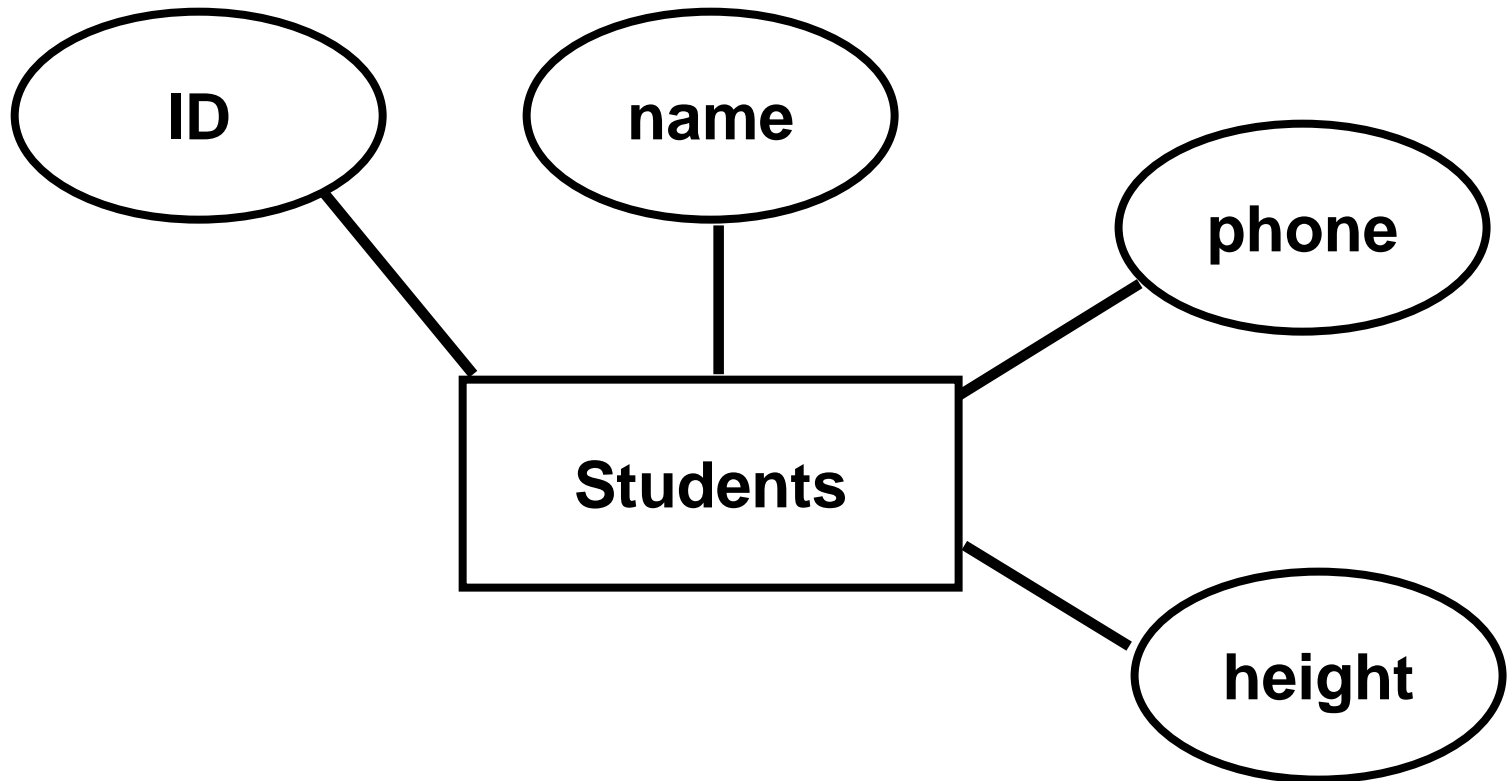

Chapter# 2

Entity/Relationship Model

Entity/Relationship Model

- Diagrams similar in spirit to OO models.
- Entity like object, = “thing.”
- Entity set like class = set of “similar” entities/objects.
- Attribute = property of entities in an entity set, similar to fields or “instance variables.”
- In diagrams, entity set is rectangle; attribute oval.

