

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

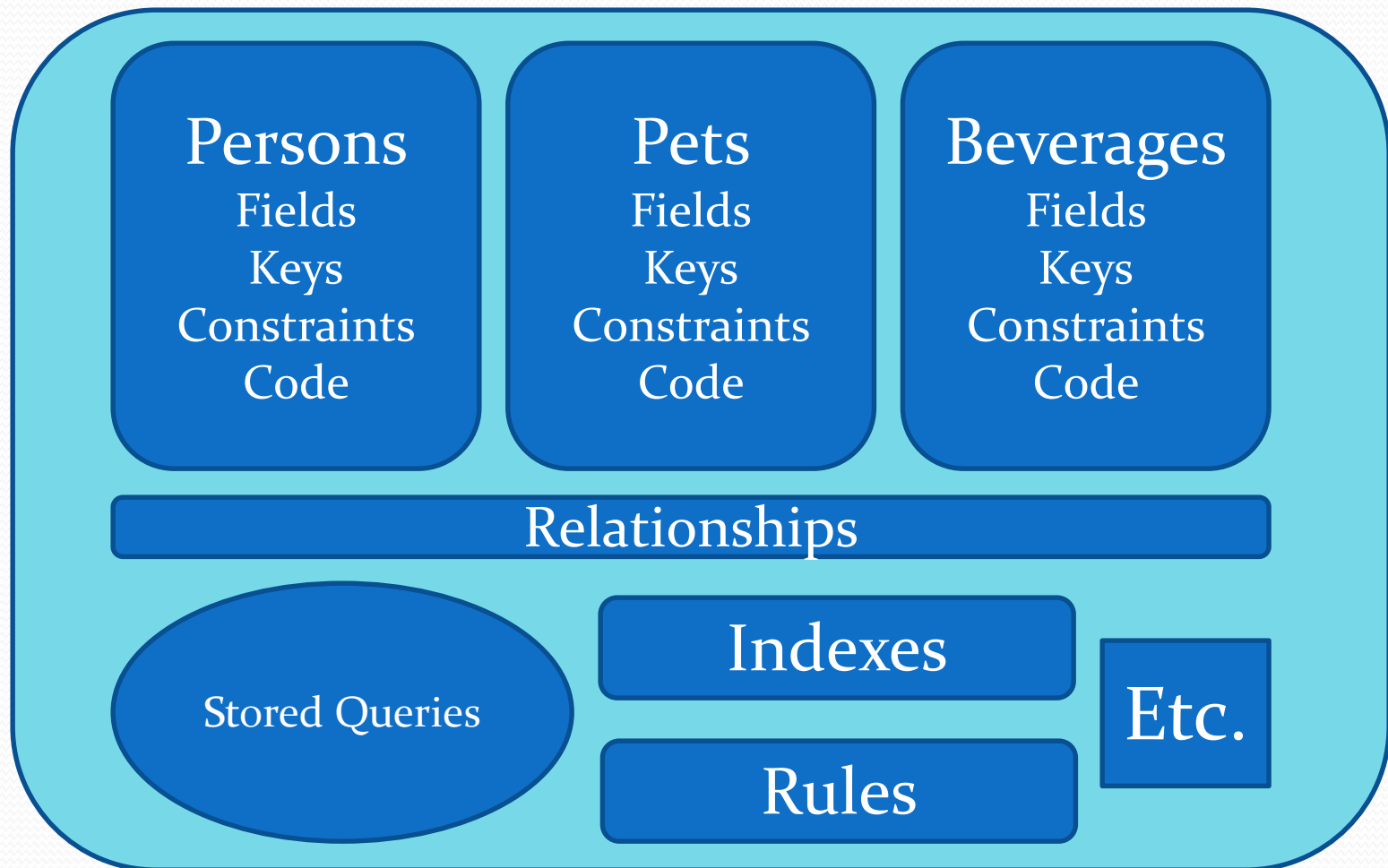
The Schema...

- 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...



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)

The image displays a comprehensive view of the Wikipedia database schema, organized into several categories:

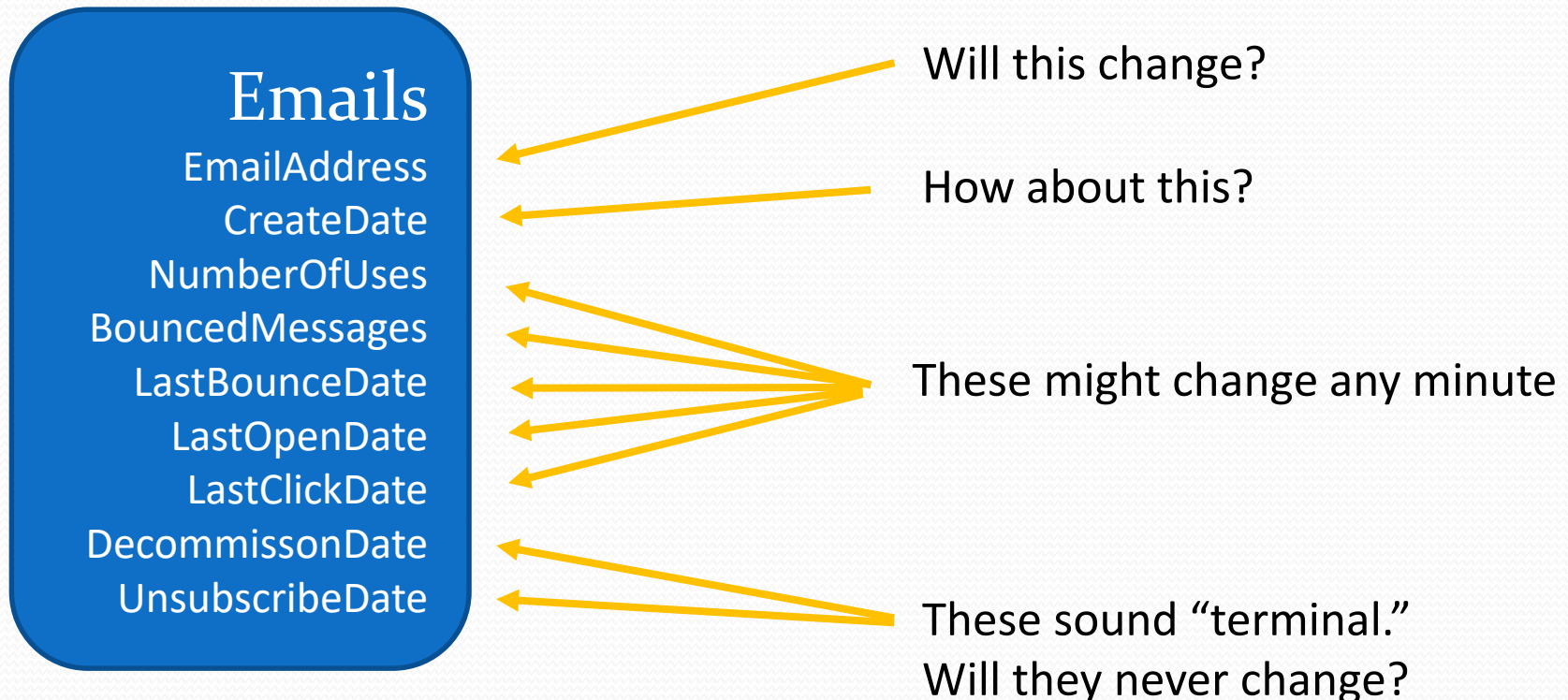
- Users:** Includes tables like `user`, `user_properties`, `ipblocks`, `bot_passwords`, `user_groups`, `user_former_groups`, and `user_newstak`.
- Logging:** Includes `logging` and `log_search`.
- Tags:** Includes `valid_tag`, `tag_summary`, and `change_tag`.
- Recent changes:** Includes `recentchanges` and `watchlist`.
- Pages:** A large section containing tables such as `archive`, `revision`, `page`, `page_props`, `page_restrictions`, `protected_titles`, `redirect`, `category`, `text`, and `text`.
- Link tables:** Includes `pagelinks`, `imagiclinks`, `iwlinks`, `templatelinks`, `externallinks`, `categorylinks`, and `langlinks`.
- Interwiki:** Includes `aliases` and `site_identifiers`.
- Caching tables:** Includes `objectcache`, `IT0n_cache`, `framcache`, `querycache`, `querycache_info`, and `querycachetwo`.
- Maintenance:** Includes `updatelog` and `job`.
- Multimedia:** Includes `image`, `filearchive`, `uploadstash`, and `oldimage`.

