Improving Table Design Through Normalization

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Overview

- Normalization
- Motivation
- Definition
- Normal forms
- Foreign key constraints

Demo

Order Tracking Table

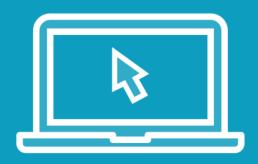"*Normalization* is the process of organizing a database to reduce redundancy and improve data integrity."

E.F. Codd's Normalization Objectives

Eliminate anomalies

Reduce restructuring

Provide more information

Neutrality of query statistics

Demo

Anomalies

First Normal Form – 1NF

One value per table cell

One table per set of related data

Each row must be unique

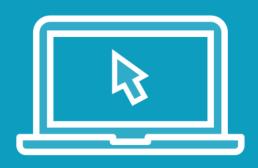(Primary Key)

Demo

First normal form – 1NF

Second Normal Form – 2NF

In first normal form (1NF)

Single column primary keys

(No non-key attributes should be dependent on any proper subset of the key)

Demo

Second normal form – 2NF

Third Normal Form – 3NF

In second normal form (2NF)
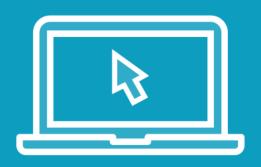
No transitive functional dependencies

(Column values should only depend upon the key)

"Every non-key must provide a fact about the key, the whole key, and nothing but the key"

Bill Kent, 1983

Demo

Third normal form – 3NF

Other normal forms

BCNF **Boyce Codd normal form (3.5NF)**

4NF **Fourth normal form**

5NF **Fifth normal form**

6NF **Sixth normal form**

Summary

Normalization

– Remove redundancy, improve integrity

Transformation

– 1NF, 2NF, 3NF

– Primary keys and foreign keys

Higher normal forms

– BCNF, 4NF, 5NF, 6NF, …

All about the key!

Exercise