Data(base) design: ER diagrams

INFO/CS 2300:
Intermediate Web Design and
Programming

Mini Crash Course

Workflow Optimization
Thursday March 24 5:30PM

Room to be announced on Piazza

Data(base) design

- Starting today: how to go from client requirements to a good relational DB schema

- Today and next time: Entity-Relationship (ER) diagrams

- After that: Normalization

- These skills apply in many situations for coders to designers to managers

ER diagrams

ER diagrams are a graphical means of displaying data relationships

- Often faster to read than a text schema
- Clarify design
- Improve budgeting
- Improve team communication

Entities

An entity is a group of something.

E.g. Movies, Stars

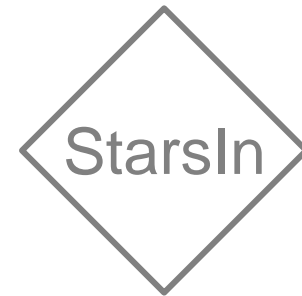| Movies	Stars

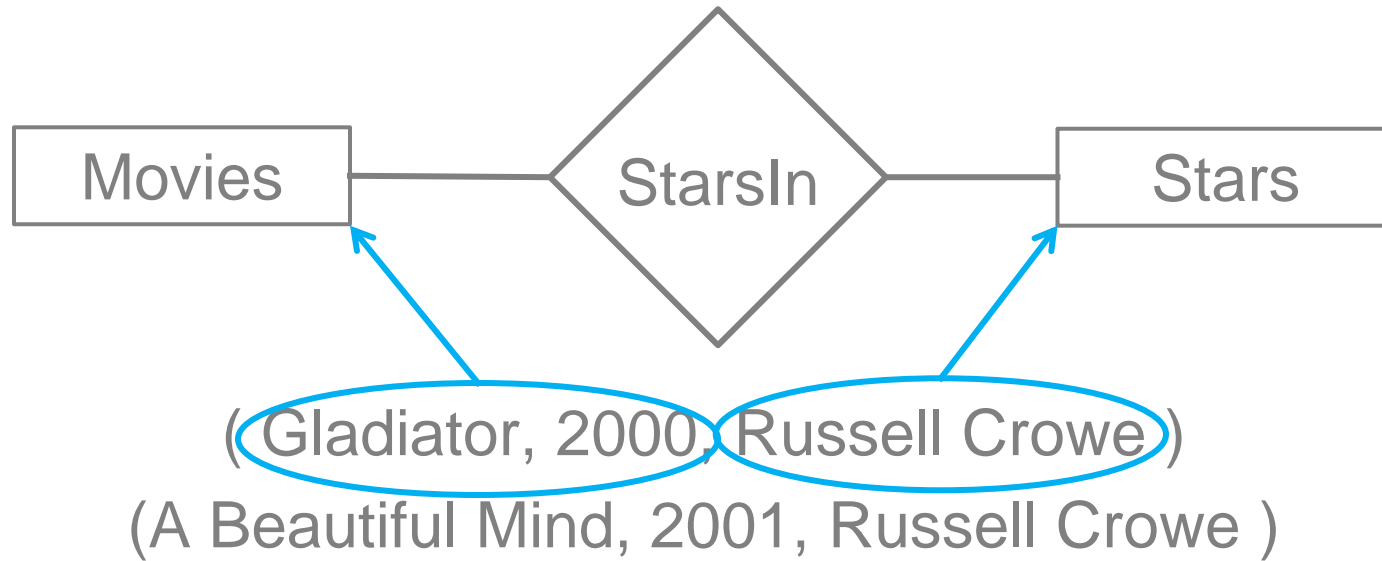Drawn using rectangles.

Photos	Albums

Relationships

A relationship is an association among two or more entities.

E.g. StarsIn is a relationship set between Movies and Stars

Drawn as diamonds.

