

# 1/23 - Database Design

## Announcements

- Form teams by Wednesday 1/25.
- Lab 1 setup instructions given over the weekend.

## Reading Quiz - Noteworthy Questions

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1. **Q4:** Primary keys should use arbitrary identifiers instead of meaningful identifiers or natural keys. Things that will change or are not unique in nature are not to be used as primary keys.
2. **Q5:** Normal forms actually go up to 6th normal form.

## Basic Terminology and Concepts

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An entity is an object that is represented in the database. In the database entities are represented as Relations and Tables. (i.e. A customer, an order, a book.)

**Schema** - the structure of a database (defining table names, datatypes and domains, fields, etc.).

**Keys** - Primary Keys (PK) and Foreign Keys (FK). A PK uniquely identifies each row within a table. Keys can be a single field or a combination of multiple fields. The FK in a child table points to the PK in the parent table.

**Relationships** - these are relations between objects.

**Constraints** - you can place constraints on fields to disallow various inputs, for example uniqueness or disallowing null values.

**Data Consistency** - It is necessary to keep a database consistent. Inconsistency can come from various sources such as duplicate data. Data Definition Language statements (i.e. CREATE, DROP) Data Manipulation Language (i.e. INSERT, UPDATE, DELETE)

## Data Anomalies

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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 try to delete a particular order.

## **Practice Problem 1:**

**Insertion** - Cannot have a group without knowing/having band members.

**Update** - A band could relocate and you would need to change each entry in the Musicians table.

**Deletion** - Canceling a show could possibly lead to deleting a band.

**Note:** Instruments and genres being able to have multiple values is a violation of 1NF.

## **Next Time**

Will pick back up SXSW Lucidchart modeling after the reading quiz next class.