My Scheming Relatives:

The Nuts and Bolts of Relational Databases

Basic Concepts

- Relational Databases
- Schemas
  - Databases
  - Tables
- Primary Keys
- Foreign Keys
- One-to-one, one-to-many, many-to-many
- Rules

Relational Databases

- Switch from flat file redundancies...

Child1Name, Child1Birthdate, Child2Name, Child2Birthdate, Child3Name...

- Break data up into logical chunks (entities)
  People
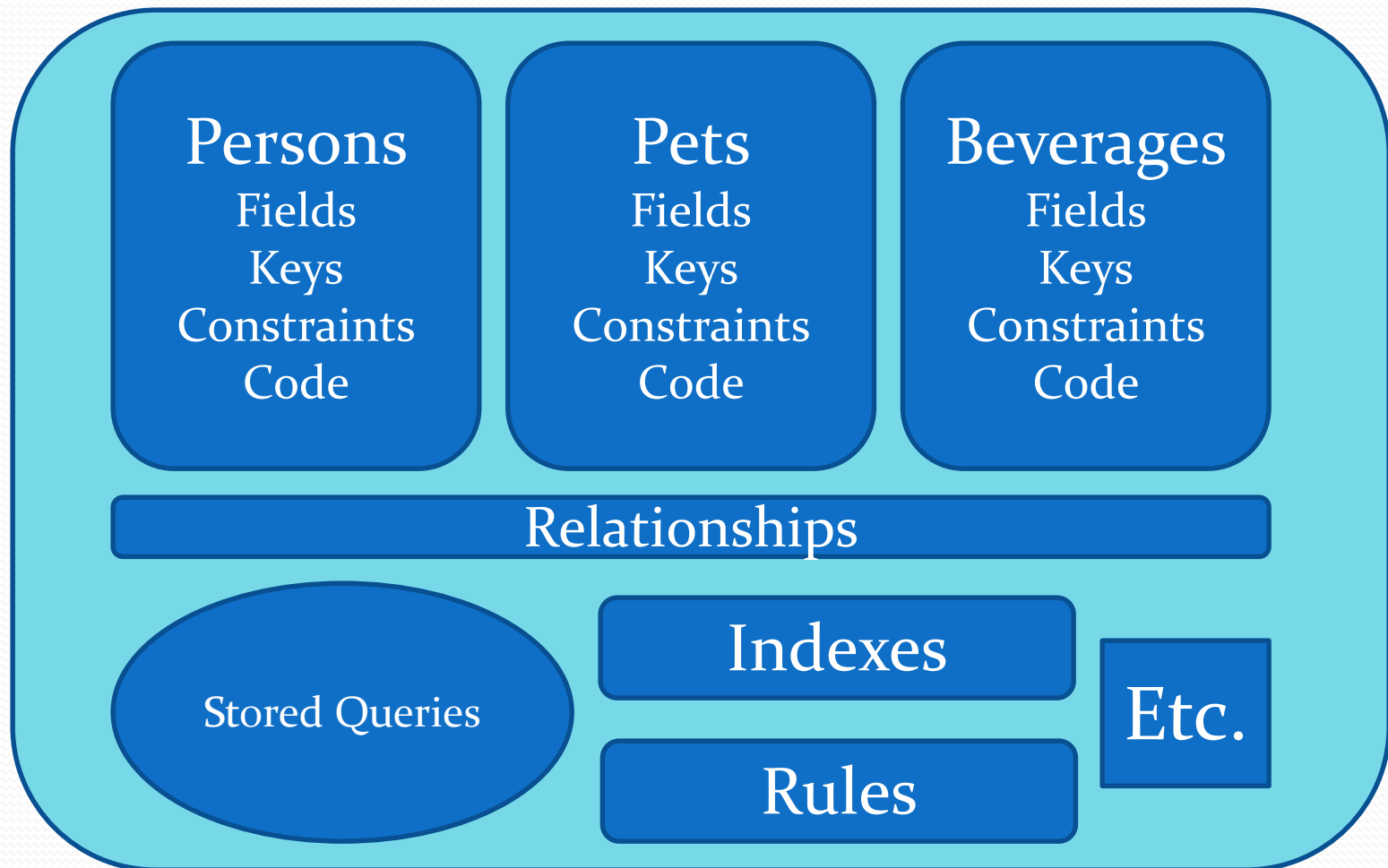 Pets
  Beverages
  Internet Memes

The Schema…

- Literally, "The Plan"
- Think of a house blueprint:
  - It describes the shape and scope of the house
  - It shows the layout of the rooms and how they relate

  Blueprint : House : Room

  - It also indicates details like plumbing, electrical, and material standards. ("Rules" that apply to all…)

The Schema...

