

ER Model

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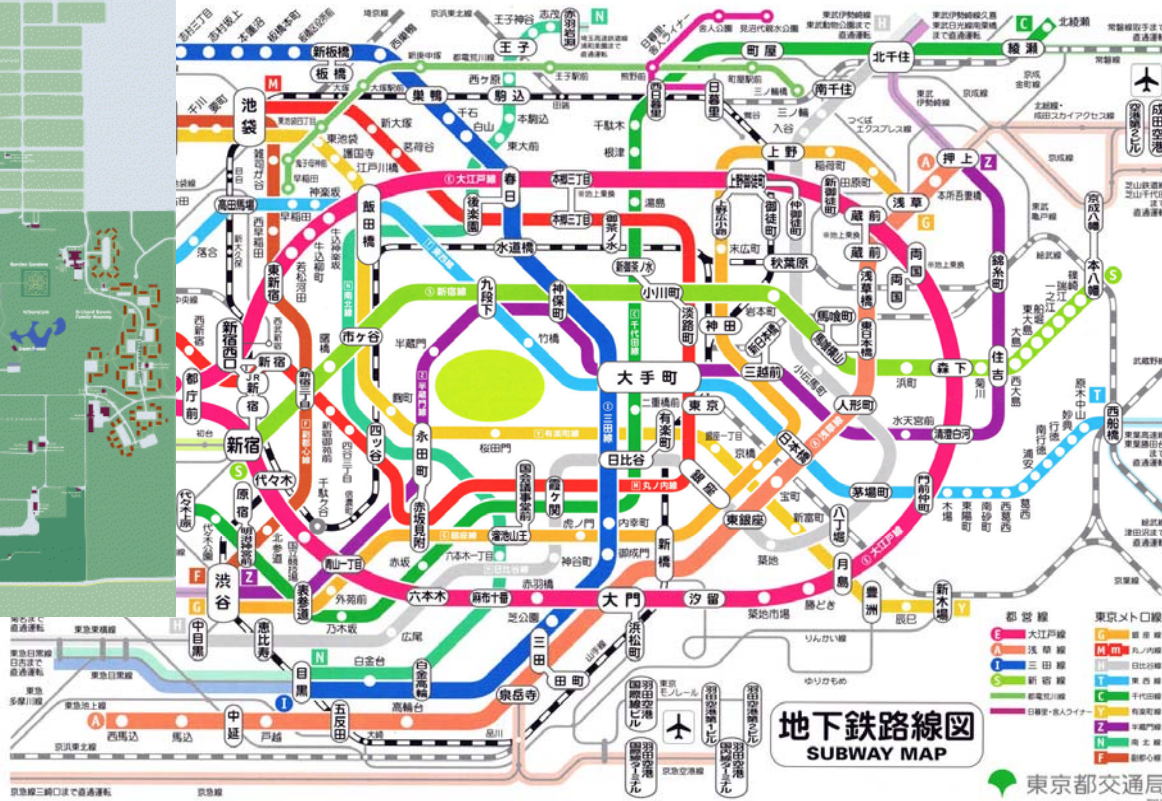
The New Contract on Lecture: Students

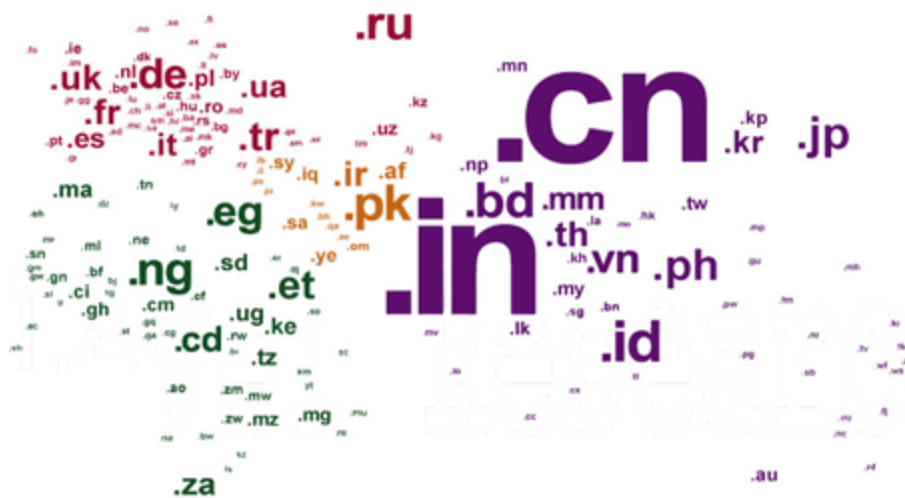
- Students:
 - Please attend class and participate.
 - Please sit in the front rows so we are together.
 - Please interact with instructor (signal, ask, answer).
 - Please do not fall asleep or ...

The New Contract on Lecture: Instructor

- Instructor:
 - Will be do my best to prepare.
 - Will respect each question.
 - Will not rush to cover all the materials.
 - Will make sure online students hear well.
 - Will not fall asleep or ...

Why Do We Learn This?