E/R Diagram



Relationships

- Connect two or more entity sets.
- Represented by diamonds.



Relationship Set

- Think of the “value” of a relationship set as a table.
- One column for each of the connected entity sets.
- One row for each list of entities, one from each set, that are connected by the relationship.

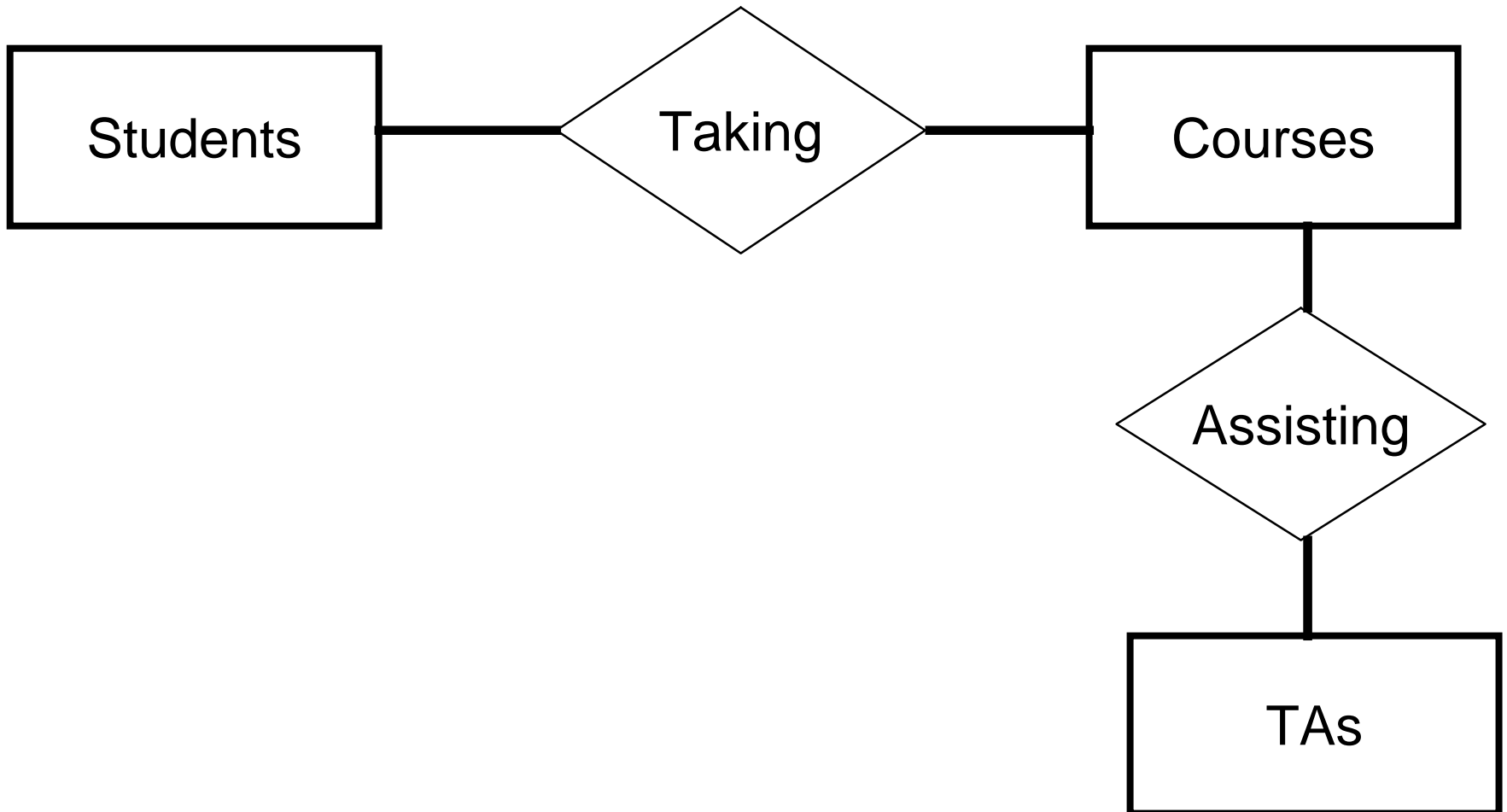
Example of Relationship Set

Students	Courses
