

## IX. Database Schema: Cloud Firestore Structure

The schema uses two main collections designed to optimize reads for the frontend and writes for the Cloud Function.

### A. Collection 1: questions (The Question Bank)

This collection stores all the proprietary content. It is primarily written to by the **Admin CMS** and read by the **Cloud Function** and the user app.

Field Name	Data Type	Description	Admin CMS Role
id	Document ID	Unique ID for the question.	Auto-generated
examId	String	Foreign key to the specific certification (e.g., pmp_2024 ).	Mandatory Mapping
domain	String	The major topic area (e.g., Domain 3: Risk Management ).	Mandatory Mapping
objectiveId	String	The specific skill objective being tested (e.g., 3.2: Analyze qualitative risks ).	Mandatory Mapping
stem	String	The text of the question.	Question Editor
options	Array	Array of 4-5 answer choices.	Question Editor
correctAnswer	String	The key for the correct choice.	Question Editor
explanation	String	Detailed rationale for the correct answer (subscription value).	Question Editor

Field Name	Data Type	Description	Admin CMS Role
difficulty	Number (1-5)	Initial difficulty rating (calibrated later by the AI).	Content Reviewer
status	String	draft , reviewed , active . Used by the Two-Stage Review Process.	Workflow Control
lastUpdatedBy	String	Admin User ID who last edited the question.	Audit/Security

## B. Collection 2: userMastery (The AI's Brain)

This collection is the heart of the personalization. It is primarily written to by the **Cloud Function** (after a quiz is submitted) and read by the **Cloud Function** (to generate the next quiz).

Field Name	Data Type	Description	Cloud Function Role
id	Document ID	Unique ID (User ID + Exam ID) (e.g., user123_pmp_2024 ).	Auto-generated
userId	String	Foreign key to the users collection.	Primary Access
examId	String	The specific certification the user is studying for.	Primary Access
masteryData	Map	The core adaptive data, structured by <b>Objective ID</b> .	AI Logic Input/O

Field Name	Data Type	Description	Cloud Function Role
masteryData.{objectiveId}.correct	Number	Count of correct attempts for this objective.	Calculate Input (M)
masteryData.{objectiveId}.total	Number	Count of total attempts for this objective.	Calculate Input (M)
masteryData.{objectiveId}.intervalFactor	Number	The Spaced Repetition interval (IF) multiplier (e.g., 1.0, 3.0, 7.0).	Spaced Repetition Logic
masteryData.{objectiveId}.lastReview	Timestamp	Date of the user's last review for this objective.	Calculate Urgency

## C. The Link to AI Logic

- Quiz Generation:** The `getAdaptiveQuestions` Cloud Function queries the `userMastery` collection, sees which objectives have a low Correct/Total ratio and a high **Urgency** (Interval Factor), and then uses those prioritized `objectiveId`s to query the `questions` collection for questions to include in the user's next quiz.
- Scoring:** When a quiz is finished, the function updates the `correct` and `total` counts in the `userMastery` collection for every objective tested, and adjusts the `intervalFactor`.

This schema provides the foundation for a fast, powerful, and scalable adaptive learning experience.

We have a complete, low-risk plan ready for the **Anti-Gravity AI Certification Coach** app!