Supplementary Materials and Database Schemes

Comprehensive Database Schemes for Features

Core Features

User Management

Document: `users`

- `user_id`: Unique identifier for the user (String)
- `name`: Full name of the user (String)
- `email`: User's email address (String)
- `password_hash`: Hashed password for secure authentication (String)
- `role`: Role of the user (`student`, `instructor`, `admin`) (String)
- `profile_picture_url`: URL of the user's profile picture (optional) (String)
- `created_at`: Timestamp of account creation (DateTime)

Course Management

Document: `courses`

- `course_id`: Unique identifier for the course (String)
- `title`: Title of the course (String)
- `description`: Brief description of the course (String)
- `category`: Course category (e.g., `Math`, `CS`) (String)
- `difficulty_level`: Difficulty level (`Beginner`, `Intermediate`, `Advanced`) (String)
- `created_by`: Instructor who created the course (String)
- `created_at`: Timestamp of course creation (DateTime)

Document: `modules`

- `module_id`: Unique identifier for the module (String)
- `course_id`: Associated course ID (String)
- `title`: Title of the module (String)
- `content`: Content of the module (String)
- `resources`: Array of URLs to additional resources (optional) (Array[String])
- `created_at`: Timestamp of module creation (DateTime)

Interactive Modules

Document: `quizzes`

- `quiz_id`: Unique identifier for the quiz (String)

- `module_id`: Associated module ID (String)
- `questions`: Array of quiz questions (Array[Object])
- `created_at`: Timestamp of quiz creation (DateTime)

Document: `responses`

- `response_id`: Unique identifier for the response (String)
- `user_id`: User who submitted the response (String)
- `quiz_id`: Associated quiz ID (String)
- `answers`: User's answers to the quiz questions (Array[Object])
- `score`: Score received for the quiz (Integer)
- `submitted_at`: Timestamp of submission (DateTime)

Performance Tracking

Document: `progress`

- `progress_id`: Unique identifier for progress tracking (String)
- `user_id`: Associated user ID (String)
- `course_id`: Associated course ID (String)
- `completion_percentage`: Percentage of course completed (Float)
- `last_accessed`: Last time the course was accessed (DateTime)

Additional Features

Quick Notes (Software Engineering)

Document: `notes`

- `note_id`: Unique identifier for the note (String)
- `user_id`: User who created the note (String)
- `course_id`: Associated course ID (optional) (String)
- `content`: Content of the note (String)
- `created_at`: Timestamp of note creation (DateTime)
- `last_updated`: Last time the note was updated (DateTime)

Adaptive Learning Recommendation Engine (Data Science)

Document: `user_interactions`

- `interaction_id`: Unique identifier for the interaction (String)
- `user_id`: Associated user ID (String)
- `course_id`: Associated course ID (String)
- `score`: Score achieved in a module (Float)
- `time_spent_minutes`: Time spent on the module (Integer)
- `last_accessed`: Last time the module was accessed (DateTime)

Document: `recommendations`

- `recommendation_id`: Unique identifier for the recommendation (String)
- `user_id`: Associated user ID (String)
- `recommended_items`: Array of recommended courses/modules (Array[String])

- **generated_at**: Timestamp of recommendation generation (DateTime)

Link to simulated Dataset to train the model and json file to include in the database: `https://drive.google.com/drive/folders/1szjm1X_Bcin8D5IzU54rjEsawb1lmqtJ?usp=sharing`

Biometric Authentication (Information Security)

Document: authentication_logs

- **log_id**: Unique identifier for the log (String)
- **user_id**: User who authenticated (String)
- **event**: Event description (e.g., "Biometric Authentication") (String)
- **timestamp**: Timestamp of the event (DateTime)
- **status**: Status of authentication (e.g., "Success", "Failure") (String)

Dynamic Configuration Management

Document: configurations

- **config_id**: Unique identifier for the configuration (String)
- **settings**: Key-value pairs for application settings (Object)
- **updated_by**: User who last updated the configuration (String)
- **updated_at**: Timestamp of the last update (DateTime)

Suggested Implementation for Additional Features

Quick Notes

- Provide a text area for note creation and a list view for displaying saved notes. - Use autosave functionality for preventing data loss. - Optional: Develop APIs for saving and retrieving notes across devices.

Adaptive Learning Recommendation Engine

- Use a recommendation dashboard for displaying personalized course or module suggestions. - Implement collaborative or content-based filtering algorithms to suggest content based on user interactions.

Biometric Authentication

- Integrate third-party biometric authentication SDKs (e.g., FaceIO, FingerprintJS) in the frontend. - Validate tokens and log authentication events for audit purposes in the backend.

Dynamic Configuration Management

- Create an admin panel for updating configurations such as feature toggles and maintenance modes. - Store configurations in a database and use caching for real-time application.