Steps in Building a DB Application

- Suppose you are working on CS411 project
- Step 0: pick an application domain
 - we will talk about this later
- Step 1: conceptual design
 - discuss with your team mates what to model in the application domain
 - need a modeling language to express what you want
 - ER model is the most popular such language
 - output: an ER diagram of the app. domain

Steps in Building a DB Application

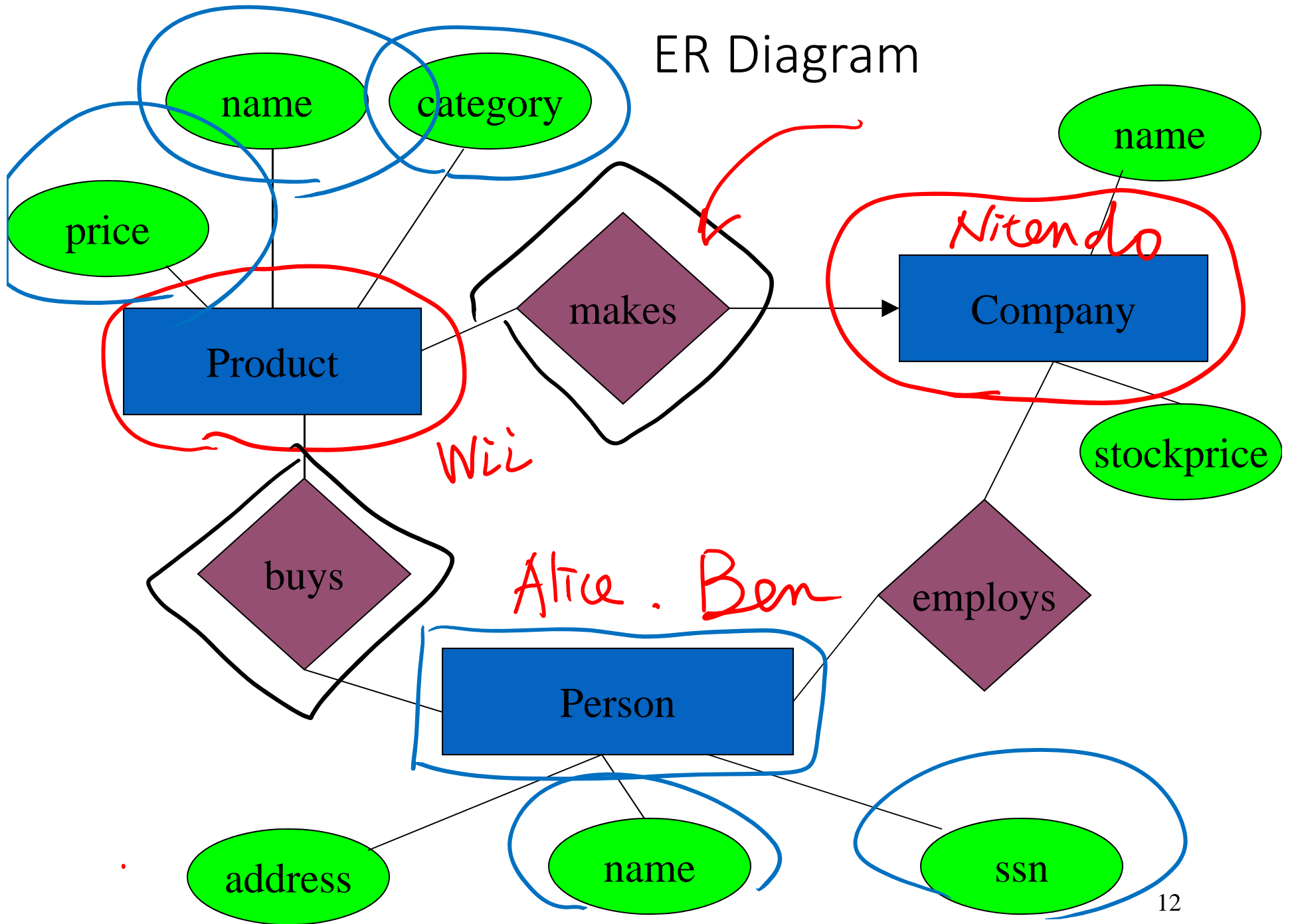
- Step 2: pick a type of DBMS
 - relational DBMS is most popular and is our focus
- Step 3: translate ER design to a relational schema
 - use a set of rules to translate from ER to rel. schema
 - use a set of schema refinement rules to transform the above rel. schema into a **good** rel. schema
- At this point
 - you have a good relational schema on paper
- And then ...

ER Model

ER Model

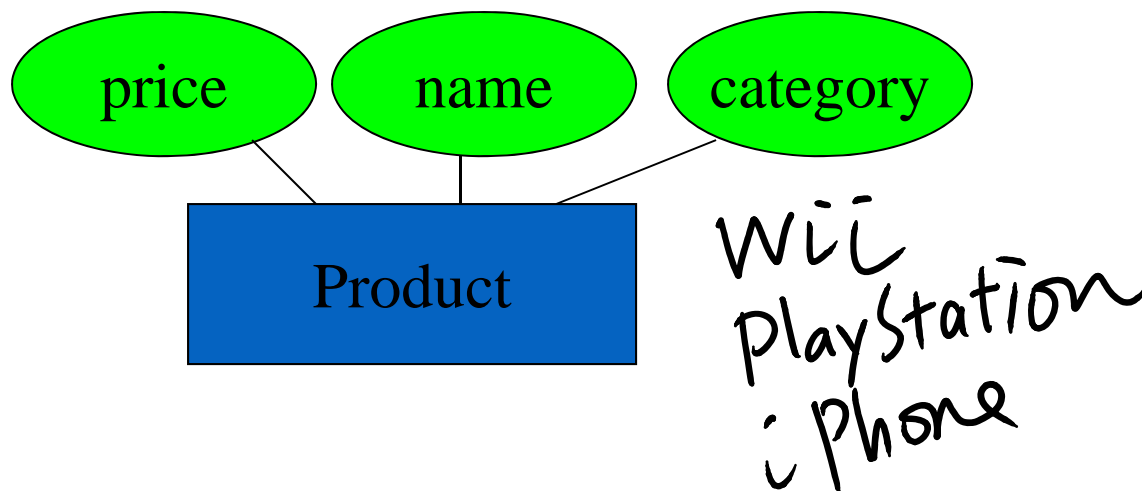
- Gives us a language to specify
 - what information the db must hold
 - what are the relationships among components of that information
- Proposed by Peter Chen in 1976
- What we will cover
 - basic stuff
 - constraints
 - weak entity sets
 - design principles

