MAKE SCHOOL

Data Modeling & Relationships

BEW 1.2

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Welcome!

Warm-Up

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In a group of 3, answer:

- What is one thing that brought you joy over spring break?
- What is one thing you're excited to learn about this term?

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About This Course

Course Syllabus

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Go over the Course Syllabus and answer any questions.

Reminder that in order to pass this course, you must:

- Earn at least a score of **2 (Basic)** for **all but one homework assignment**.
- Pass the **final project** by earning a rubric score of at least **2 (Basic)**.
- Pass the final assessment by earning a score of at least 70%, **OR** earn at least 70% on all 3 quizzes.
- Abide by the Attendance Policy.

Agenda

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- What is Data Modeling?
- One-to-Many Relationships
- **Activity**: Worksheet Part 1
- Many-to-Many Relationships
- **Activity**: Worksheet Part 2
- **BREAK**
- Entity Relationship Diagrams
- Primary Keys & Foreign Keys
- **Activity**: Create an ERD
- Wrap-Up

Learning Outcomes

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By the end of today, you should be able to...

1. **Identify** the relevant entities for a given website, as well as the relationships between them.
2. **Create** an Entity Relationship Diagram for a given scenario.
3. **Identify** the Primary & Foreign Keys for a given entity.

What is Data Modeling?

What is Data Modeling?

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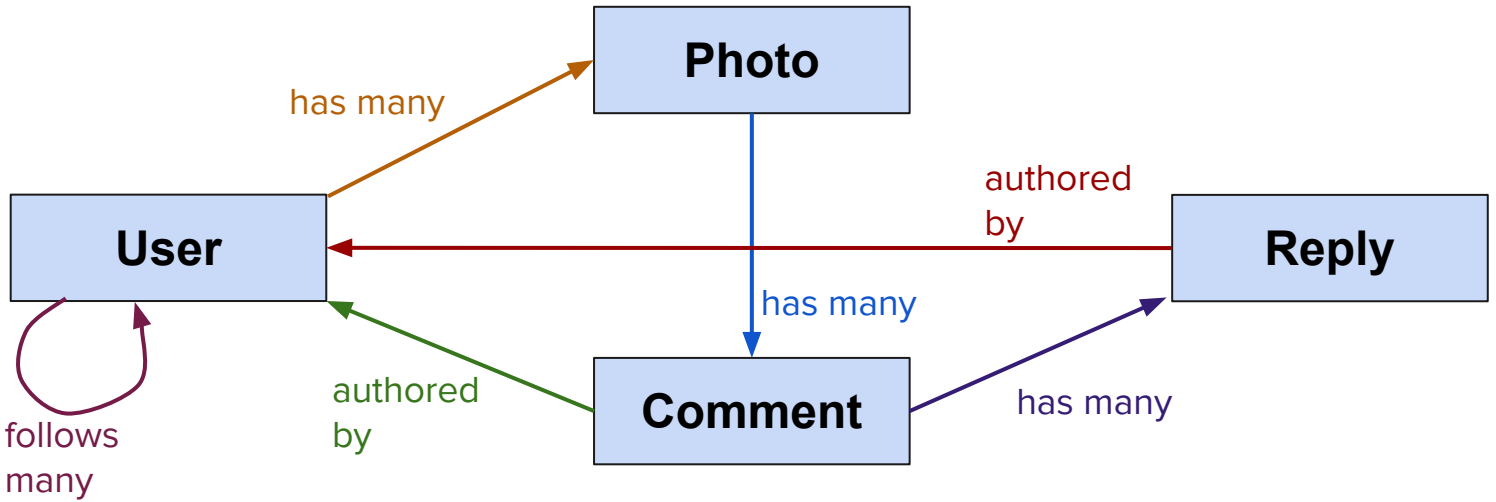
Let's say you were commissioned to build a web site.

On this website, **Users** can upload **Photos**, leave **Comments** on photos, leave **Replies** to comments, and **Follow** other users.

Where would you start building this? (What would the first steps be?)

What is Data Modeling?

I would start by figuring out the **data model**. That is, what **entities** do we need for the site, and how are they **related** to each other?



What is an Entity?