StarsIn
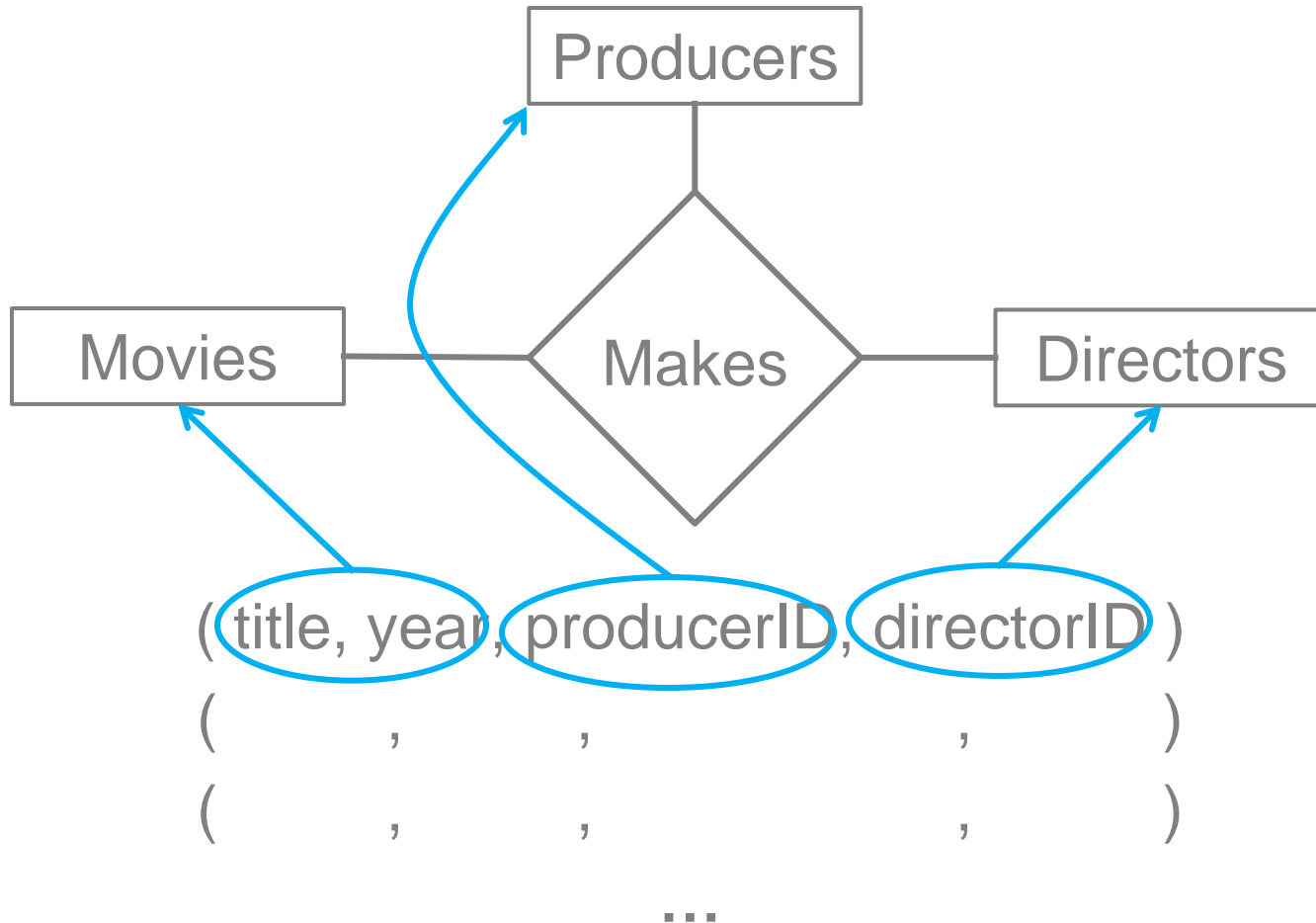