Advanced ER Concepts

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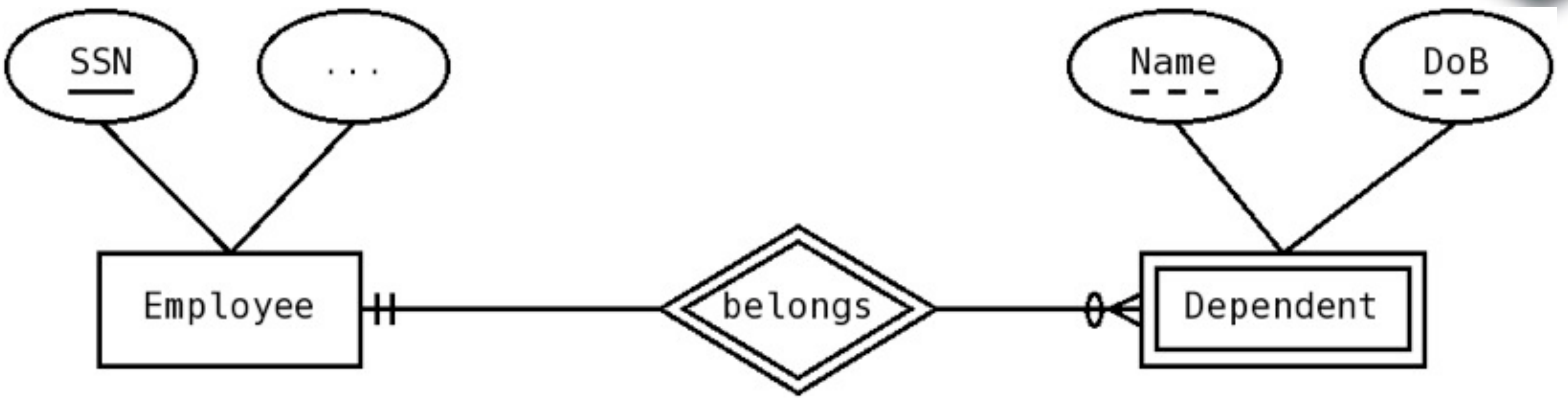
Weak Entities

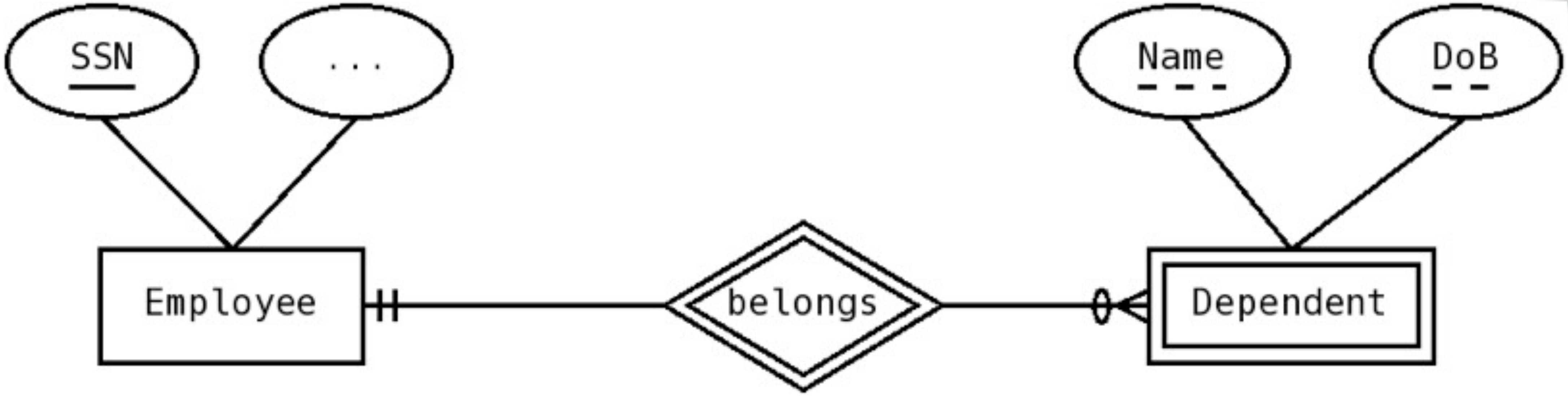
- Don’t have an identifier (identification-dependent)
- Different from existence-dependent
- Normally, don’t care about entities except as attached to strong
- Could add id to make strong
- Double lines (also for identifying relationship)
- Discriminator is dash-underlined