Sally	CS 421
Sally	CS 461
Joe	CS 461

Multiway Relationships

- Usually binary relationships (connecting two E.S.) suffice.
- However, there are some cases where three or more E.S. must be connected by one relationship.
- Example: relationship among students, courses, TA's. Possibly, this E/R diagram is OK:

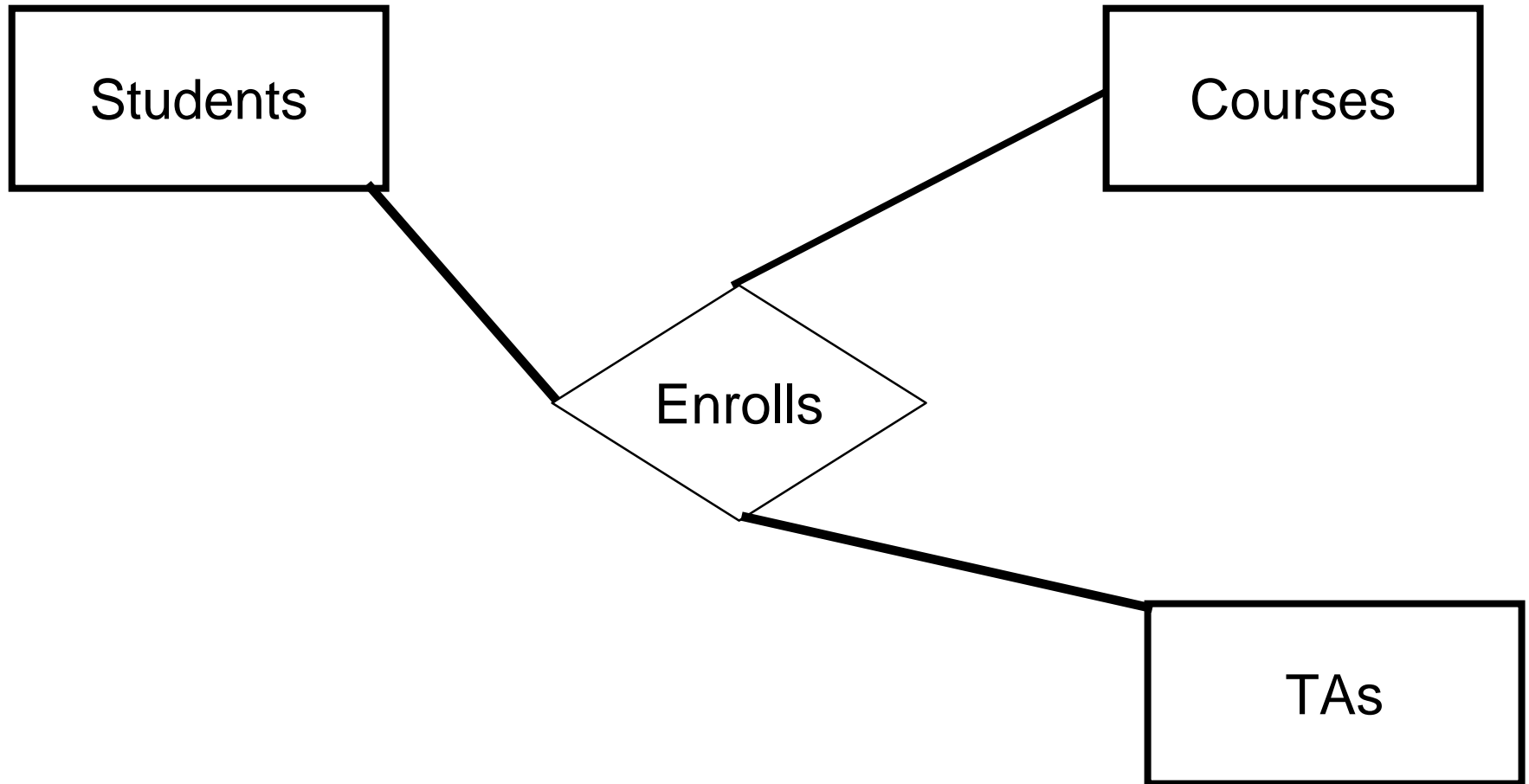
Relationship among students, courses, TA's