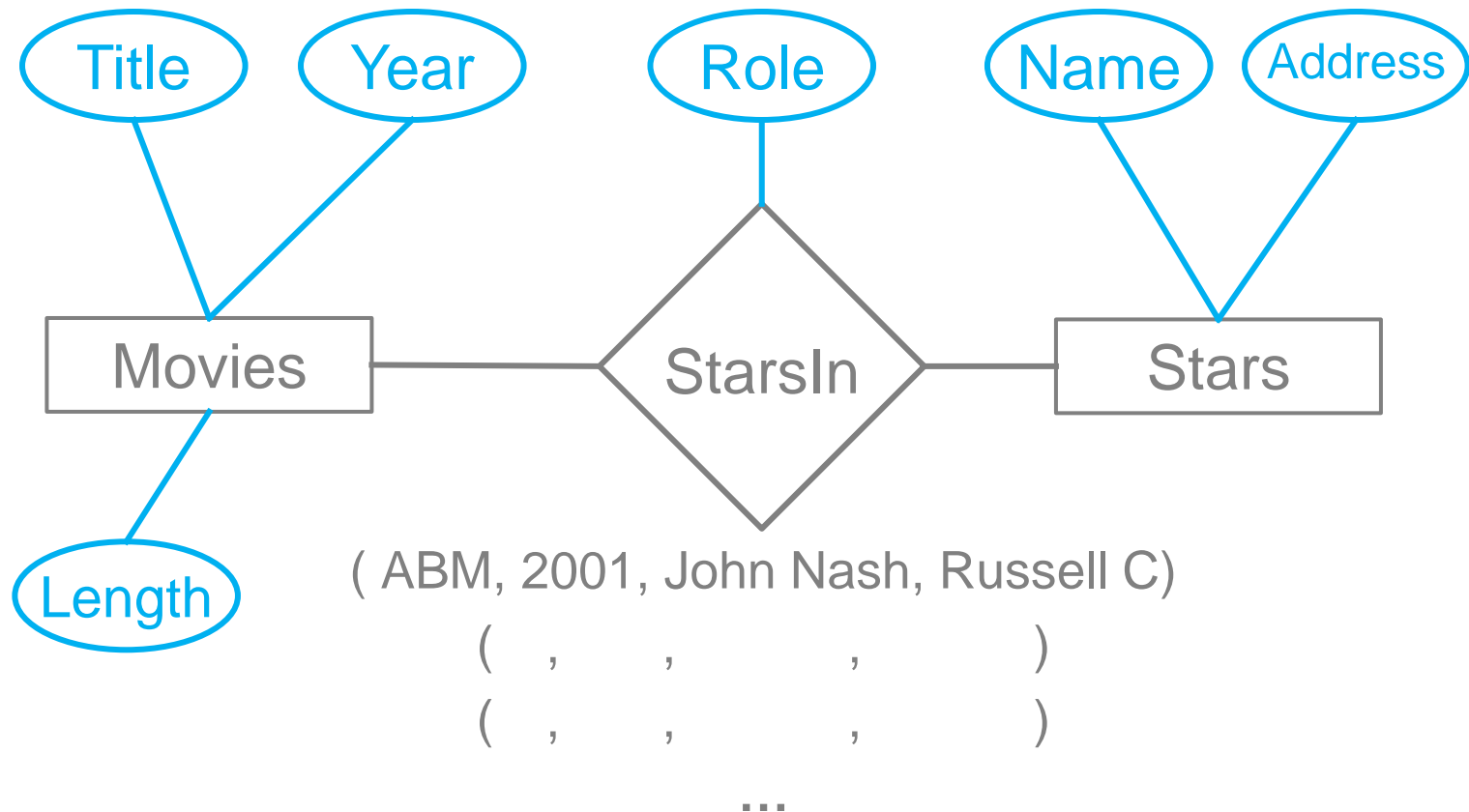
ImageInAlbum