Example: Dependent



- Imagine we want to represent an Employee's kids or dependents,employee may not want to give us the kids SSN
- Can represent dependent as weak entity; they don't have an identifier, but need to distinguish among dependents of same employee

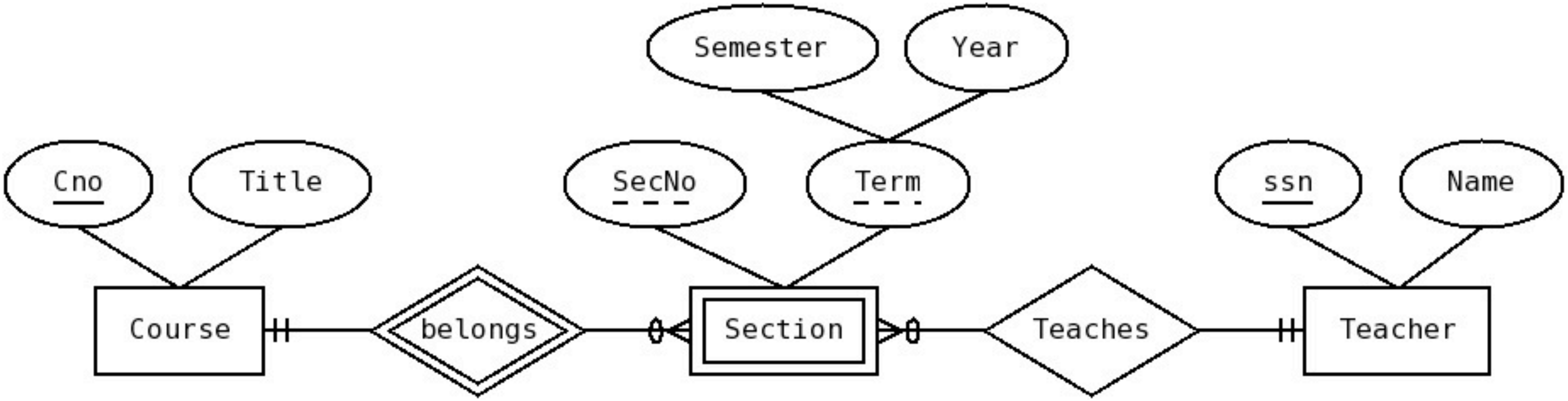
Example: Dependent



- Since employee is weak, we use double lines to draw it.
- Name and Dob, together, distinguish among dependents of *same* employee, they're its *discriminator* and go dash-underlined
- Belongs is the *identifying relationship,* so has double lines too

Example: Section

- Sections of a course can be represented as weak entities
- Weak entities can have other relationships



Quick Check

- We want to model information about TV series and their episodes.
  - –For each series, we keep its id (identifier) and title.
  - –We keep track of episodes of a series.
  - –For each episode we keep its number (which is unique among all episodes of the same series, but not among all episodes), title, and the date it first aired.

