

CS 360 Internet Programming
Lecture 23: Web Applications
Entity Relationship Modeling

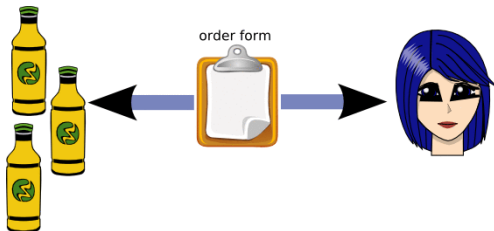
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1 Entity Relationship Modeling

- Overview
- Entities
- Relationships
- Key Attributes

Entities and Relationships

- juice store example: three main entities
 - juices
 - customer
 - order
- purchasing action creates a relationship between customer, order, and juice
 - must associate one customer with each order
 - customers can make more than one order
 - each order has one or more bottles of juice



Identifying Entities

- **entity**: objects that can be described by characteristics
 - juice: juice name, description, year
 - customer: surname, firstname, initial, address, city, state, zipcode, phone, birthdate
 - juicery: juicery name
 - region: region name
 - users: user name, password
- **order** entity: represents a purchase of some juice made by a customer
 - order: date, creditcard, expirydate, instructions, customer, juice
 - need credit card with order, rather than customer, because a different card could be used for each order
 - need some way to associate juice with orders

Designing Tables

- **customer** table
 - customer id
 - name
 - address
- **order** table
 - order id
 - customer id
 - juice id
 - quantity
- can only order one type of juice in a single order
 - solution: add “juice id2”, “juice id3”, “quantity2”, “quantity3” to the order table
 - must decide on a maximum number of juice per order
 - must decide on empty values if an order has fewer than this

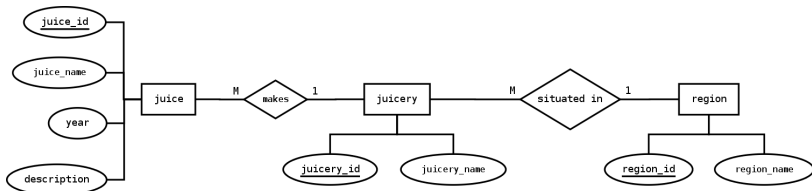
Normalization

- better solution: store the items that make up an order
- **items** table
 - item id
 - price
 - quantity
 - juice id
 - order id
- when do you add a table versus or more attributes?
 - normalize the database according to a set of rules
 - [MySQL article](#)

Types of Relationships

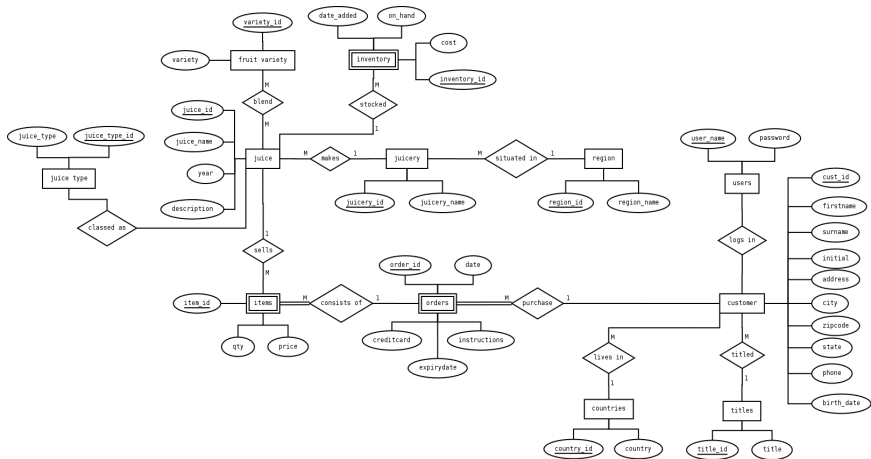
- one-to-one
 - exactly one instance of the first entity for each instance of the second entity
 - example: customer has exactly one set of login information
- one-to-many
 - one or more instances of the second entity for each instance of the first entity
 - example: each juicery sells many juices, but each juice is made by exactly one juicery
- many-to-many
 - each entity is related to more than one instance of the other entity
 - example: a juice can be made up of many types of fruits, and each fruit can be in more than once juice

Examples



- a juicery can make many juices
- each juice is made by one juicery
- similar reasoning for the regions

Complete Example



Primary Keys

- must uniquely identify each record
 - can use a combination of keys, e.g. surname and firstname
 - must be sure it will be unique!
 - can always use an integer identifier
- for orders, use a combination of order_id and customer_id to uniquely identify the order
 - allows each customer to have an order #1
 - this makes orders a **weak entity**: part of primary key is the key from another entity
 - represented with a double box
- orders have a **full participation** relationship with customers
 - can't have an order without a customer
 - similar reasoning for items: can't exist without an order
 - represented with a double line