ER Diagram



Entities and Attributes

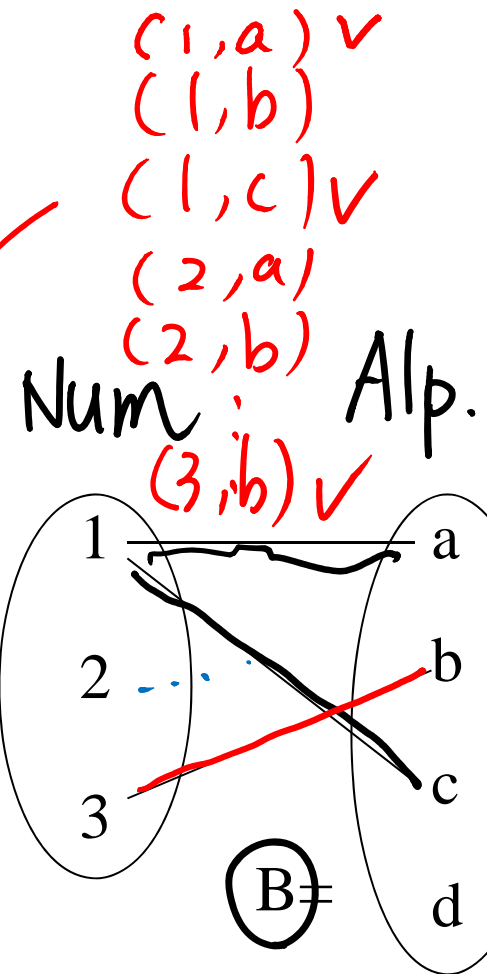
- Entities
 - real-world objects distinguishable from other objects
 - described using a set of attributes
- Attributes
 - each has an atomic domain: string, integers, reals, etc.
- Entity set: a collection of similar entities



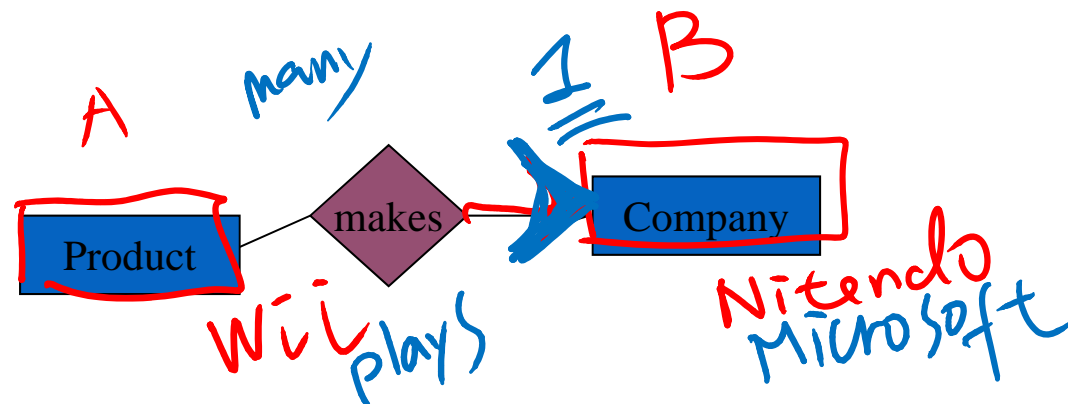
Relationships

A mathematical definition:

- if A, B are sets, then a relation R is a subset of $A \times B$
- $A = \{1, 2, 3\}$, $B = \{a, b, c, d\}$
 $R = \{(1, a), (1, c), (3, b)\}$



makes is a subset of **Product** x **Company**:



Multiplicity of E/R Relationships

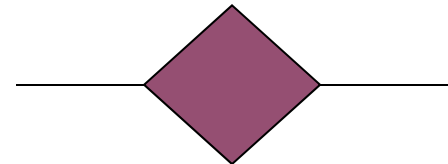
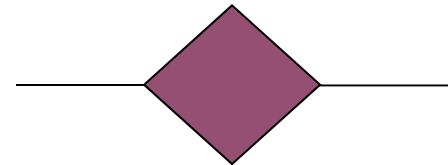
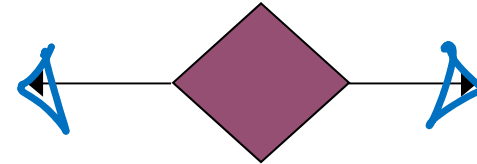
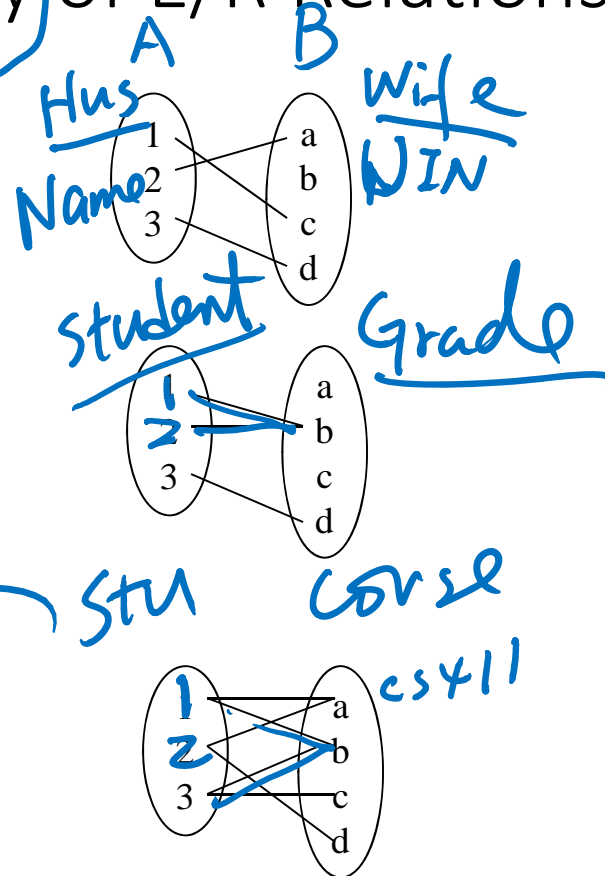
- one-one:



- many-one

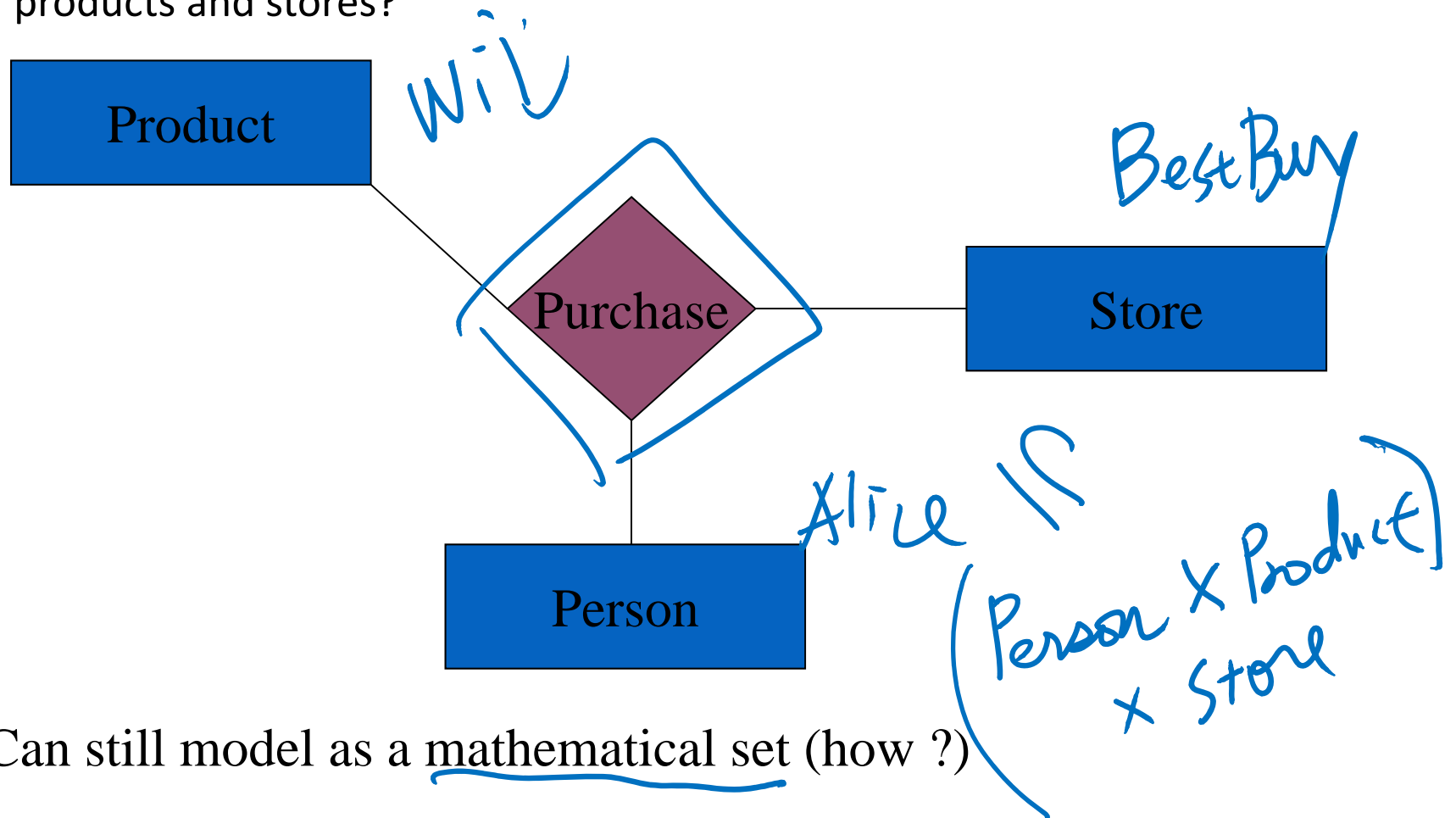


- many-many



Multiway Relationships

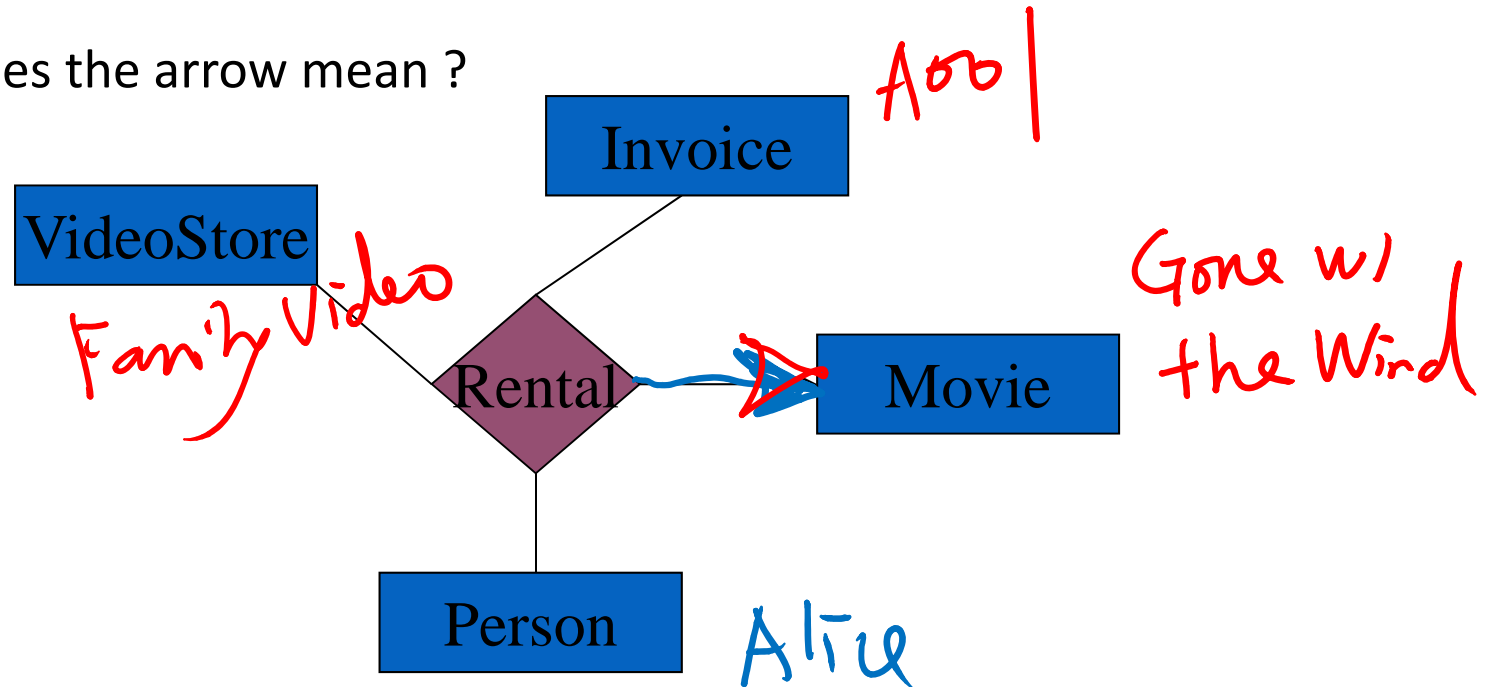
How do we model a purchase relationship between buyers, products and stores?



Can still model as a mathematical set (how ?)

