From ER to Tables

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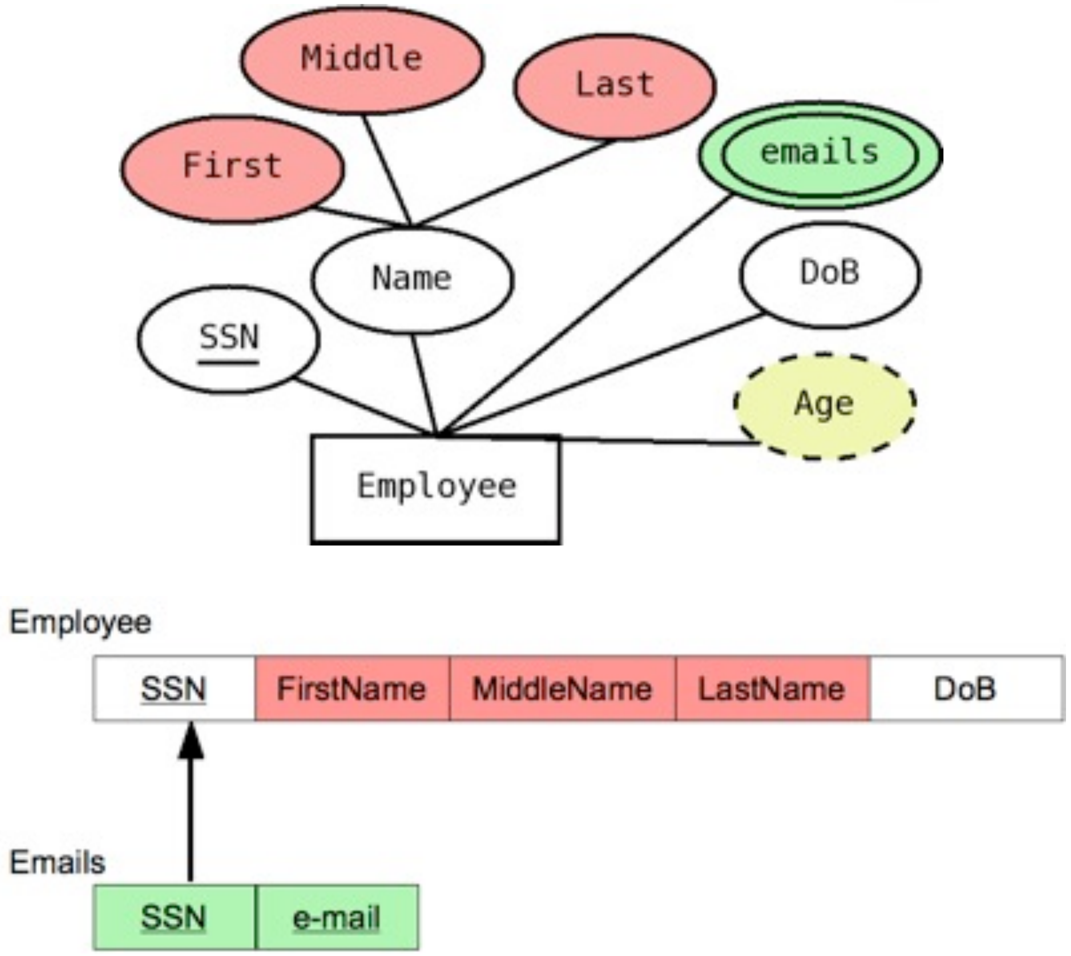
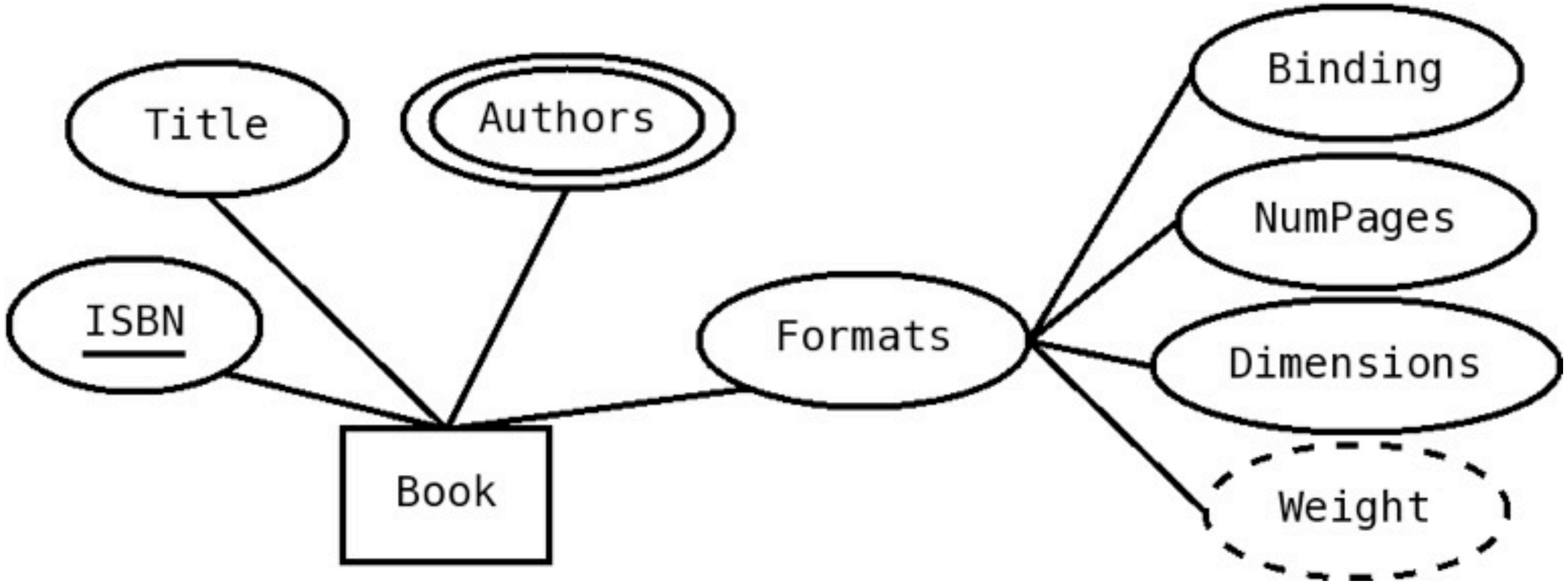
Transforming Entities

