Database Tables – Intelligent Learning System

Table: users

Field Name	Data Type	Constraints	Description
_id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique identifier for each user
name	VARCHAR(100)	NOT NULL	Full name of the user
email	VARCHAR(150)	UNIQUE, NOT NULL	Unique login email address
password_hash	VARCHAR(255)	NOT NULL	Encrypted password
role	ENUM('Student','Instructor','Admin')	NOT NULL	Role of the user
profile_image	VARCHAR(255)	NULL	URL to avatar/image
preferredMedia	VARCHAR(50)	NULL	Preferred learning media type
masteryScore	DECIMAL(5,2)	DEFAULT 0 CHECK (masteryScore BETWEEN 0 AND 100)	Overall academic strength score
weaknessTags	TEXT	NULL	Tags identifying struggle areas
createdAt	TIMESTAMP	DEFAULT CURRENT_TIMESTAMP	Account creation timestamp

Table: courses

Field Name	Data Type	Constraints	Description
id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique course ID
title	VARCHAR(150)	NOT NULL	Name of the course
instructorId	BIGINT	FOREIGN KEY REFERENCES users(_id), NOT NULL	Reference to Instructor

description	TEXT	NOT NULL	Course summary
descEmbedding	TEXT	NULL	AI vector embedding for semantic search
tags	TEXT	NULL	Course categorization keywords
isPublished	BOOLEAN	DEFAULT FALSE	Visibility status of course

Table: modules

Field Name	Data Type	Constraints	Description
id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique module ID
courseId	BIGINT	FOREIGN KEY REFERENCES courses(id), NOT NULL	Reference to parent course
title	VARCHAR(150)	NOT NULL	Module name
sequenceOrder	INT	NOT NULL	Default module order
difficultyLevel	INT	CHECK (difficultyLevel BETWEEN 1 AND 10)	Difficulty scale (1-10)

Table: lessons

Field Name	Data Type	Constraints	Description
id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique lesson ID
moduleId	BIGINT	FOREIGN KEY REFERENCES modules(id), NOT NULL	Reference to parent module
title	VARCHAR(150)	NOT NULL	Lesson name
type	ENUM('Video','Quiz','Reading','Assignment')	NOT NULL	Lesson type
content	TEXT	NOT NULL	Stores lesson text or resource URL

vectorEmbeddi ng	TEXT	NULL	AI embeddi ng for context retrieval
estimatedDurati on	INT	CHECK (estimatedDurati on > 0)	Expected completio n time (minutes)

Table: enrollments

Field Name	Data Type	Constraints	Description
id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique enrollment ID
studentId	BIGINT	FOREIGN KEY REFERENCES users(_id), NOT NULL	Reference to student
courseId	BIGINT	FOREIGN KEY REFERENCES courses(id), NOT NULL	Reference to course
enrolledAt	TIMESTAMP	DEFAULT CURRENT_TIMESTAM P	Enrollment timestamp
overallProgress	DECIMAL(5,2)	DEFAULT 0 CHECK (overallProgress BETWEEN 0 AND 100)	Course completion percentage
adaptivePath	TEXT	NULL	AI-generated lesson sequence for student

Table: activity_logs

Field Name	Data Type	Constraints	Descript ion
id	BIGINT	PRIMARY KEY, AUTO_INCREMEN T, NOT NULL	Unique activity log ID
studentI d	BIGINT	FOREIGN KEY REFERENCES users(_id), NOT NULL	User performi ng action
resourc eId	BIGINT	NOT NULL	Lesson or quiz accessed
actionT	ENUM('VideoStart','VideoPause','PageScroll','	NOT NULL	Type of

			interaction
ype	QuizAttempt')		interaction
timesta mp	TIMESTAMP	DEFAULT CURRENT_TIMES TAMP	Time of event
duratio n	INT	CHECK (duration >= 0)	Time spent in seconds
metadat a	TEXT	NULL	Addition al context data (JSON format)

Table: quizzes

Field Name	Data Type	Constraints	Description
id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique quiz ID
lessonId	BIGINT	FOREIGN KEY REFERENCES lessons(id), NOT NULL	Linked lesson
questions	TEXT	NOT NULL	List of question objects (JSON format)
conceptTag	VARCHAR(100)	NOT NULL	Knowledge gap classification tag

Table: submissions

Field Name	Data Type	Constraints	Description
id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique submission ID
studentId	BIGINT	FOREIGN KEY REFERENCES users(_id), NOT NULL	Reference to student
quizId	BIGINT	FOREIGN KEY REFERENCES quizzes(id), NOT NULL	Reference to quiz
score	DECIMAL(5,2)	CHECK (score BETWEEN 0 AND 100)	Quiz score

| answers | TEXT | NOT NULL | Student answers (JSON format) |
| timeTaken | INT | CHECK (timeTaken >= 0) | Total time taken in seconds |

Table: attendance

Field Name	Data Type	Constraints	Description
_id	BIGINT	PRIMARY KEY, AUTO_INCREMENT, NOT NULL	Unique attendance ID
studentId	BIGINT	FOREIGN KEY REFERENCES users(_id), NOT NULL	Reference to student
courseId	BIGINT	FOREIGN KEY REFERENCES courses(id), NOT NULL	Reference to course
lessonId	BIGINT	FOREIGN KEY REFERENCES lessons(id), NULL	Optional live lesson reference
date	DATE	NOT NULL	Session date