Arrows in Multiway Relationships

Q: what does the arrow mean ?



A:

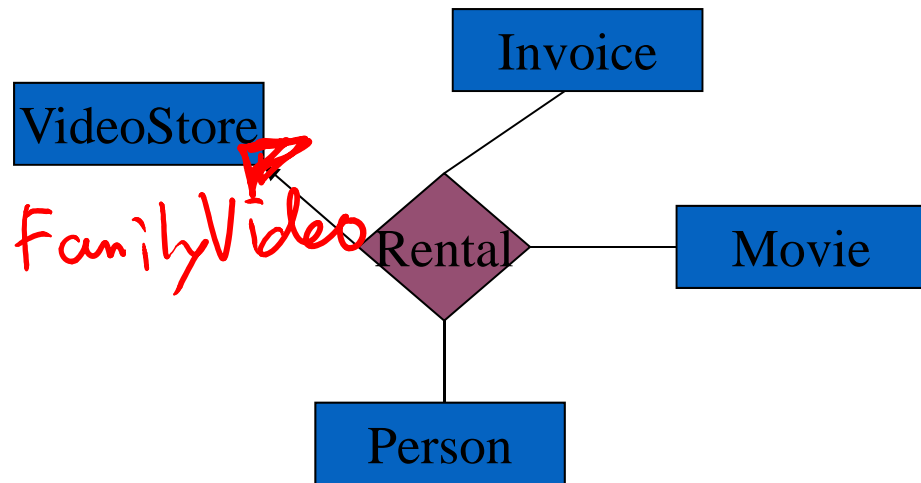
Person, VideoStore, Invoice
→ Movie

Arrows in Multiway Relationships

Q: how do I say: "invoice determines store" ?

A: no good way; best approximation:

