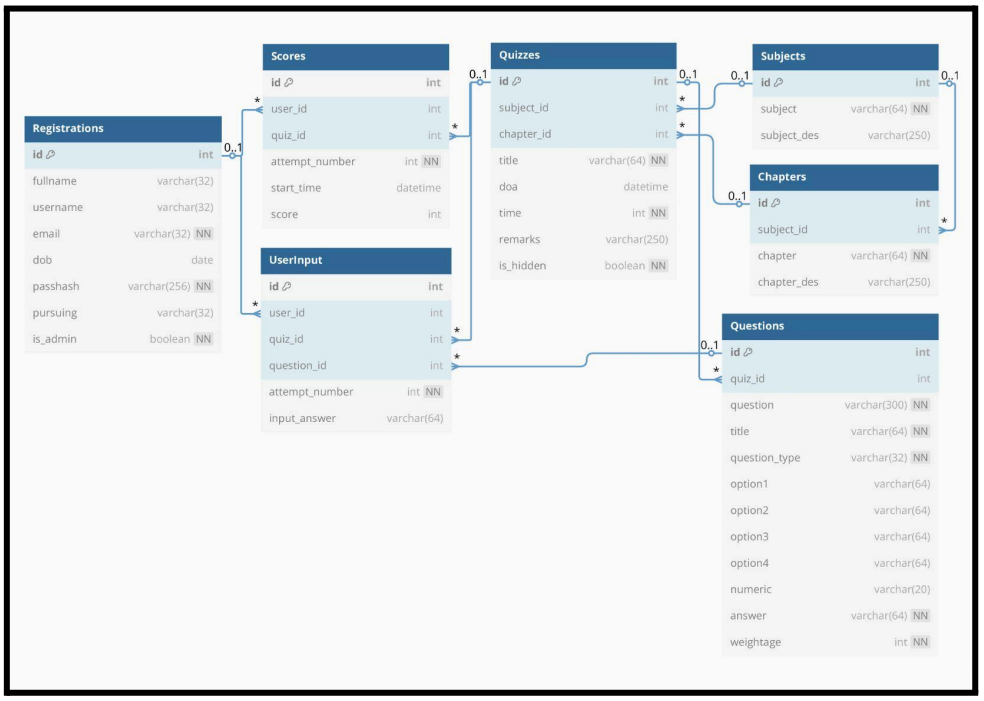
Description

The "QuizVerse" app is a Flask-based multi-user exam preparation platform where an admin (quiz master) manages subjects, chapters, quizzes, and questions, while users register, attempt quizzes, and view scores.

Technologies used

1. Flask:
    - Purpose: Core framework facilitating backend functionality, routing, and rendering templates.
2. Flask Extensions:
    - Flask-Login: For handling user authentication and role-based access control.
    - Flask-SQLAlchemy: For ORM-based database interactions with SQLite.
    - Flask-Bcrypt: For securely hashing passwords.
3. SQLite:
    - Purpose: Backend database to store application data, including users, quizzes, and scores.
4. Jinja2 Template Engine:
    - Purpose: Used for dynamic rendering of HTML templates.
5. HTML, CSS, Bootstrap:
    - Purpose: For designing a responsive and interactive front-end.
6. Matplotlib:
    - Purpose: To generate visualizations such as pie charts, bar charts, and performance graphs.
7. Other Utilities and Libraries:
    - Datetime: For handling quiz durations, timestamps, and age verification.
    - Functools: For creating reusable decorators like @admin_auth.
    - Base64 and BytesIO: For embedding chart images into web pages.

DB Schema Design



1. Normalization: The database follows proper normalization to avoid redundancy and ensure scalability.
2. Data Integrity: Primary keys, foreign keys, unique constraints, and check constraints ensure integrity across relationships.
3. Flexibility: Relationships with cascading deletions allow consistent cleanup of child records when parent records are removed.
4. Role Management: The is_admin flag in the Registrations table differentiates admins from regular users.
5. Multi-Layer Validation: Data validation is done at the frontend, application, and database levels to ensure consistency and security.

Architecture and Features

- Admin Dashboard: Admin can create, edit, and delete subjects, chapters, quizzes, and questions.
- User Dashboard: Users can register, log in, attempt quizzes, and view scores.
- Quiz Management: Includes MCQs, automatic scoring, and timer functionality for quizzes.
- Data Validation: Implemented at multiple levels (frontend, backend, and database using constraints).
- Secure Authentication: Passwords are securely hashed with Flask-Bcrypt.
- Charts: Summary statistics visualized using libraries like Matplotlib.
  These features are implemented using Flask controllers, SQLAlchemy relationships, and dynamic Jinja2 templates for a seamless experience.

Video (Link) I hope you find the video engaging.

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