Movies — StarsIn — Stars

(Gladiator, 2000, Russell Crowe)
(A Beautiful Mind, 2001, Russell Crowe)
...

Photos — PhotoInAlbum — Albums

More than two entities

Producers

Movies — Makes — Directors

(title, year, producerID, directorID)

(, , ,)

(, , ,)

...
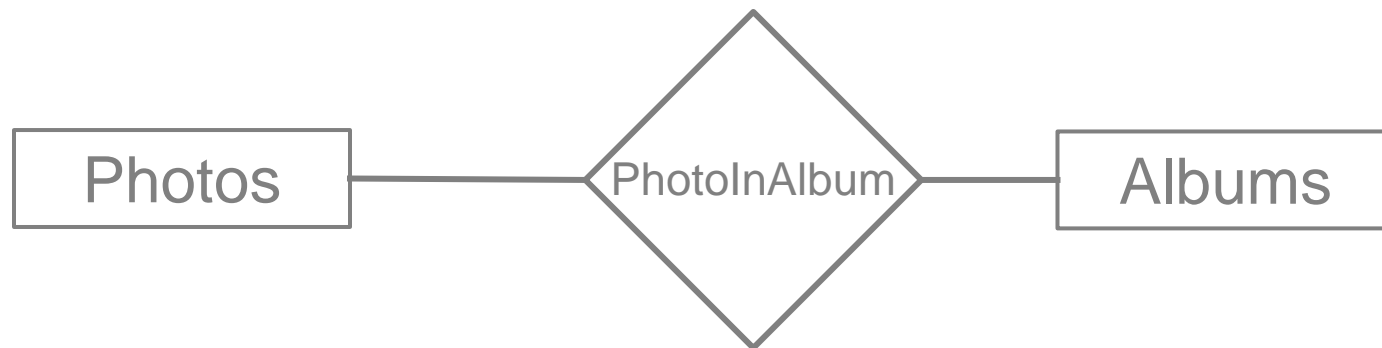
ER Diagram: Level of detail

Feature	Conceptual	Logical	Physical
Entity names	X	X	
Entity relationships	X	X	
Attributes		X	
Primary keys		X	X
Foreign keys		X	X
Table names			X
Column names			X
Column data types			X

Source: https://www.lucidchart.com/pages/ER-diagram-symbols-and-meaning

Attributes

Both entities and relationships can have
properties or attributes.

(ABM, 2001, John Nash, Russell C)

(,   ,   ,   )

(,   ,   ,   )

...