Noway
A001

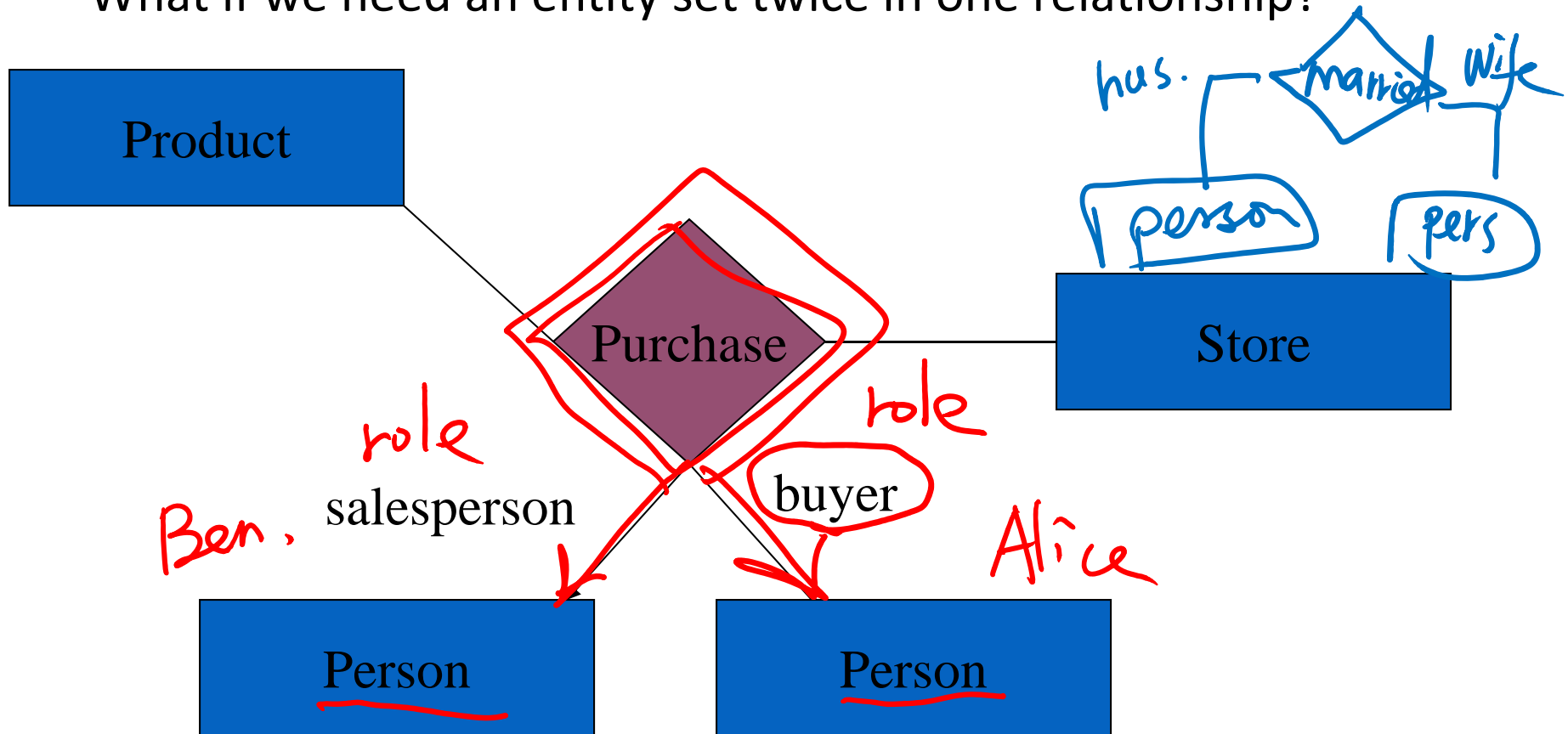


Q: Why is this incomplete ?

Invoice, Movie, Person
→ VideoStore

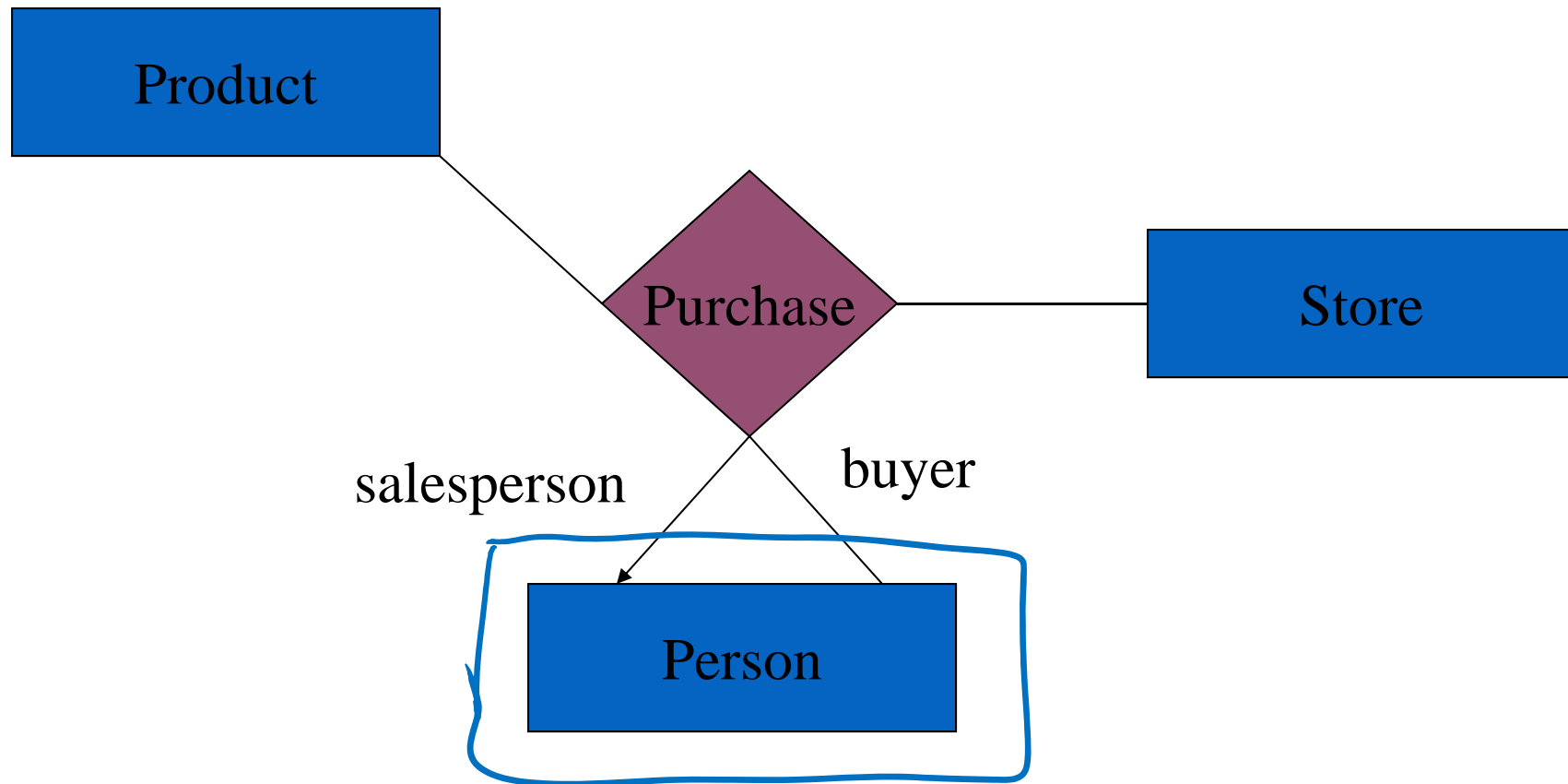
Roles in Relationships

What if we need an entity set twice in one relationship?

