Entity relationship diagram

Welcome to this lab activity

In this lab activity, you will explore how a relational database represents objects and their properties. Furthermore, you will look at depicting a relational database schema in an entity relationship (ER) diagram and how to identify and select appropriate field types for storing data in a MySQL database.

Context

In the first few topics, you worked on a 'Book shop' dynamic web application. Let us suppose that we wanted to develop the app functionality further and have a very large book database.

- We want users of the app to be able to search for books, publishers and authors that contain specific words.
- We want users of the app to be able to search for books based on their publication dates.
- We would like the most recent books to appear highest in the list by default, but for the user to be able to change the sort criteria.
- We would like at least two types of users for the app:
  - customers to search for reading data related to books from the database
  - admin users to create, update and delete data as well as reading data from the database.
- We would like a user to be able to click on a book to see all data relevant to that book as well as its stock availability.
- We would like admin users to be able to update stock availability when new books arrive in the store or when customers buy books.

How readily does the current database design facilitate these functional requirements?

After completing the following tasks, upload pictures of any hand-drawn documents or notes in the next discussion activity.

Task 1: Define the application concept

List all the app functionalities that you have developed so far and the functionalities listed above in addition to any new functionalities that you would like to add to your app.

Task 2: Define user interactions

Define three basic user interactions the app will perform. Make your user interactions very specific, for example:

- Basic function 1: Display a list of available books in alphabetical order. The author's name will appear next to the name and price of the book.

You may find sketching a simple wireframe useful for this part of the task.

Task 3: Identify objects

In a relational database schema, there will be a distinct table to represent every type of object or entity. Every record (row) in the table will hold details about a specific instance of that type of object or entity (type of thing).

What objects or entities does your database need to represent? For example, if the Twitter app used a relational database, a 'Tweet' might be considered an entity (type of thing) and have its own table. Each row within the Tweet table would then represent a specific Tweet.

List the tables required for your application to meet the basic requirements identified in Task 2.

Task 4: Identify object fields

Each column or field in the tables will represent a property of that class of object. For example, the properties of a Tweet might include 'user_account', 'timestamp' and 'tweet_text'.

What information about an object do you think would you need for your application to meet its functional requirements?

List the fields you think should be associated with each entity in your schema.

Task 5: Identify field types

When designing a relational database schema, you should also consider the type of data that each column or field in the database will contain.

Here are some of its commonly used field types.

- INT   whole numbers
- DECIMAL   decimal numbers
- VARCHAR(L)   variable length string, where L is the maximum length
- CHAR(L)   fixed length string, where L is the length
- TEXT for long strings of text
- BLOB binary object, for binary-encoded data such as images
- TIMESTAMP   for date and time values stored in UTC.

You can refer to the MySQL documentation for other field types.

Beside each field that you identified, specify which field type you would choose to represent its data.

Task 6: Depict your schema in an ER diagram

You can use an ER diagram as a standard format for depicting relational database schemas. Produce an ER diagram for your application's schema. Include table names and relationship cardinalities between entities (tables).

Draw a separate diagram with all the tables including their names, field names, field types, primary keys (PKs) and foreign keys (FKs).

When designing your database, think of potential future queries or functionalities that could help you to identify entities, properties for each entity and PKs, and FKs and association types.

End of lab

Congratulations on completing this lab.

Make sure you have a copy of your hand-written documents and notes related to this activity to share in the next discussion.

In the next lab activity, you will explore how database operations involving multiple tables are carried out.