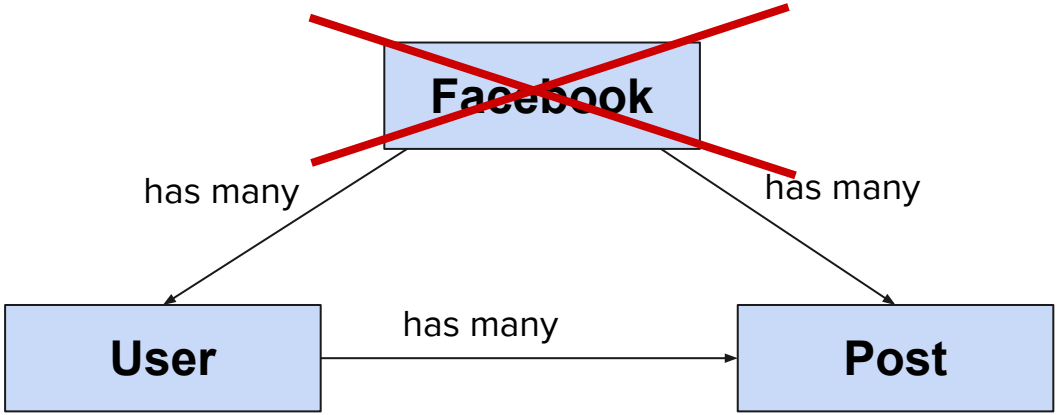
An **entity** (also called a **resource**) is a category of objects that have fields in common. You can think of it like a class.

BlogPost (class)	
title	`string`
content	`string`
author_id	`integer`

BlogPost (instance)	
title	'Top 5 Programming Languages'
content	'In my opinion, the top 5 programming languages include…'
author_id	5

What is NOT an entity?

A common misconception is to draw a diagram like this:



Why is this diagram incorrect?

Answer: "Facebook" is not an entity, because there is only one of it!

What is Data Modeling?

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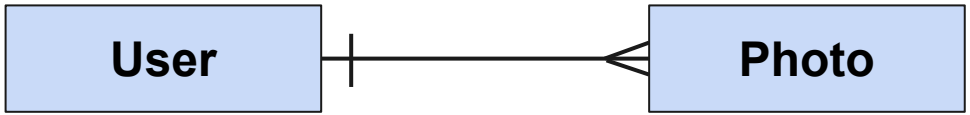
Data modeling is the process of determining what these entities and relationships are.

It is a necessary part of storing our data in a database, and is one of the first steps to creating a web application.

One-to-Many Relationships

One-to-Many

The most common type of relationship in a database is **one-to-many**.

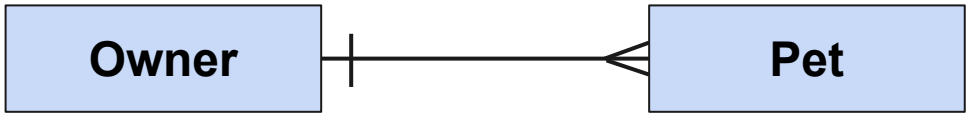


"One User has many Photos"

In diagrams, we use a cross and a **crow's foot** to symbolize the relationship.

One-to-Many

Is this a one-to-many relationship?



*"One Owner **can have** many Pets"*

A misconception is to say, "Well, an owner can have a pet, and a pet can have an owner! So it must be one-to-one!"

It is one-to-many if it is **possible** for an Owner to have many Pets, regardless of if they actually do.

Activity - Worksheet (10 minutes)

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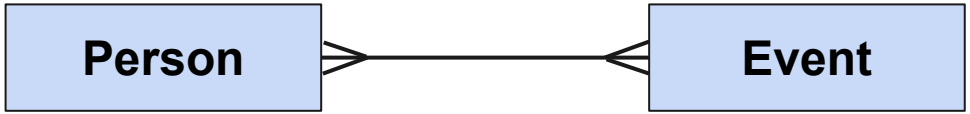
With a partner, fill out the One-to-Many Relationships worksheet by drawing the appropriate relationships for each scenario.

Many-to-Many Relationships

Many-to-Many

Another type of relationship is **many-to-many**.