Multi-way Relationships

- Works in CS 461, because each TA is a TA of all students. Connection student-TA is only via the course.
- But what if students were divided into sections, each headed by a TA?
 - Then, a student in CS 461 would be related to only one of the TA's for CS 461. Which one?
- Need a 3-way relationship to tell.

Relationship among students, courses, TA's (II)



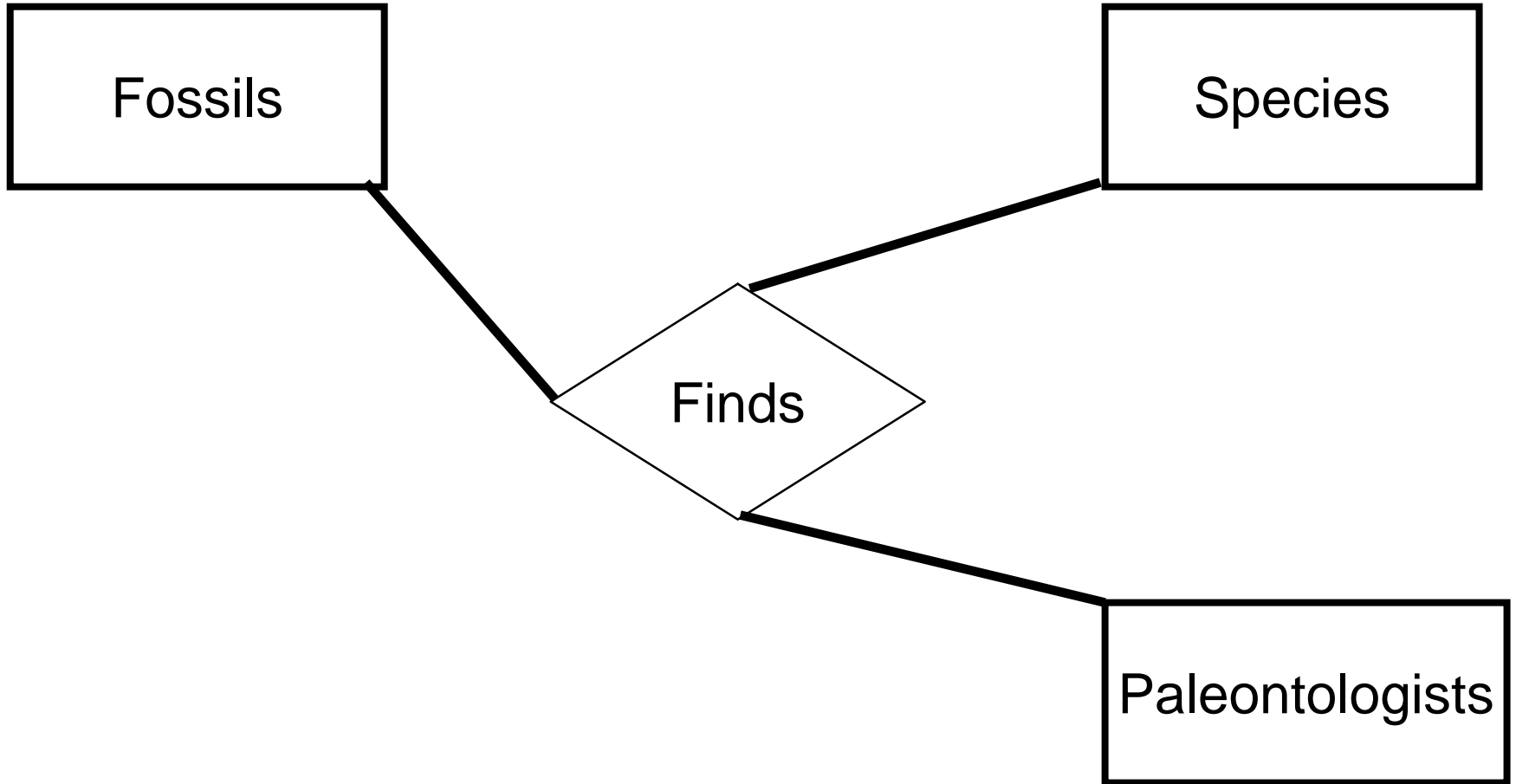
Table

Students	Courses	TAs
Sally	CS461	Claire
Sue	CS461	Ankur
Joe	CS461	Claire

Question

- A Design Issue: Should Multi-way Relationships be Split?
- Depends on whether it can be expressed as independent binary relationships.
- Example:

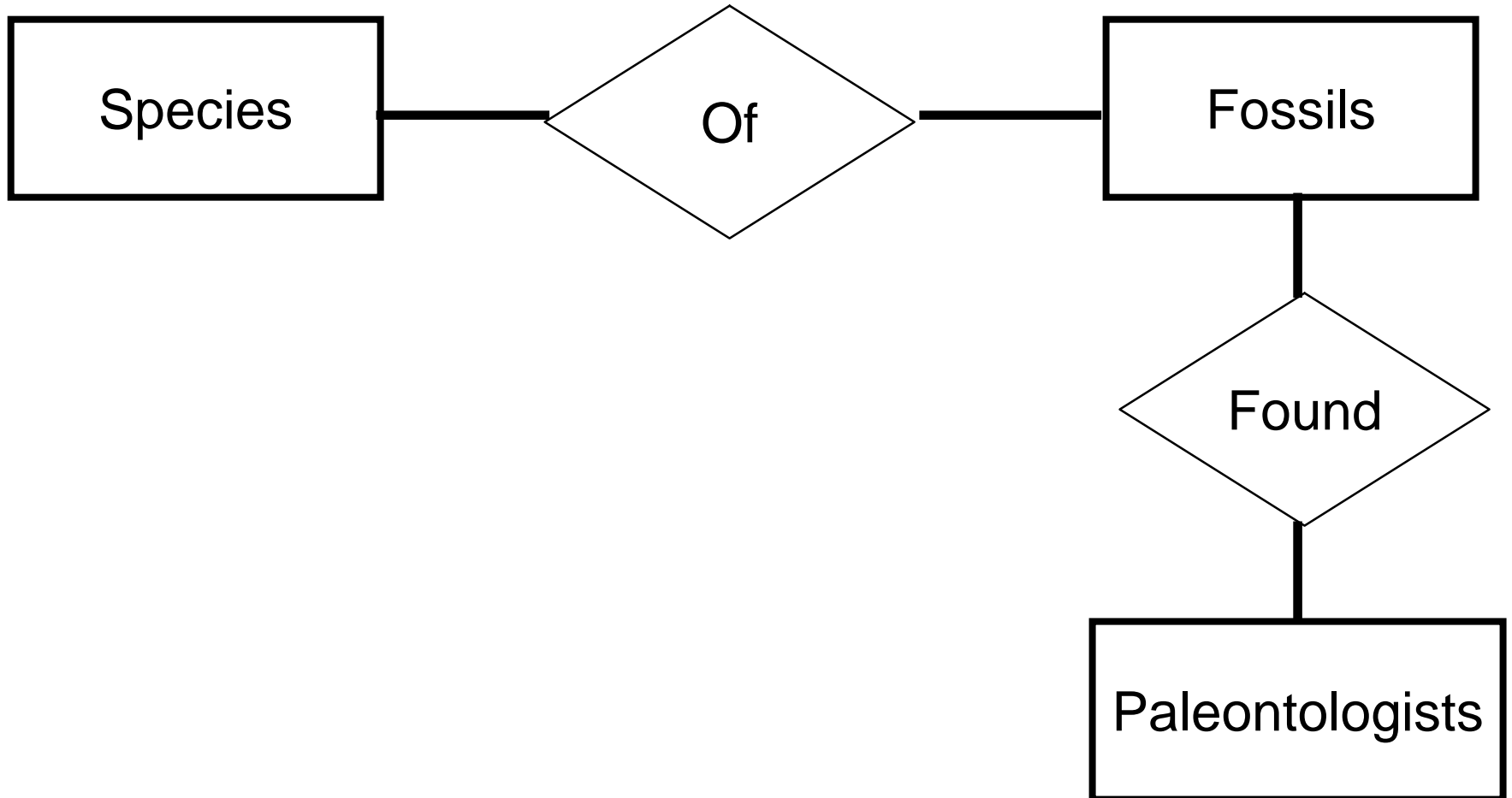
Diagram



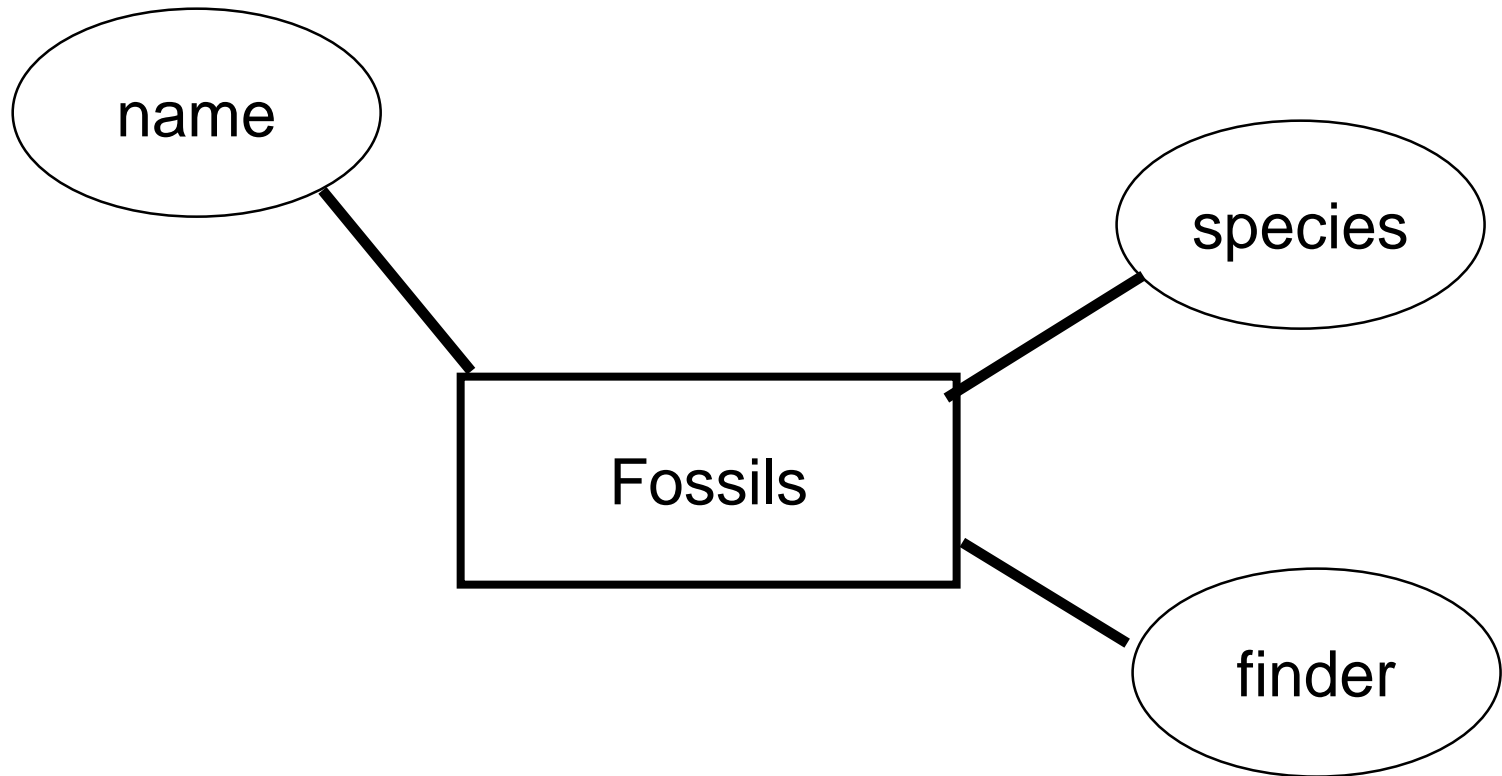
Table

Fossils	Species	Paleontologists
Lucy	A. Afarensis	Johansson
...

OK



What's Wrong?