Persons
Fields
Keys
Constraints
Code

Pets
Fields
Keys
Constraints
Code

Beverages
Fields
Keys
Constraints
Code

Relationships

Stored Queries

Indexes

Rules

Etc.

The Schema…

- MSSQL and Oracle see it differently

  Database : Schema : Table : Field

  Neighborhood : Blueprint : House : Rooms

- Schema is considered "Owner" of a subset of the database
- Mostly for security reasons

The Wikipedia Schema(s)

Defining Relationships

- To draw a relationship, each entity requires a **primary key**
  - **P**ermanent
  - **U**nique
  - **N**onsensical

Primary Keys

- What makes a key **Permanent**?
- Never, never, never will be changed. (Ever...)

Emails
EmailAddress
CreateDate
NumberOfUses
BouncedMessages
LastBounceDate
LastOpenDate
LastClickDate
DecommissonDate
UnsubscribeDate

Will this change?

How about this?

These might change any minute

These sound "terminal."
Will they never change?
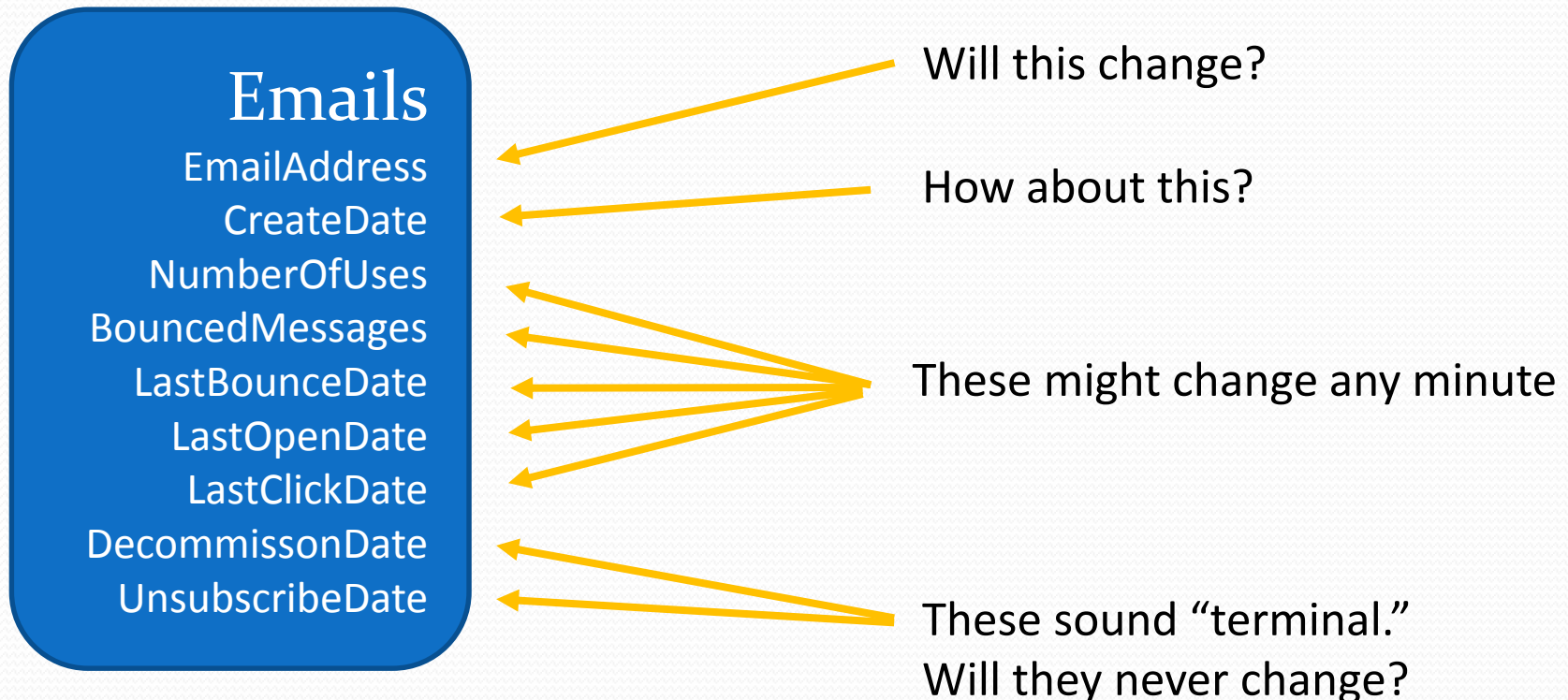
Primary Keys

