

Relational Database Design - 9/25

Announcements

- Install psql on computers before next class.

Reading Quiz

- Q1: C.
- Q2: B. An unnormalized model does not even satisfy First Normal Form.
- Q3: A. A functional dependency is a relationship among attributes.
- Q4: A. A composite key is made up of multiple columns.
- Q5: B. There will be more tables in the database the higher the normal form.

Data Anomalies

We need to ensure that we do not have any anomalies so that we can have the freedom to best represent the objects we are trying to model while avoiding duplicate data.

Insertion anomaly - Example: If our customers and items are all stored in the orders table in the same record, then we are not able to create an item without someone having ordered it already.

Update anomaly- Example: Multiple order records store the same customers name. So what happens when we modify the customers name? It only happens in one place causing inconsistent data.

Deletion anomaly - Example: If we have items only associated with orders, then what happens when we delete the order for a customer? We have the potential of completely deleting an item from the database if we delete all orders with that item.

Practice Problem 1

If you add the store information directly into the orders table then we are left with anomalies again. For example if you update say the name of the store then you would need to do that for every single record in the orders table that contains that store. This is not good and is an update anomaly.

Sometimes we need to consider the addition of other tables which will allow us to keep data only in one place rather than duplicating it. This is sort of the idea of normalization.

Normal Forms

1NF: All attributes must have scalar values. You also should have a primary key for all tables.

2NF: 1NF holds and additionally there must be no partial dependences of any of the columns on the primary key.

3NF: 2NF holds and additionally there exists no non-key attributes that are functionally determined by other non-key attributes.

Practice Problem 2

As you are looking at the data you need to find the relationships and you would really need to find out if they are actually functionally dependent relationships or not (by talking to a domain expert or business analyst).