Solution

- We want to model information about TV series and their episodes.
  - –For each series, we keep its id (identifier) and title.
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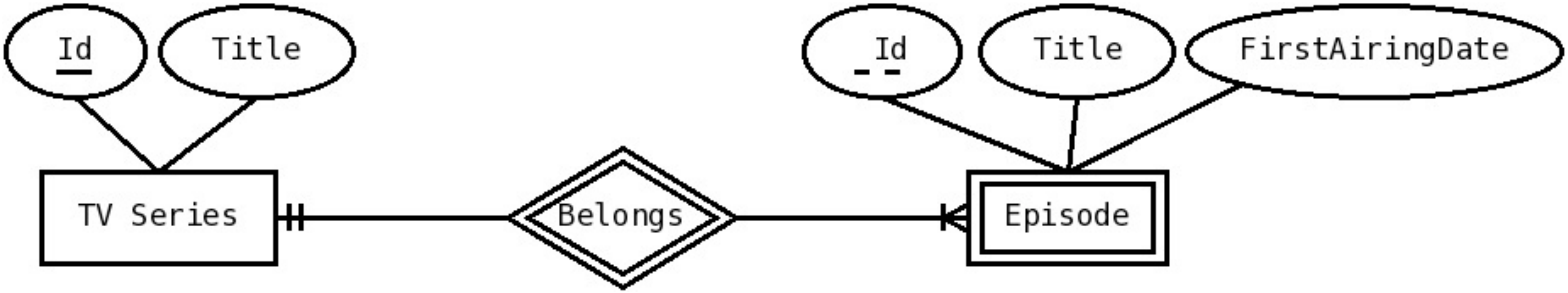
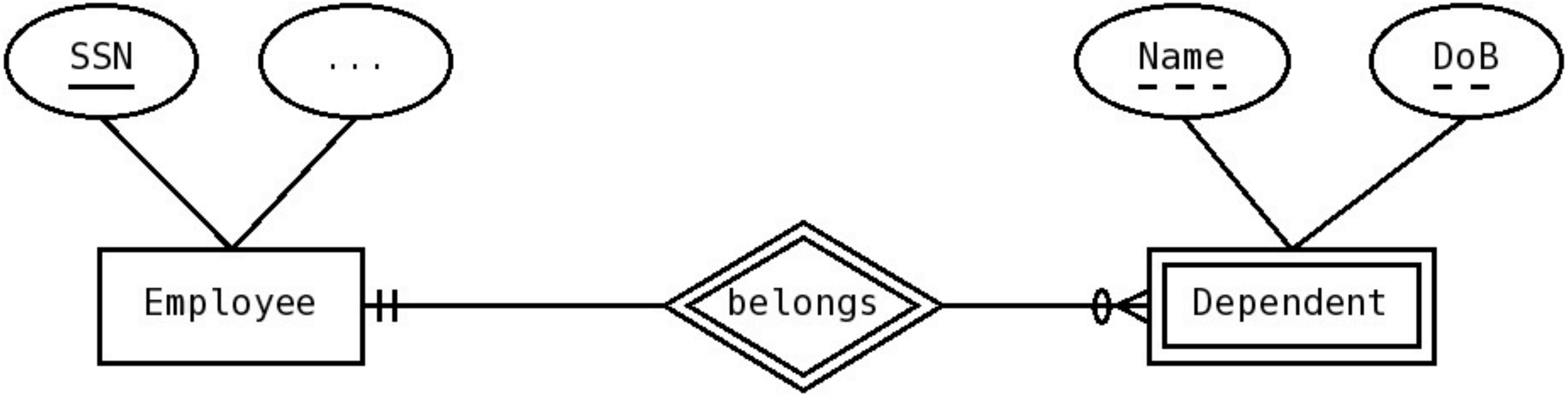
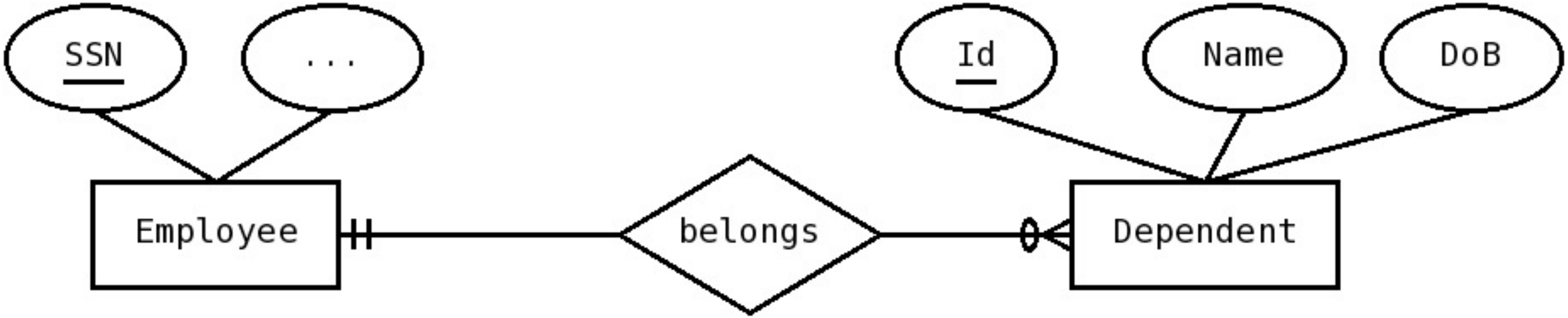