- What makes a record **Unique**?
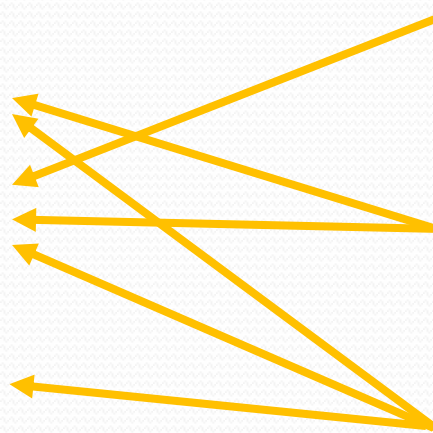- Can be comprised of one or more fields

Persons
FirstName
MiddleName
LastName
PhoneNumber
EyeColor
City
State
Zip

Just LastName?

LastName AND FirstName?

LastName AND FirstName AND City?

Primary Keys

- What makes a key field **Nonsensical**?
- Since data cannot be changed to reflect changing circumstances, it can't represent real or reliable data

  123-45-6789   Social Security Number

  206-304-1056   Phone Number

  2016MisseCC   Matriculation, 5 chars of last name, first initial, middle initial

  72Emily1098   Birth year, first name, random four numbers

- At some point we just throw up our hands and simply ask,
  - Random or auto-incrementing?

Relationships

- Each table has it's own PUNny PK

Persons
PersonID = PK
FirstName
LastName

Degrees
DegreeID = PK
DegreeName
Institution

Pets
PetID = PK
PetName

Foreign Keys

- When the parent table key is referenced in a child table (which has it's own primary key) it is called a **foreign key**. (As in "from another table.")

- Since both keys are P.U.N., the bond is immutable.

