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ER DIAGRAM DOCUMENTATION

LearnHub – Online Learning Platform

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1. Introduction

The Entity Relationship (ER) Diagram represents the logical database structure of the Learn Hub Online Learning Platform. It illustrates the entities involved in the system, their attributes, and the relationships between them.

The Learn Hub platform is developed using the MERN stack, where MongoDB is used as the database. The ER diagram focuses on two primary collections:

- Users
- Courses

These collections store all essential information required for managing users and courses within the platform.

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2. Entities and Attributes

2.1 Users Collection

The Users collection stores information about all registered individuals on the platform. Users may act as students, educators, or administrators depending on their assigned role.

Attributes:

1. **_id**
    - Automatically generated by MongoDB
    - Acts as Primary Key
    - Ensures uniqueness for each user
2. **name**
    - Stores the full name of the user
3. **email**
    - Stores the user’s email address
    - Must be unique
4. **password**
    - Stores the encrypted password
5. **type**
    - Defines the user role (Student / Educator / Admin)

Primary Key: _id

2.2 Courses Collection

The Courses collection stores all information related to courses created by educators.

Attributes:

1. **_id**
    - Automatically generated unique identifier
    - Acts as Primary Key
2. **User ID**
    - References the educator who created the course
    - Acts as Foreign Key
    - Links to Users(_id)
3. **C_ educator**
    - Name of the course educator
4. **C_ categories**
    - Category of the course (e.g., Web Development, Programming)
5. **C_ title**
    - Title of the course
6. **C_ description**
    - Detailed information about the course
7. **sections**
    - Stores modules or sections of the course
    - Data Type: Array
8. **C_ price**
    - Price of the course
9. **enrolled**
    - Number of students enrolled

Primary Key: _id
Foreign Key: user ID → References Users(_id)

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3. Relationship Between Users and Courses

The relationship between Users and Courses is **One-to-Many (1:N)**.

- One Educator can create multiple Courses.
- Each Course is created by only one Educator.

This relationship is implemented using the user ID field in the Courses collection.

Relationship Representation:

Users (1) —— can create —— (N) Courses

This ensures proper linkage and maintains data integrity within the database.

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4. ER Diagram Explanation

In the ER Diagram:

- Rectangles represent Entities (Users, Courses).
- Ovals represent Attributes.
- Diamond represents Relationship ("can").
- _id serves as the primary key in both collections.
- User ID acts as a foreign key linking Users and Courses.
- sections is a multi-valued attribute stored as an array.

This structure supports scalability, flexibility, and efficient data retrieval in MongoDB.

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5. Advantages of the ER Design

1. Simple and clear database structure
2. Supports role-based access control
3. Enables efficient course management
4. Scalable using MongoDB document-based storage
5. Maintains data consistency through key referencing

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6. Conclusion

The ER Diagram of the Learn Hub Online Learning Platform effectively defines the system's database structure using two major collections: Users and Courses. The one-to-many relationship ensures that educators can manage multiple courses while maintaining structured and organized data storage.

This design supports scalability, efficient querying, and smooth integration with the backend developed using Express.js.