Keys

Keys shown by underlined attributes.
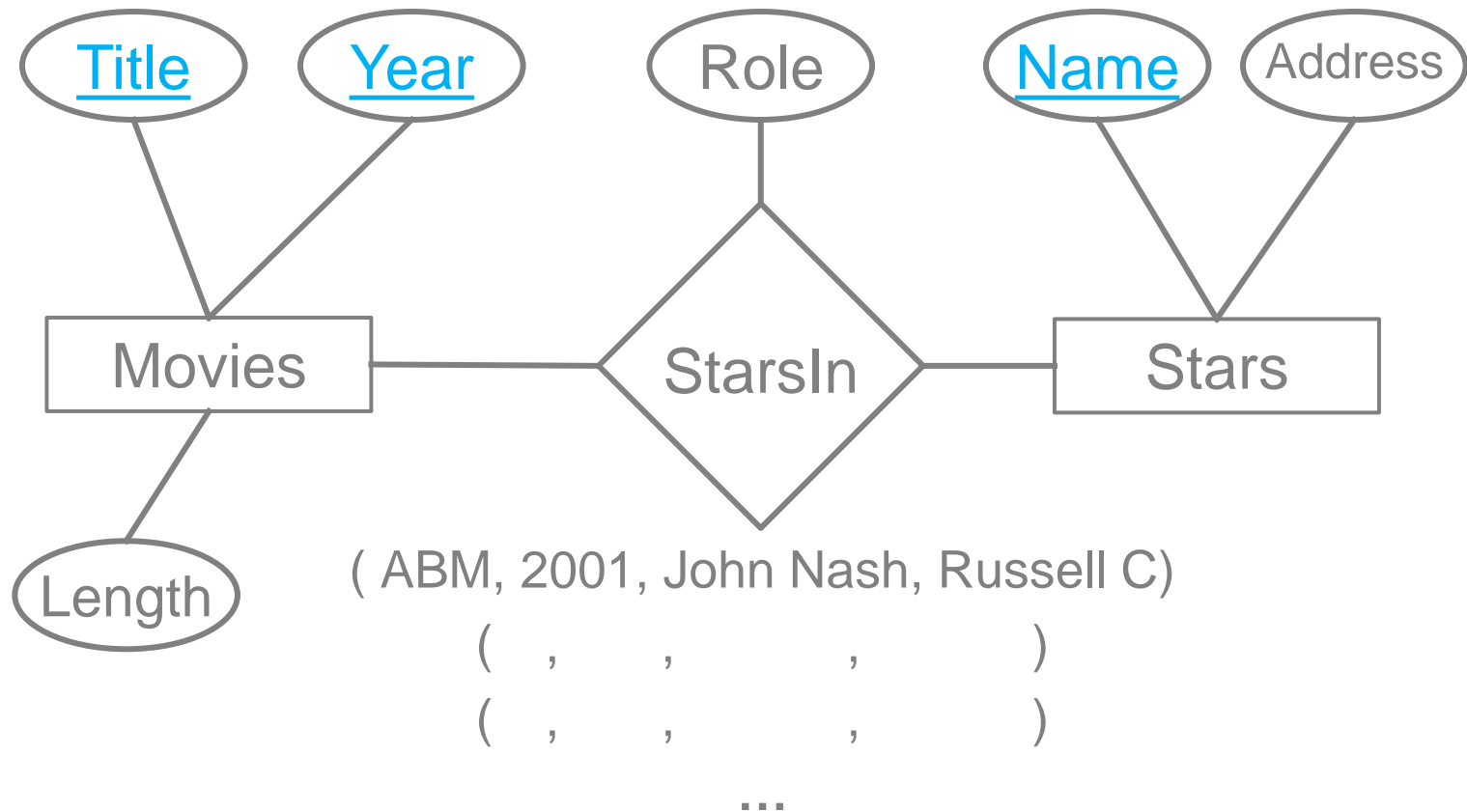
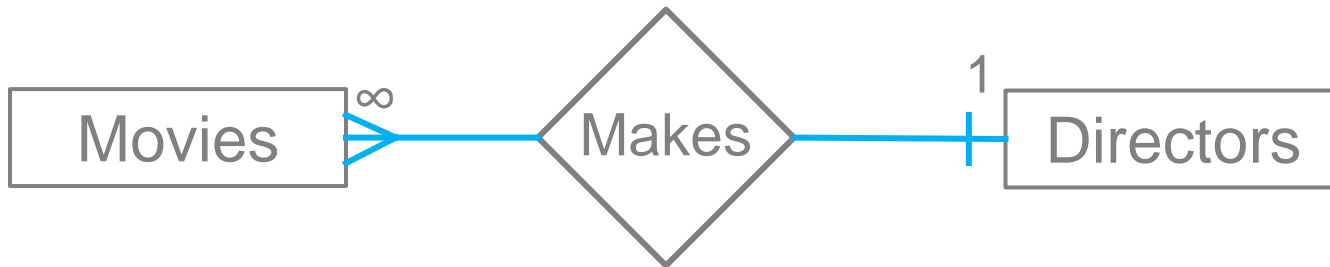# Crow's foot notation

General

One

Many

More specific

One (and only one)

Zero or one

One or many

Zero or many

Many-to-one

We need a way to show that a movie has one director but a director can have many movies.