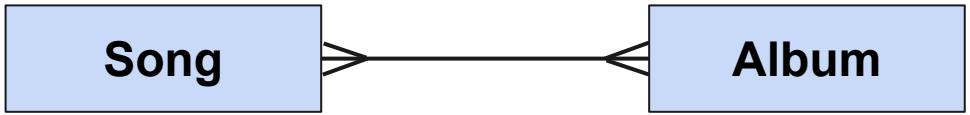


"One Person can attend many Events, and an Event can be attended by many People"

In diagrams, we use a **double crow's foot**  to symbolize the relationship.

Many-to-Many

Is this a many-to-many relationship?

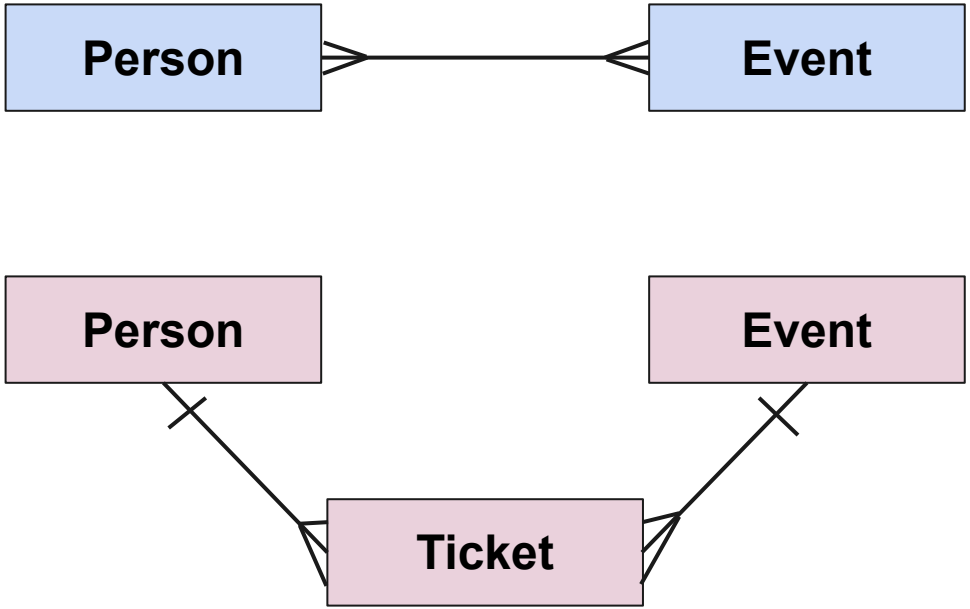


Answer: It depends!

You, as the developer, will need to decide whether it's okay for one song to be on multiple albums.

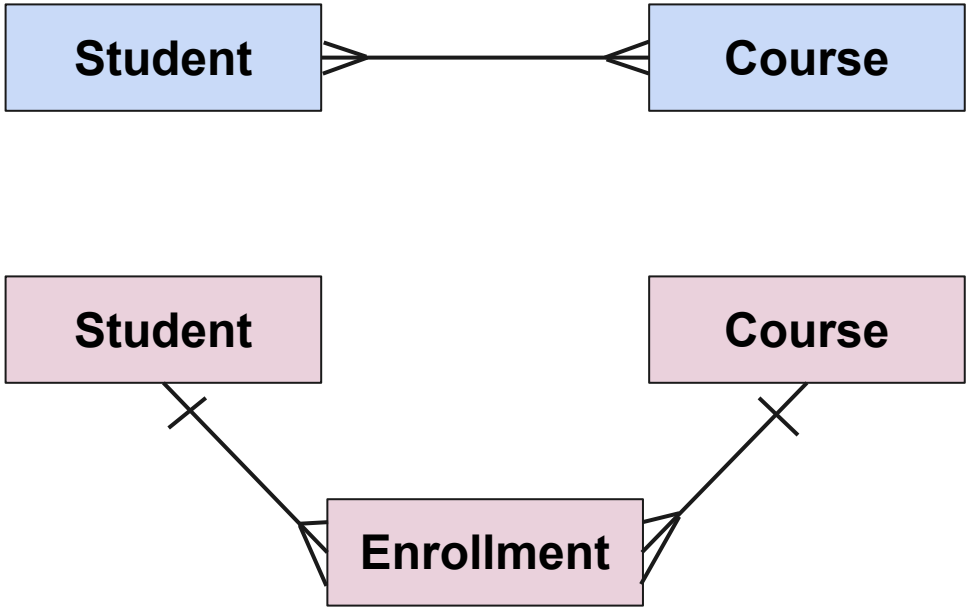
Many-to-Many

Every many-to-many relationship can also be written as **two** one-to-many relationships via a "bridge" table.



