

MongoDB Schema Design Overview – Online Learning Platform

Collection	Description
users	Stores all users including students, instructors, and admins.
courses	Stores course metadata, each course has one instructor.
lessons	Lessons for each course, ordered and linked by <code>course_id</code> .
exams	One exam per course with nested questions array.
enrollments	Tracks student enrollments for each course.

Schema Design

1. users Collection

The users collection stores information about users in the platform. Users can be students, instructors, or admins.

```
_id: "u20"  
name : "Admin Tom Wilson"  
email : "tom@platform.com"  
password : "hashed_password_20"  
role : "admin"  
registered_at : "2024-01-08T08:30:00Z"
```

- **_id**: Unique user ID.
- **name**: User's name.
- **email**: User's email.
- **Password**: User's password

- **role:** Role of the user (student, instructor, admin).
- **registered_at:** Timestamp of when the user registered.

2. courses Collection

The courses collection stores details about courses. Each course has a reference to an instructor (instructor_id), which is linked to a record in the users collection.

```
_id: "c10"  
title: "Web Development Basics"  
description: "Learn HTML, CSS, and JavaScript to build websites."  
instructor_id: "u11"  
category: "Web Development"  
created_at: "2024-03-10T10:00:00Z"
```

- **_id:** Unique course ID.
- **title:** Title of the course.
- **description:** Short description of the course.
- **instructor_id:** Reference to the instructor in the users collection.
- **category:** Category of the course (e.g., Programming, Data Science).
- **created_at:** Timestamp when the course was created.

3. lessons Collection

The lessons collection represents individual lessons within a course. Each lesson is associated with a course (course_id), and the lessons are ordered by order_number.

```
_id: "l6"  
title: "Introduction to Python - Lesson 6"  
content: "This is the content for lesson 6 of Introduction to Python."  
course_id: "c1"  
order_number: 6  
created_at: "2024-03-07T00:00:00Z"
```

- **_id**: Unique lesson ID.
- **title**: Title of the lesson.
- **content**: Text content of the lesson.
- **course_id**: Reference to the course in the courses collection.
- **order_number**: The sequence number of the lesson within the course.
- **created_at**: Timestamp when the lesson was created.

4. exams Collection

The exams collection stores exam details for each course. Each exam has multiple questions, each with options and a correct answer.

```
  _id: "e14"
  course_id: "c14"
  title: "Network Fundamentals - Final Exam"
  start_time: "2024-03-20T09:00:00Z"
  duration_minutes: 60
  questions: Array (5)
    0: Object
    1: Object
    2: Object
    3: Object
    4: Object
```

- **_id**: Unique exam ID.
- **course_id**: Reference to the course in the courses collection.
- **title**: Title of the exam.
- **start_time**: The start time of the exam.
- **duration_minutes**: Duration of the exam in minutes.

- **questions:** An array of questions, each with possible options and the correct answer.

5. enrollments Collection

The enrollments collection tracks which students are enrolled in which courses. It includes the enrollment status and the enrollment timestamp.

```
_id: "en13"
student_id: "u3"
course_id: "c11"
enrolled_at: "2024-03-14T00:00:00Z"
status: "pending"
```

- **_id:** Unique enrollment ID.
- **student_id:** Reference to the student in the users collection.
- **course_id:** Reference to the course in the courses collection.
- **enrolled_at:** Timestamp when the student enrolled in the course.
- **status:** Enrollment status (active, pending).