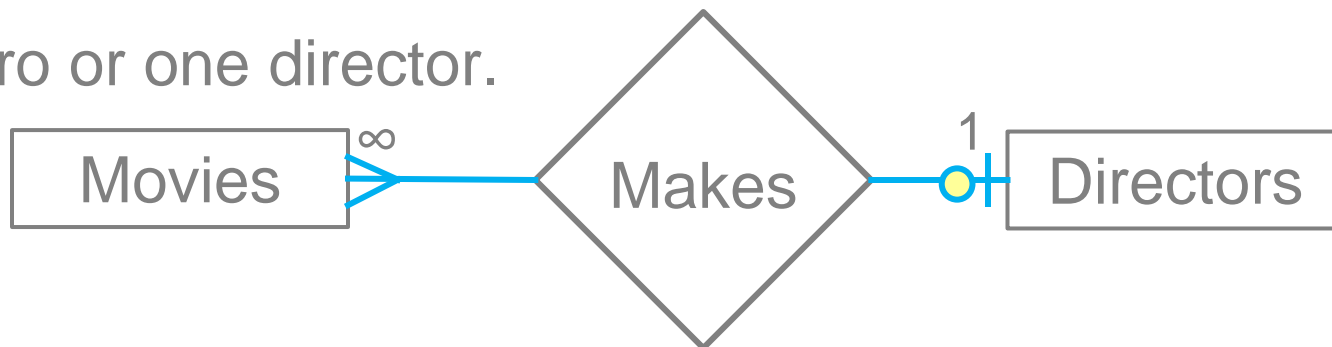Movies $\xrightarrow{\infty}$ Makes $\xrightarrow{1}$ Directors

(Indiana Jones 4, Steven Spielberg)
(Lincoln, Steven Spielberg)
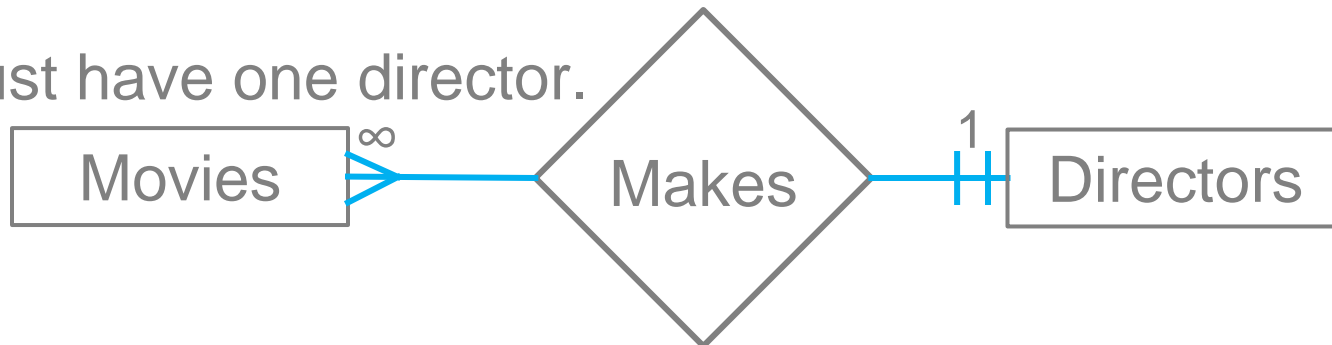~~(Lincoln, Steve Mohlke)~~