Can make weak strong

- Sometimes, it is useful to transform a weak entity into a strong entity
- We can just create an identifier for it





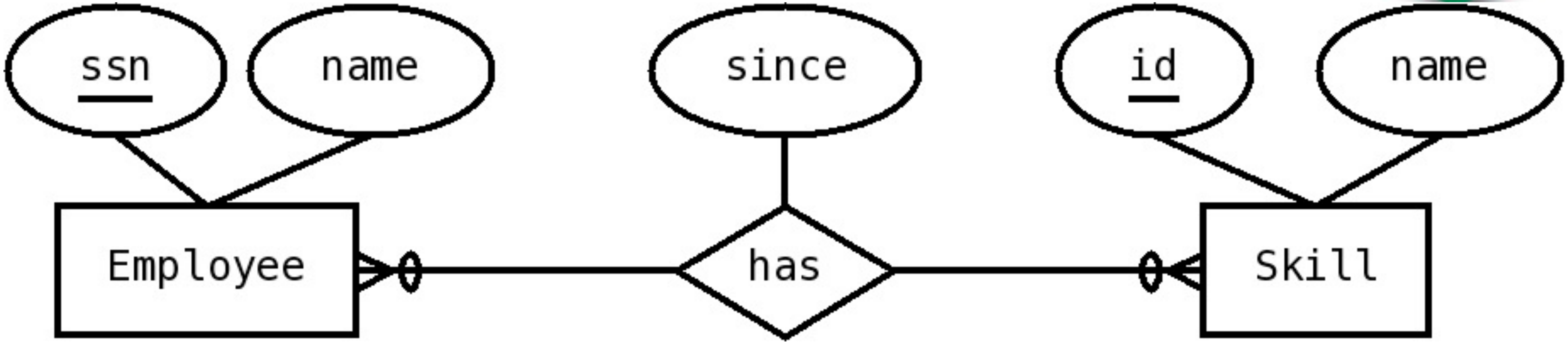
Should we make strong ?

- Advantages
  - Conceptual simplicity (weak entities are harder to understand)
  - Eventually, simpler keys (for relational model)
- Disadvantages
  - Extra attribute
  - Extra work (generating it)
  - Need to keep track of the constraints separately (the discriminator is unique among weak entities related to the same strong entity)

