Relational Databases

In this lesson, we will discuss relational databases.

We'll cover the following

- What is a relational database?
- What are relationships?
- Data consistency
- ACID transactions

What is a relational database?#

A relational database is the most widely used type of database in the industry. A relational database saves data containing relationships, like *One to One*, *One to Many*, *Many to Many*, *Many to One*, etc. It has a relational data model. *SQL* is the primary data query language used to interact with relational databases.

MySQL is the most popular example of a relational database. Alright!! I get it but what are relationships?

What are relationships?#

Let’s say you as a customer buy five different books from an online bookstore. When you created an account at the bookstore, you would have been assigned a customer ID say C1. Now, C1[You] is linked to five different books B1, B2, B3, B4, and B5.

This is a *one to many* relationship. In the simplest of forms, one table will contain the details of all the customers and another table will contain all the products in the inventory.

One row in the customer table will correspond to multiple rows in the product inventory table.

Upon pulling the user object with the ID C1 from the database we can easily find what books C1 purchased via the relationship model.

Data consistency#

Besides the relationships, relational databases also ensure saving data in a normalized fashion. In very simple terms, normalized data means a unique entity occurs in only one place/table in its simplest and atomic form and is not spread throughout the database.

This helps maintain consistency in the data. In the future, if we want to update the data, we update the one place and every fetch operation gets the updated data.

Had the data been spread throughout the database in different tables, we would had to update the new value of an entity everywhere. This is troublesome, and things can get inconsistent.

ACID transactions#

Besides normalization and consistency, relational databases also ensure *ACID* transactions.

ACID stands for Atomicity, Consistency, Isolation, Durability.

An acid transaction means if a transaction, say a financial transaction, occurs in a system, it will either be executed with perfection without affecting any other processes or transactions, and the system will have a new state after the transaction that is durable and consistent. Or if anything amiss happens during the transaction, say a minor system failure, the entire operation is rolled back.

When a transaction happens, there is an initial state of the system *State A*, and there is a final state of the system *State B* after the transaction. Both the states are consistent and durable.

A relational database ensures that the system is either in *State A* or *State B* at all times. There is no middle state. If anything fails, the system goes back to *State A*.

If the transaction is executed smoothly the system transitions from *State A* to *State B*.

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