Many-to-Many

Let's try one more together. How would we re-write this relationship with a middle entity?



Many-to-Many

This means that if we have **3 students** each taking **3 classes**, we'd have **9 enrollments**.

Students
Sally
Quinn
Joe

Courses
CS
Writing
SPD

Enrollments	
Sally - CS	Joe - CS
Sally - Writing	Joe - Writing
Sally - SPD	Joe - SPD
Quinn - CS	
Quinn - Writing	
Quinn - SPD	

Activity - Worksheet

With a partner, fill out the Many-to-Many Relationships Worksheet to add a bridge table to each relationship.

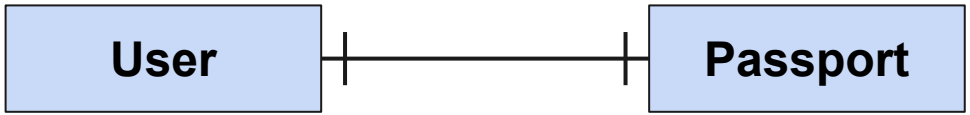
One-to-One Relationships

One-to-One

One-to-one relationships are relatively uncommon in database design, but we do need them sometimes.

Example: Marriage. **One** person can only have **one** spouse (at least in the US).

Another example: Passports. **One** user can only have **one** passport.



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Break - 10 min

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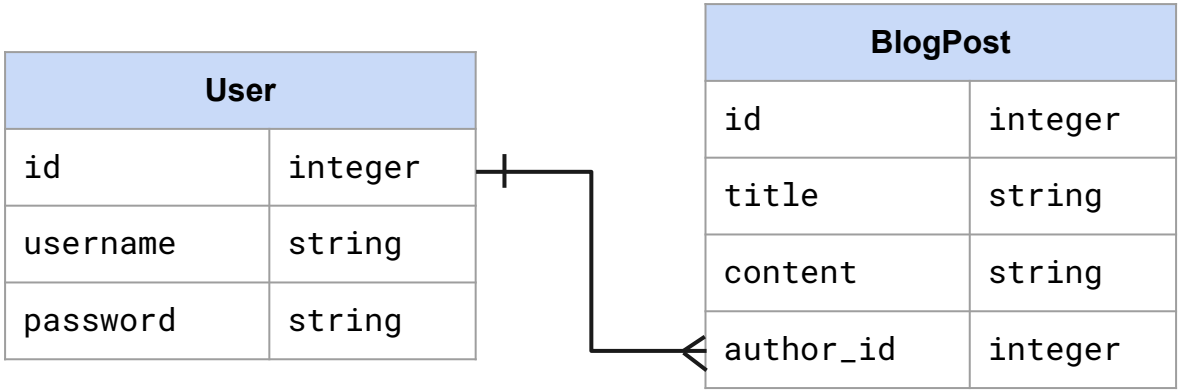
Entity Relationship Diagrams

ERDs

An **entity relationship diagram**, or **ERD**, is a formal way of describing the relationships in a database.

It contains a table describing each entity, and lines between them to describe the relationship.



Lucidchart

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Lucidchart is online software that makes it easier to create professional-quality ERDs.

You can use your student email to get a free student Lucidchart account!

Watch as your instructor demonstrates how to create a diagram.

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Primary Keys

Primary Keys

A **primary key** is a field in an entity that can be used to uniquely identify each instance of the entity. Example: **username**.

A primary key must be:

- Unique (no two users can have the same username)
- Not null (every user must have a username)
- Never changing (a user cannot modify their username)

Primary Keys

Usually, an **id** field is used as a primary key.

Let's consider some more. Would each of these make a good primary key for a **User** entity?