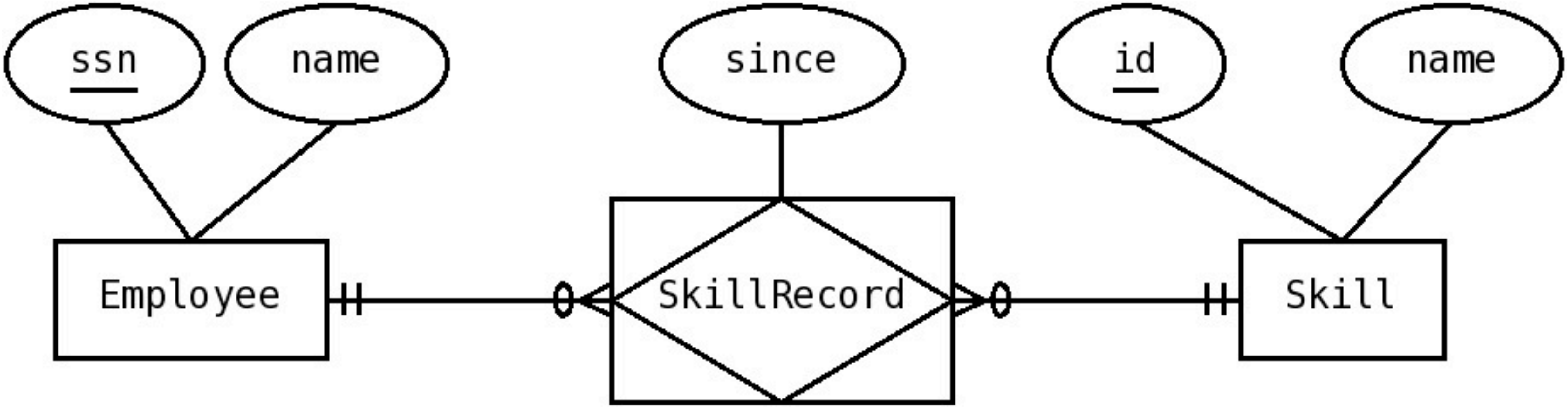
Associative Entities

- Entity that represents an association
- Kind of between entity and relationship
- Kind of weak entity, depending on more than one entity
- Useful mainly for ternary relationships
- Notation: Diamond inside square, the associating relationships are just lines