Relationships

- The FK records the relation to the parent

Persons
PersonID = PK
FirstName
LastName

Degrees
DegreeID = PK
PersonID = FK
DegreeName
Institution

Pets
PetID = PK
PersonID= FK
PetName
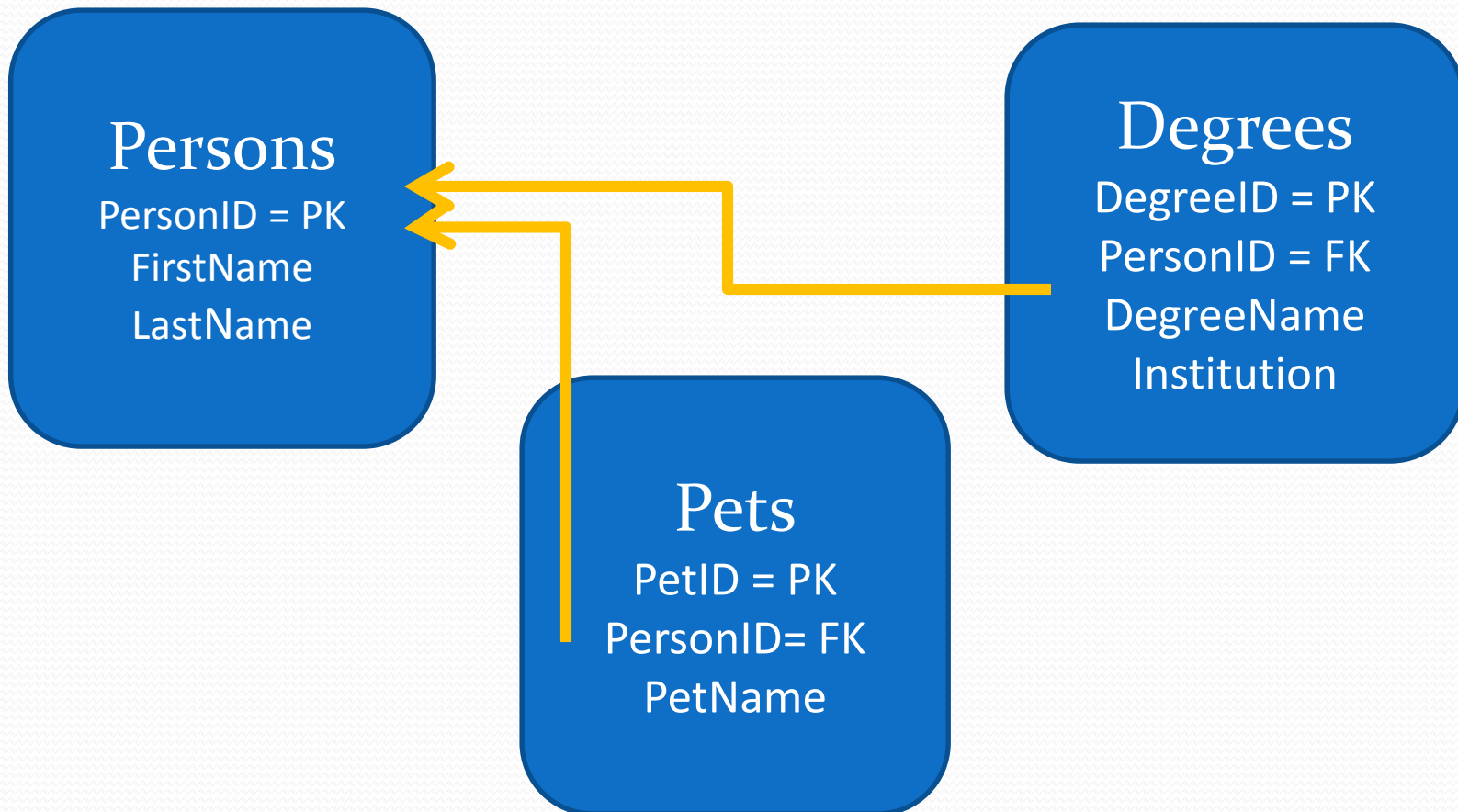
Types of Relationships

- A **one-to-one** (inheritance) relationship is used to extend the 1:1 structure of the parent table.

Persons
PersonID = PK
FirstName
LastName

Identifiers
PersonID= PK
SocialSecurity#
EyeColor
LobotomyDate
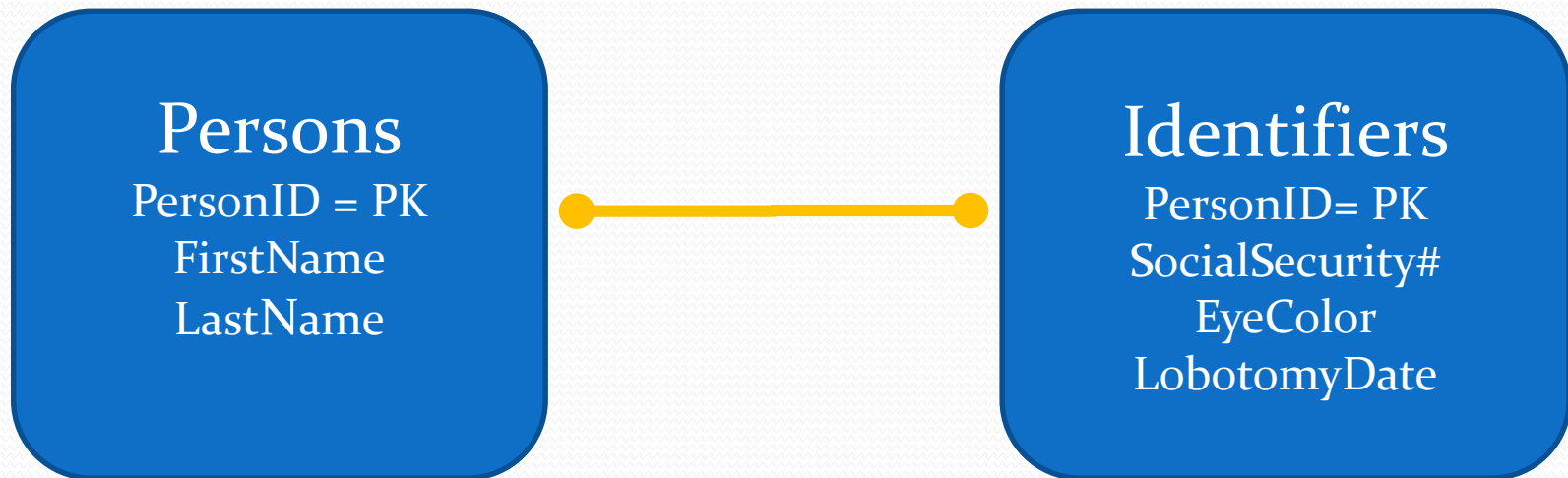
Types of Relationships