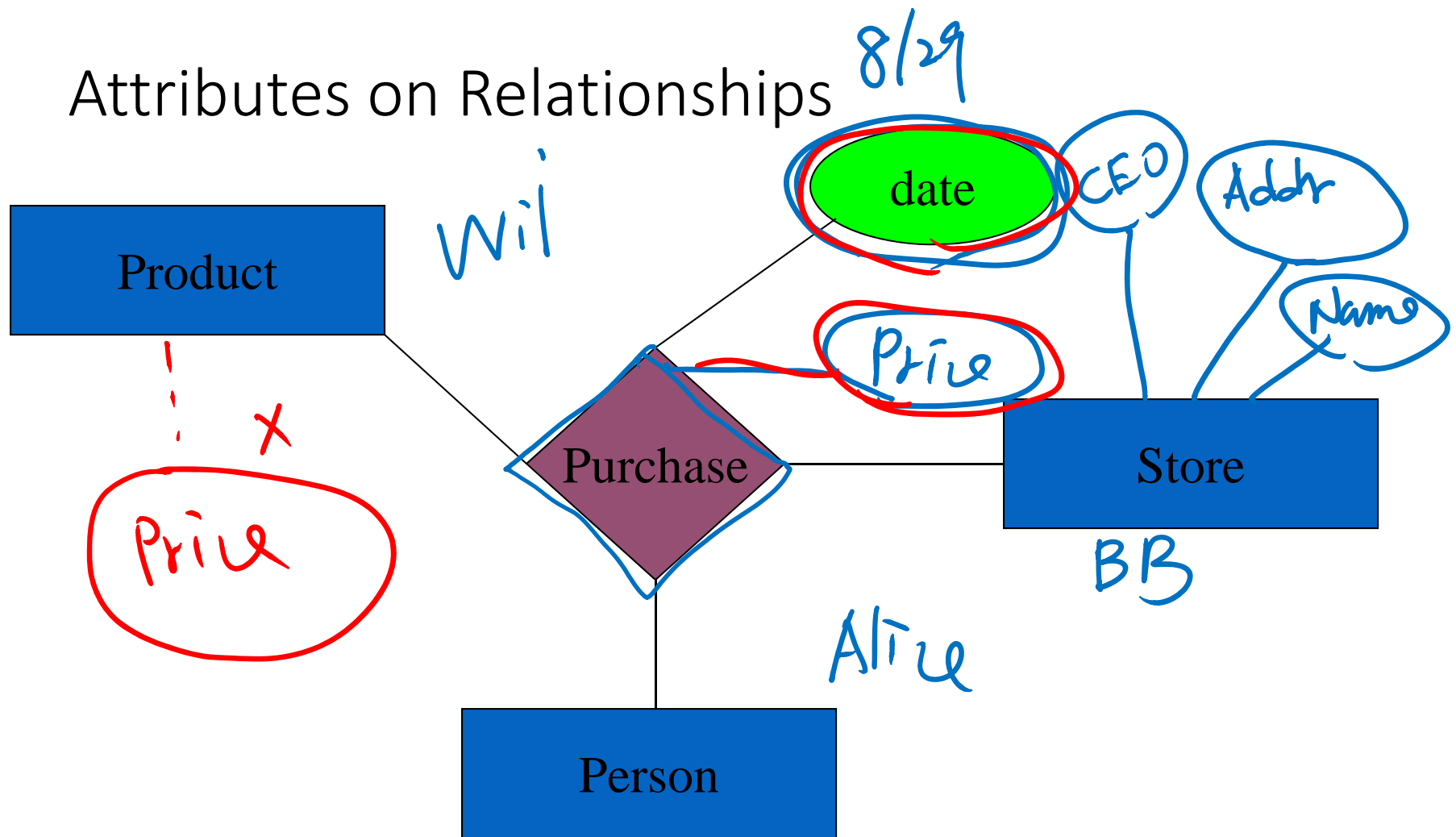


Roles in Relationships

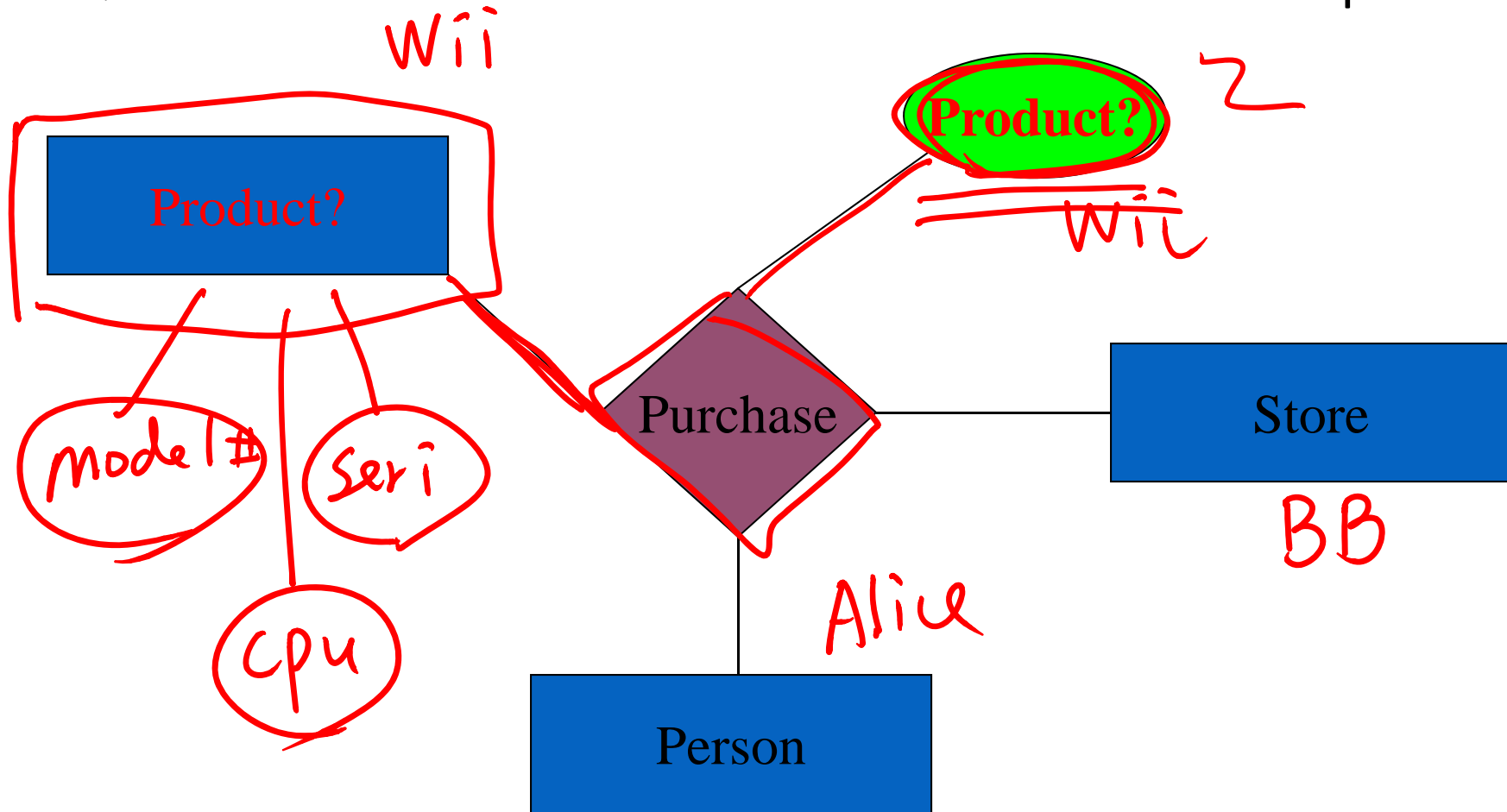
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