Defining Relationships

- To draw a relationship, each entity requires a **primary key**
 - Permanent
 - Unique
 - Nonsensical

Primary Keys

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



Primary Keys

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

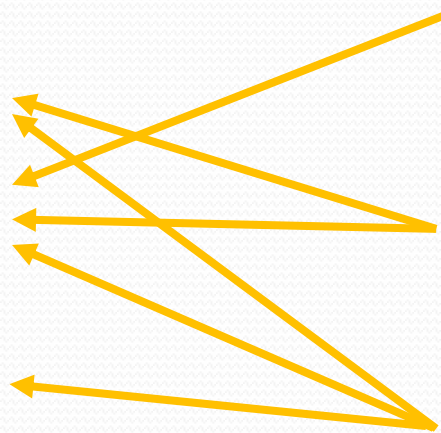
Persons

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

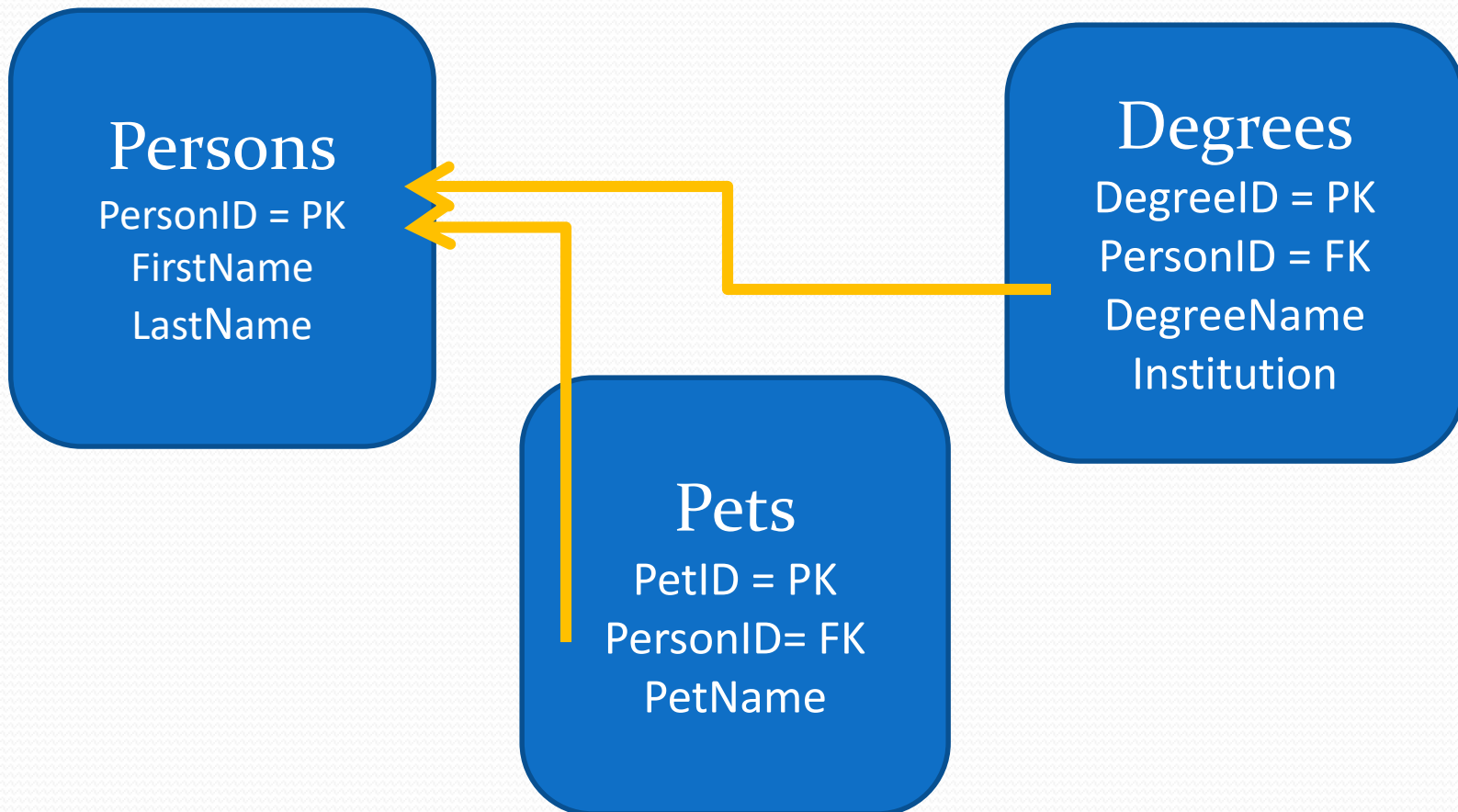
PetName

Foreign Keys

- When the parent table key is referenced in a child table (which has its own primary key) it is called a **foreign key**. (As in “from another table.”)
- Each record in the child table can reference any foreign key in the parent table.
- Since both keys are P.U.N., the bond is immutable.