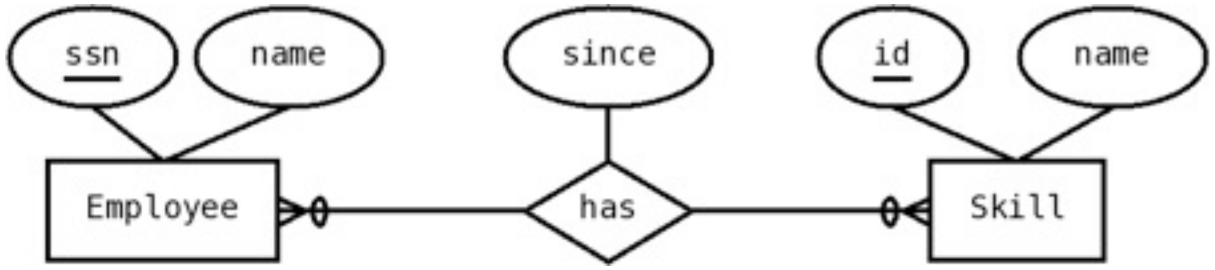
Simple example

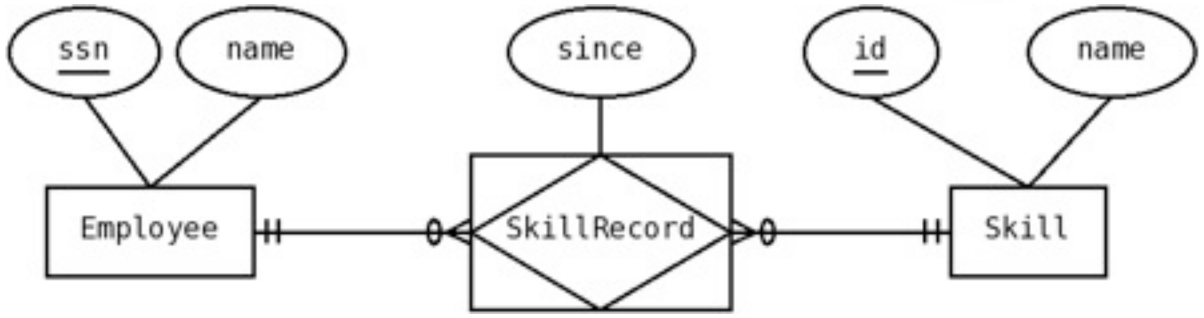


- Can become



Simple Example

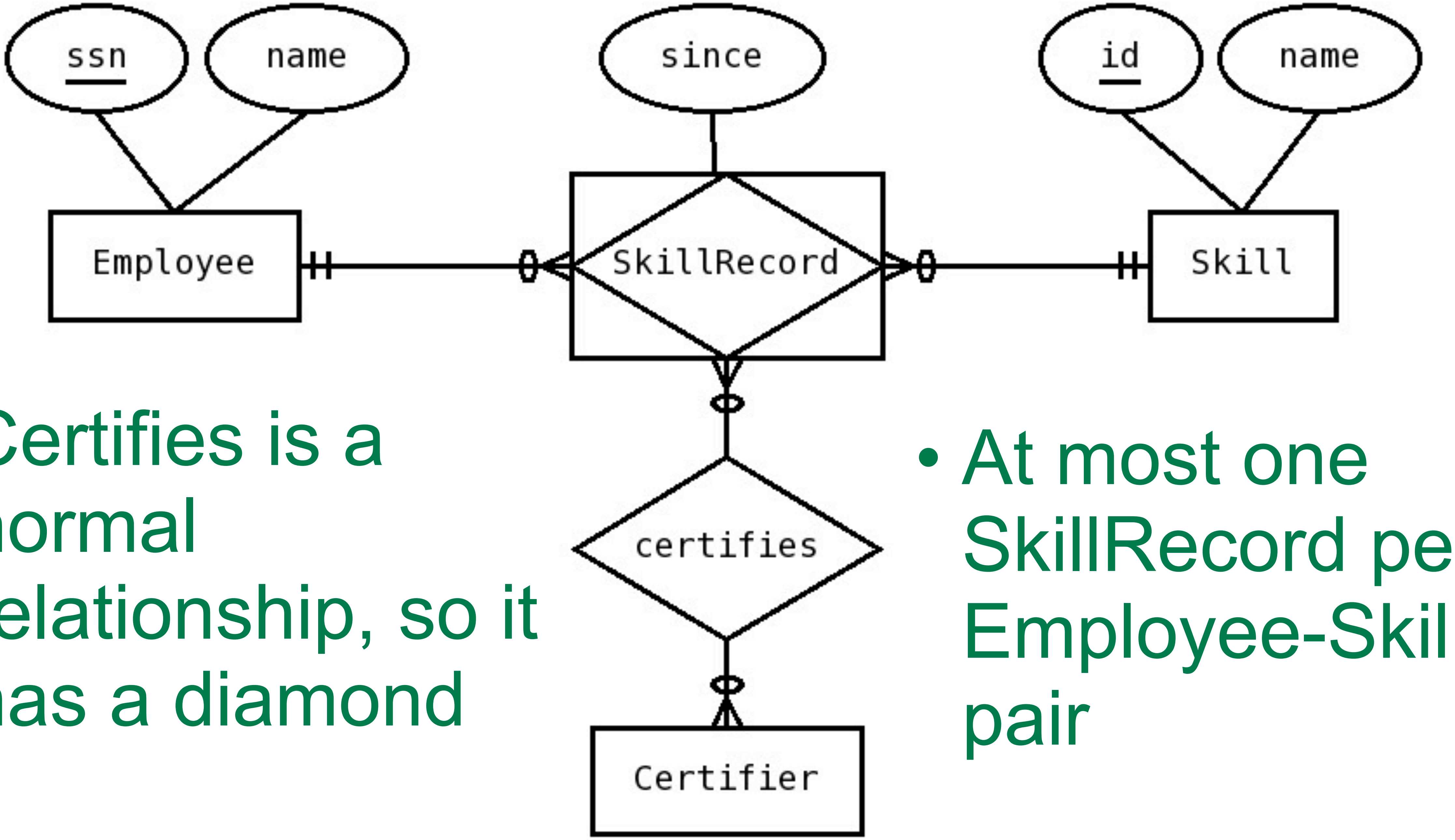




- Mechanics
  - –Associative entity is rectangle with diamond inside
  - –Name changes from verb to noun
  - –Lines from associative entity to the entities it associates now represent relationships (with no diamond, to mark them as special)
  - –Cardinality for those relationships for the associative entity is always exactly one, since each instance represents one association instance

Why ?