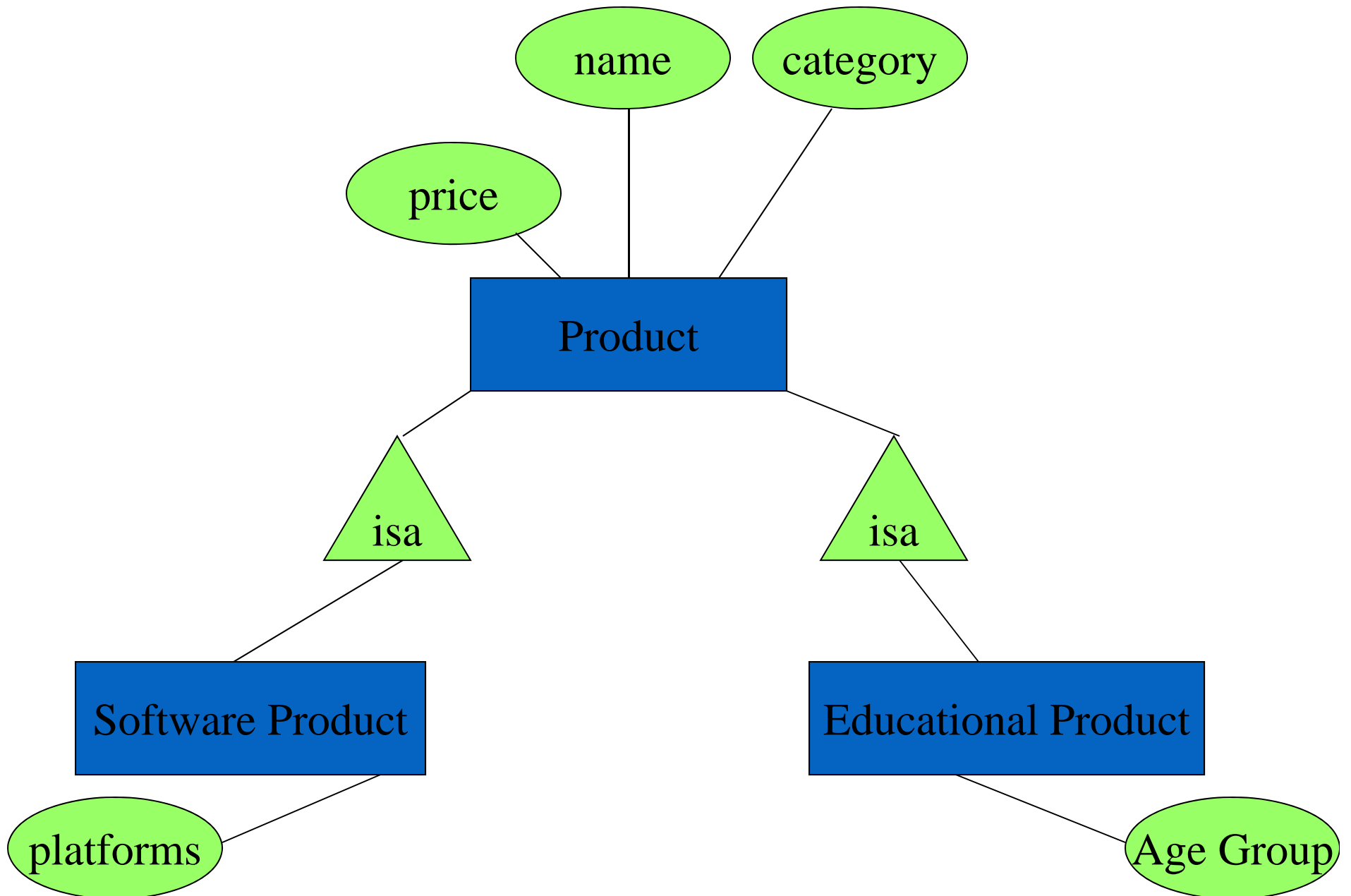
Attributes on Relationships



Q: Attributes vs. Entities on Relationships?



Subclasses in ER Diagrams



Warning: Viewers' Discretion Please