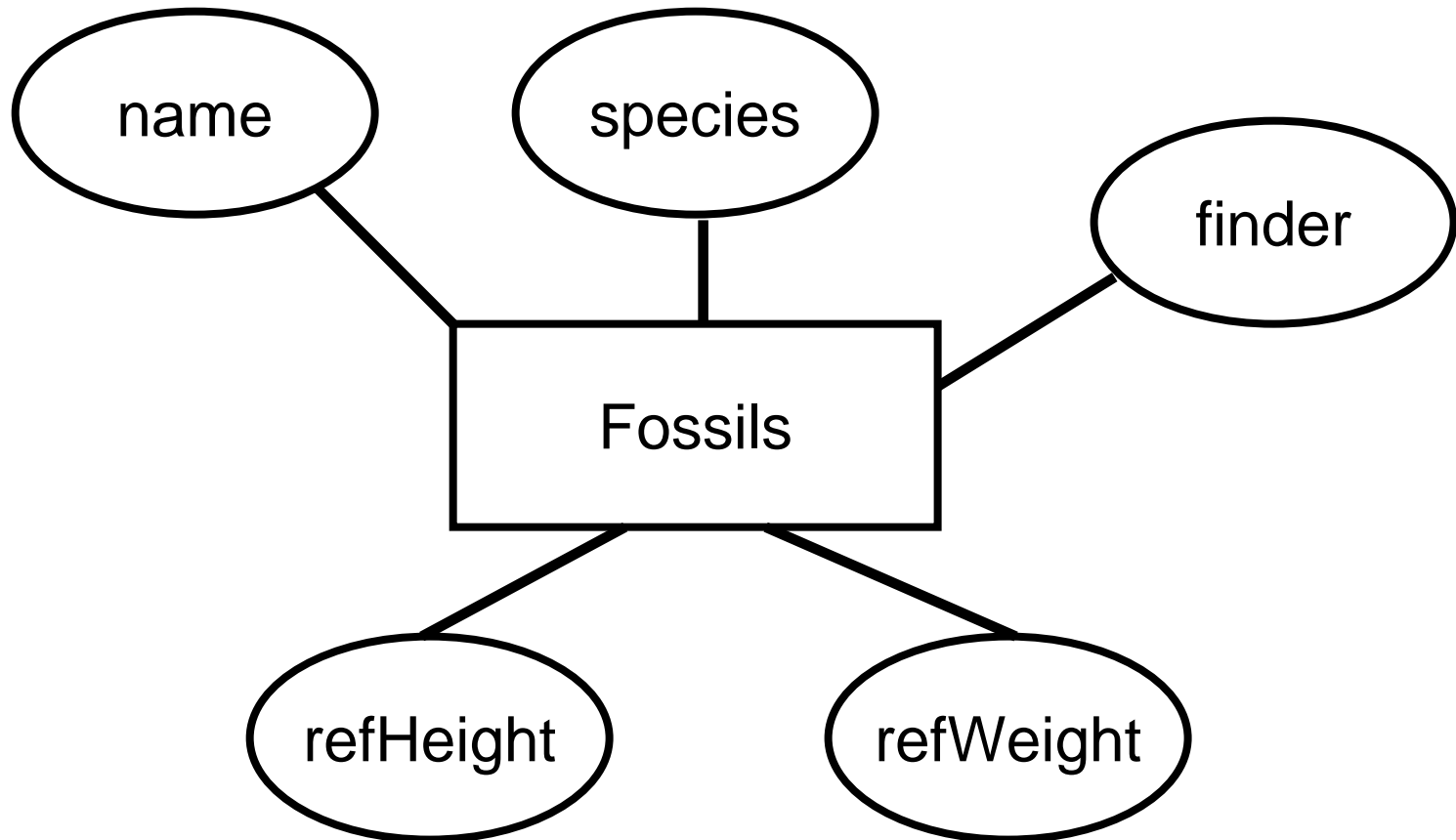
Attributes Vs. E.S. + Relationships

1. Makes it impossible to represent properties of species (e.g., height and weight of reference individual) finders.
2. Difficult to represent a set of finders for a single fossil.

Attributes Vs. E.S. + Relationships (II)

- But if (1) and (2) are not a problem, e.g., we don't want to represent attributes of species, then E.S. + attributes is simplest and best.

Can We Solve (1) by Adding Attributes?



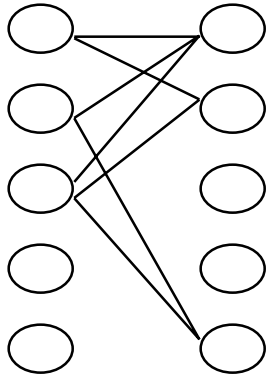
Can We Solve (1) by Adding Attributes? (II)

- Introduces the great problem of Redundancy.
 - Now for every fossil of a species, we repeat the reference height and weight.
 - Wastes space (not so important these days).
 - Offers opportunity to inconsistency, e.g., change height in only one fossil among several of the same species.

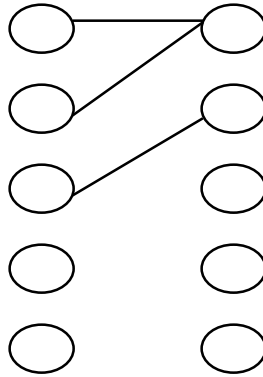
Can We Solve (1) by Adding Attributes? (II)

- Introduces the great problem of Redundancy.
 - Now for every fossil of a species, we repeat the reference height and weight.
 - Wastes space (not so important these days).
 - Offers opportunity to inconsistency, e.g., change height in only one fossil among several of the same species.

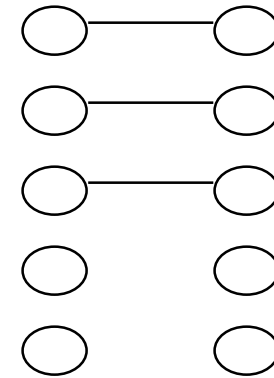
Multiplicity of Relationships



Many-to-many



Many-to-one



One-to-one