- First and last name ❌ Not unique
- Phone number ❌ Could change
- Email address ❌ Could change
- Social security number ❌ Not everyone has one

Primary Keys

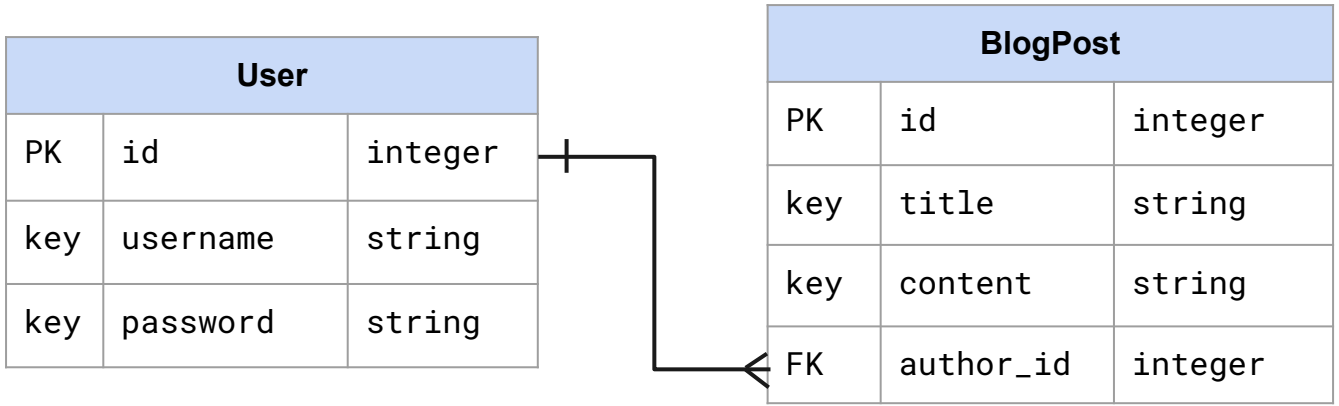
We can label a primary field with **PK** in the entity relationship diagram.

User		
PK	id	integer
Key	username	string
Key	password	string

Foreign Keys

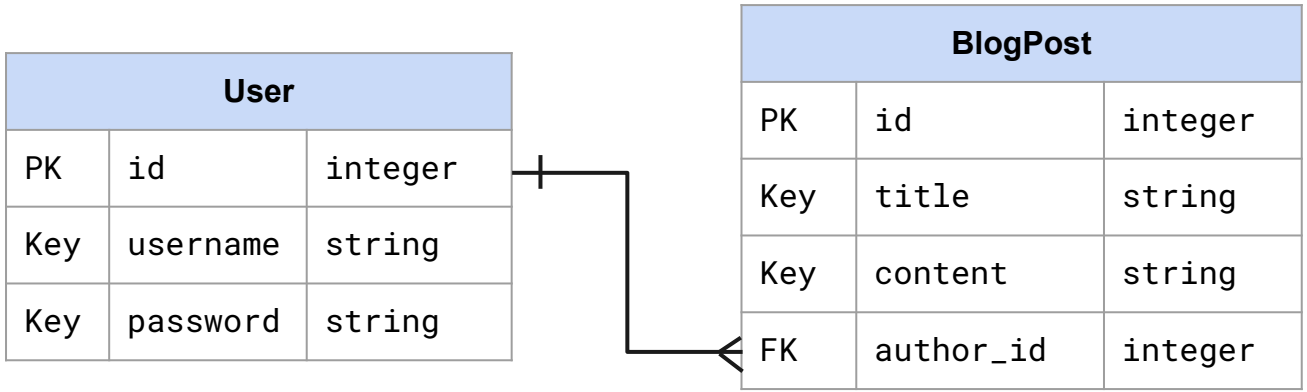
Foreign Keys

A **foreign key** is just a primary key that's in a foreign place - that is, stored within another object. For example, the **User**'s **id** field is a primary key, but when stored in a **BlogPost** as **author_id**, it is a foreign key.



Foreign Keys

We can label foreign keys as **FK** in the entity relationship diagram.



Activity - Create an ERD

With a partner, create a Lucidchart diagram for the following scenario:

On the website Pinterest, a User can create many Pins and many Boards. A Board can contain many Pins, and a Pin can belong to many Boards.

If you are having trouble getting started, watch this video on creating an ERD in Lucidchart.

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Wrap-Up

Wrap-Up

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- Homework: ERDs - on Gradescope