- Associative entity is an entity, so it can now have other relationships !



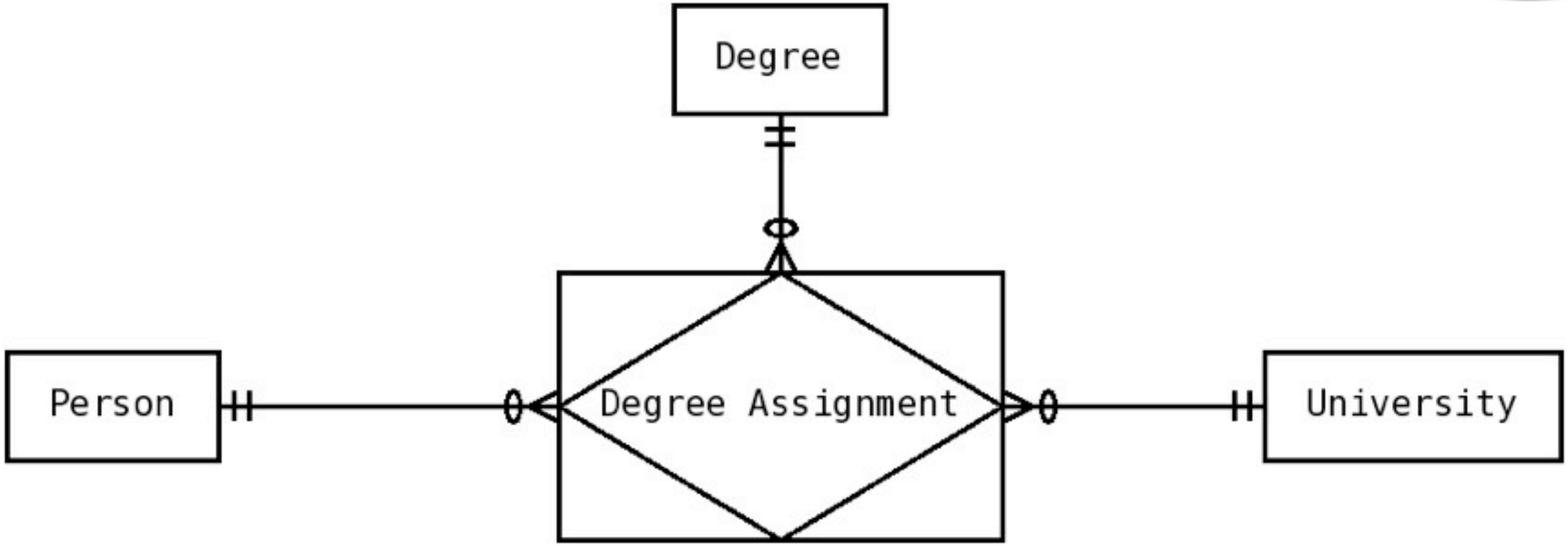
- Certifies is a normal relationship, so it has a diamond

- At most one SkillRecord per Employee-Skill pair

Ternary Relationships

- Most relationships are binary, but sometimes we need to relate three (or more :) entities at the same time
- Ternary relationships associate 3 entities *at the same time*
- Represent different information that having 3 binary relationships among the pairs of entities
- To represent them, we use associative entities
- At most ONE relationship instance for each trio of entity instances

Example: Degree



- A person gets a specific Degree from a University
- Degree assignment associates, at the same time, the person, degree and university