Required relationship

With the more specific notation, we can show whether a movie must have a director or whether it can have no director.
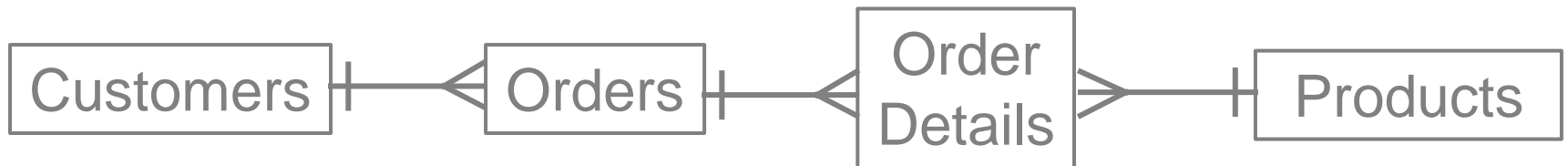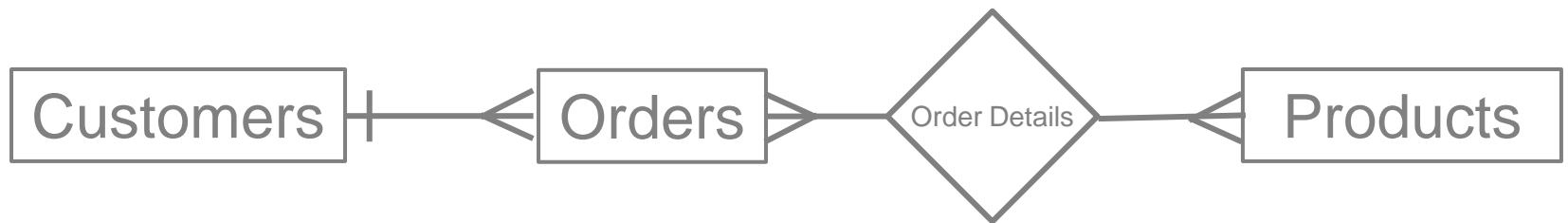
Zero or one director.

| Movies | ∞ >─── Makes ───○┤ Directors | 1 |

Must have one director.

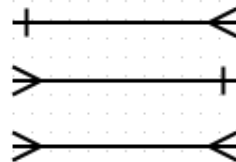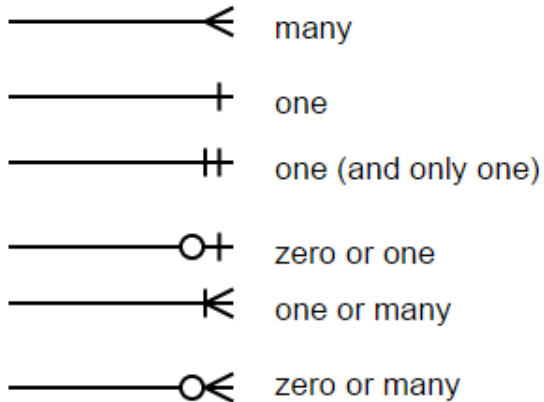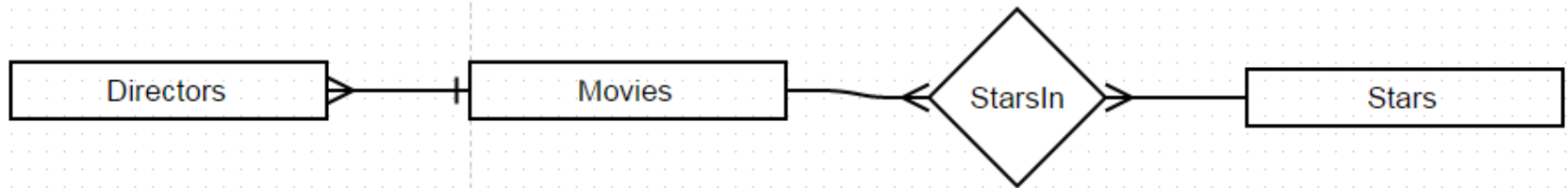| Movies | ∞ >─── Makes ───┤┤ Directors | 1 |

Click In!

Many to Many -> 3rd table

Movies ER diagram

Now you try…

Review

- ER diagrams a graphical way of showing how various data should be related
- Next time: Guidelines for making ER diagrams, and how to translate ER diagrams into relational schema