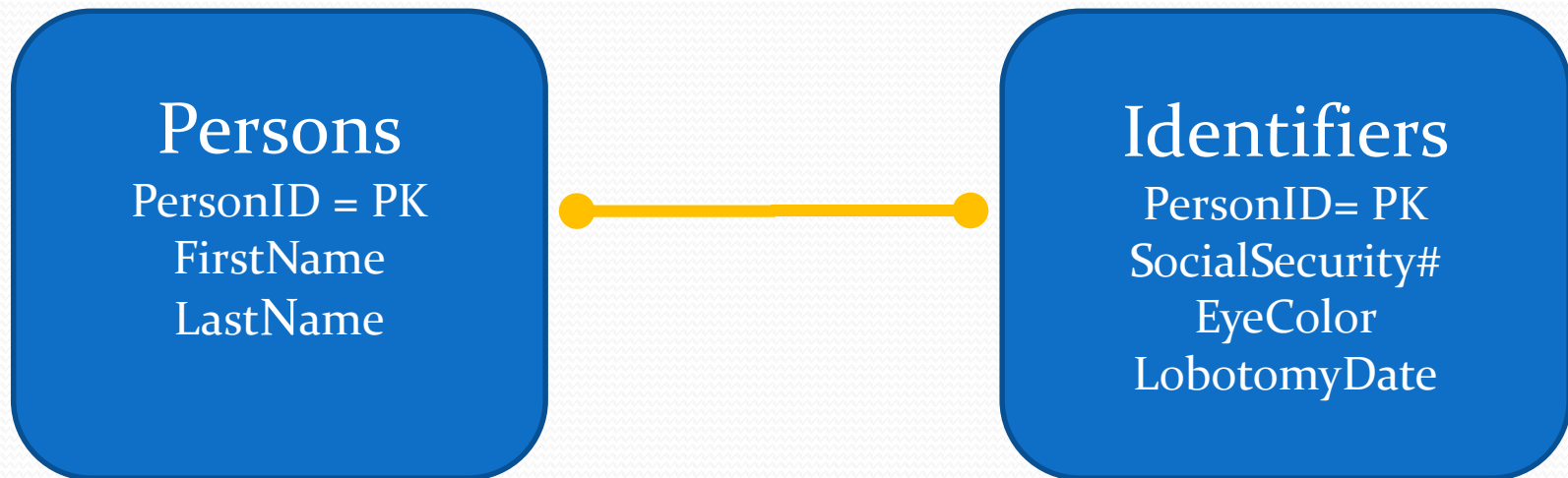
Relationships

- The FK records the relation to the parent



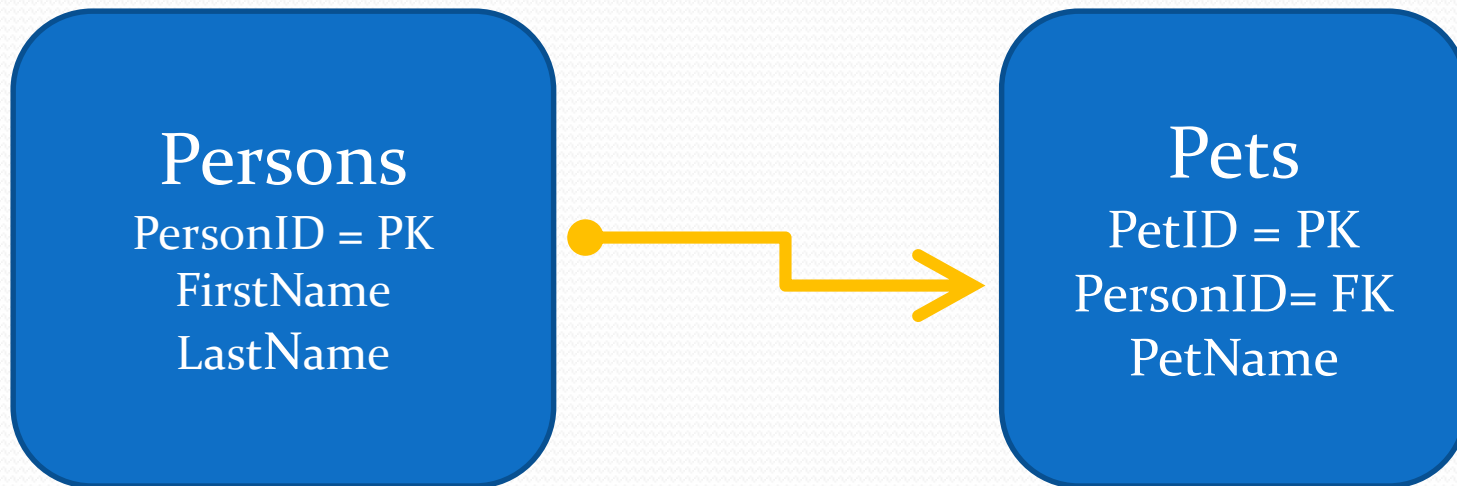
Types of Relationships

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



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.



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