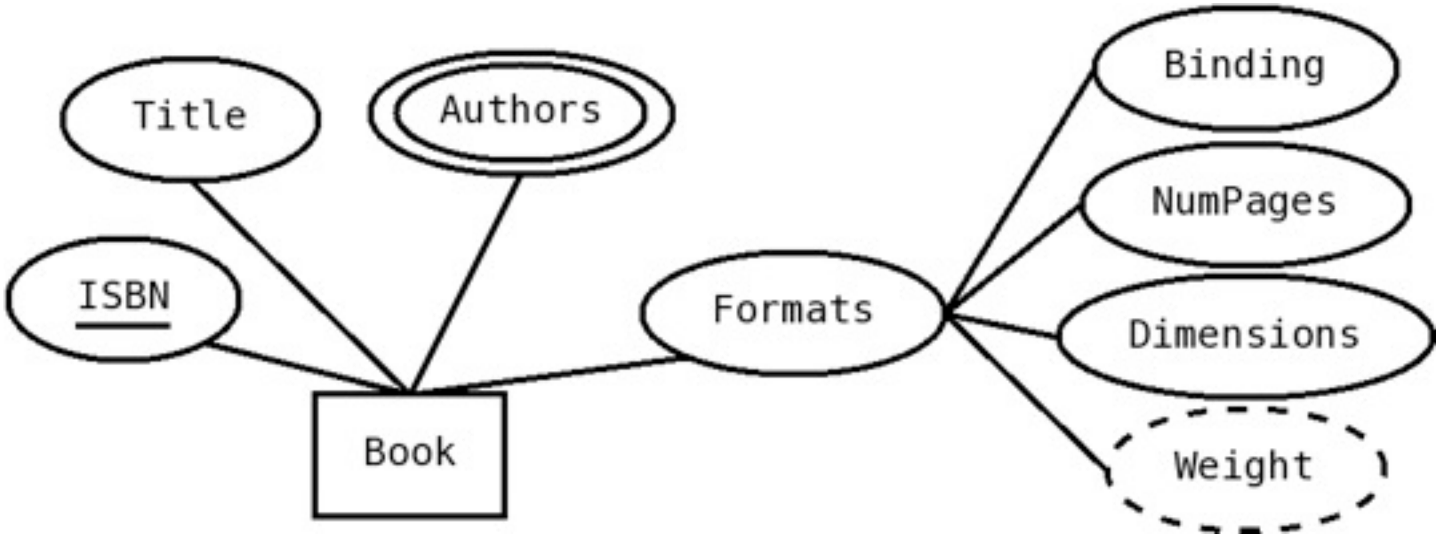
- Create a new table for each entity
- Remember to underline identifier
- For composite attributes, map only the basic pieces
- Derived attributes disappear
- For multivalued attributes we need a new table
  - We may need to create several tables for independent multivalued attributes