- A **one-to-many** relationship is used to store multiple child values.
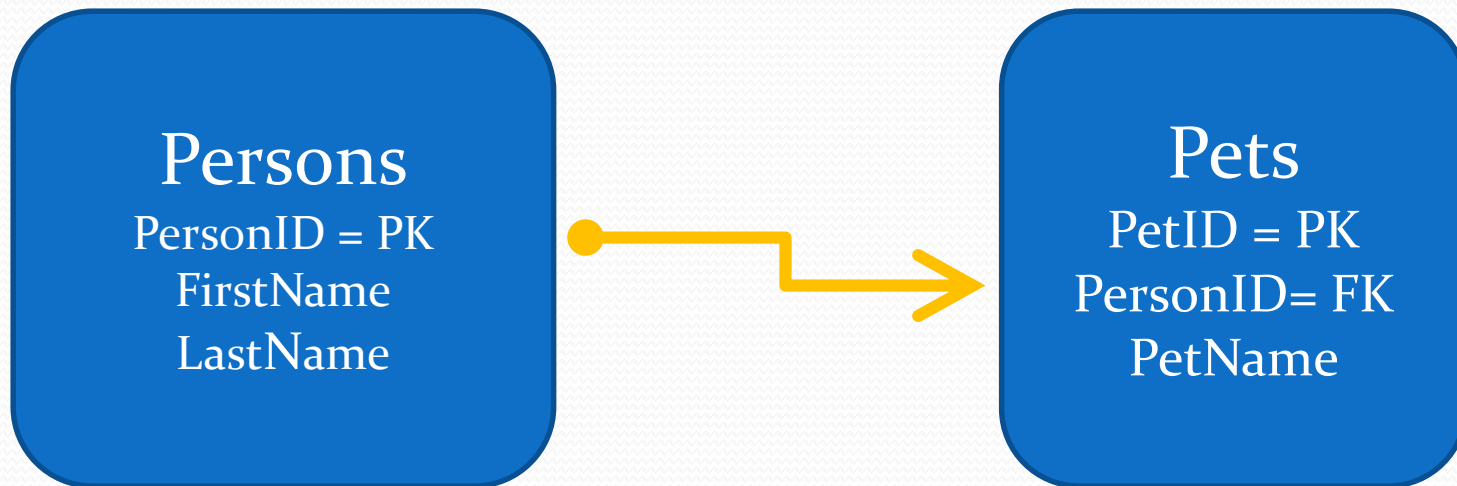
Types of Relationships

- **Many-to-many** relationships are used when several parent entities are related to several child entities.

Persons	PersonsPets	Pets
PersonID = PK FirstName LastName	PersonID = PK PetID = PK	PetID = PK PersonID = FK PetName

Schema Rules

- "The first rule of Schema Club…"
  - A lot of stuff, much of it unseen, that happens in the background to maintain the schema's integrity
  - Set and forget
- Table constraints
- Number and date formats
- Character sets / Languages
- Indexes