You try


Title
Authors
Binding
NumPages
ISBN
Formats
Dimensions
Book
Weight

Solution



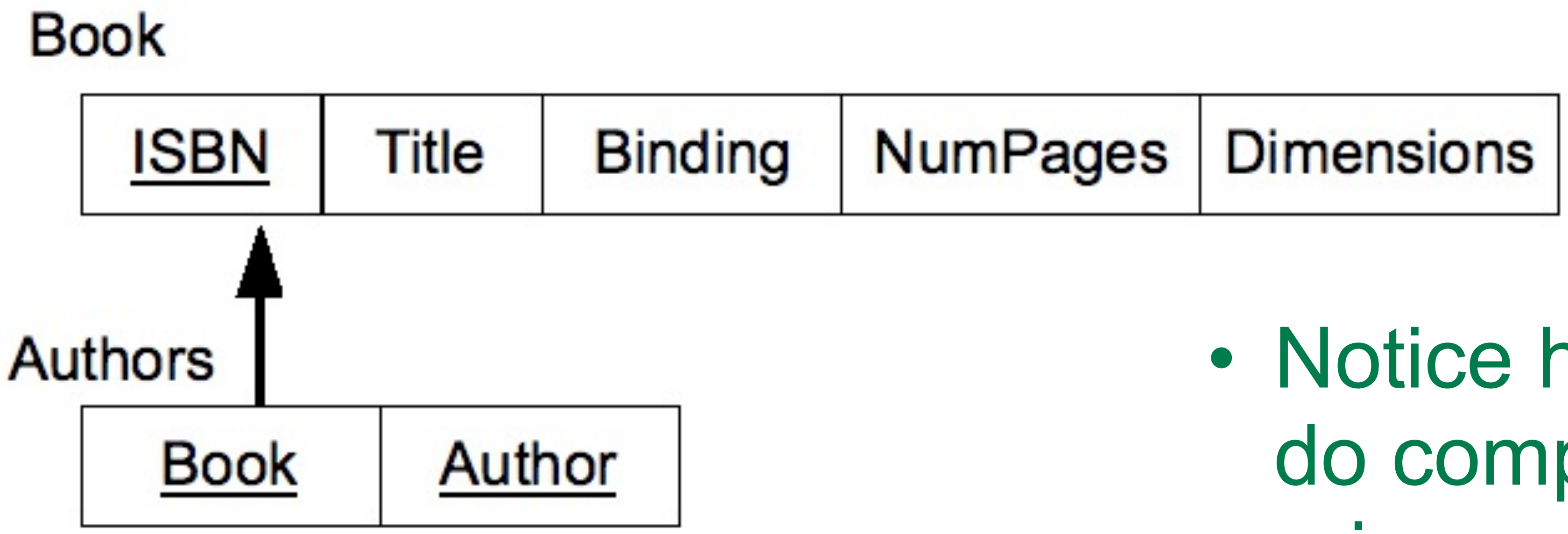
Book

ISBN	Title	Binding	NumPages	Dimensions

Authors

Book	Author

Corresponding SQL

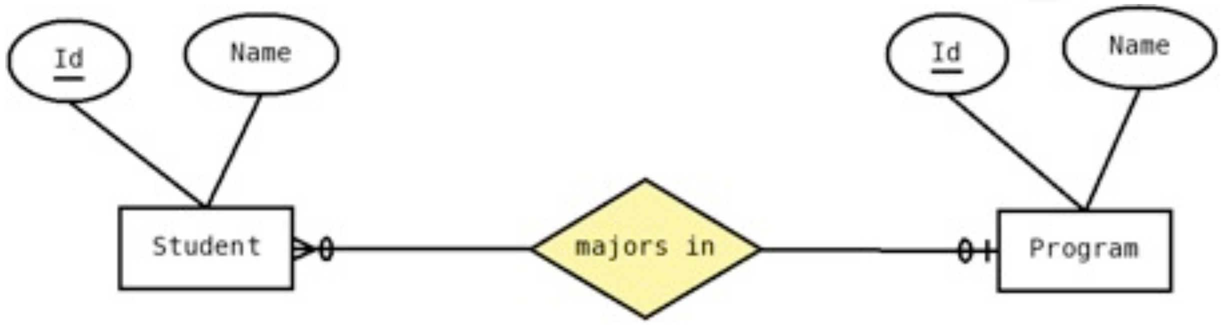


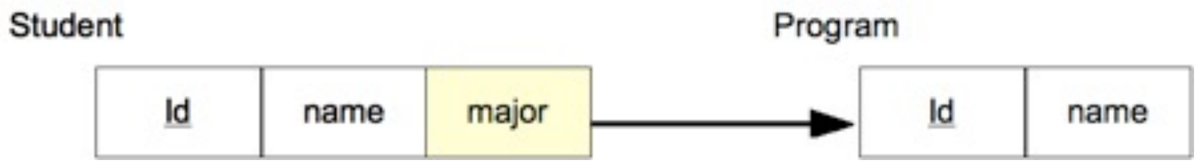
```
CREATE TABLE Book (
  ISBN NUMERIC(13) PRIMARY KEY,
  Title VARCHAR(50),
  Binding CHAR(1),
  NumPages NUMERIC(4),
  Dimensions varchar(20)
);

CREATE TABLE Authors (
  Book NUMERIC(13) REFERENCES BOOK(ISBN),
  Author VARCHAR(20) ,
  PRIMARY KEY(Book,Author)
);
```

- Notice how we do composite primary key for Authors table
- Notice that naming conventions may vary

one-to-many relationships

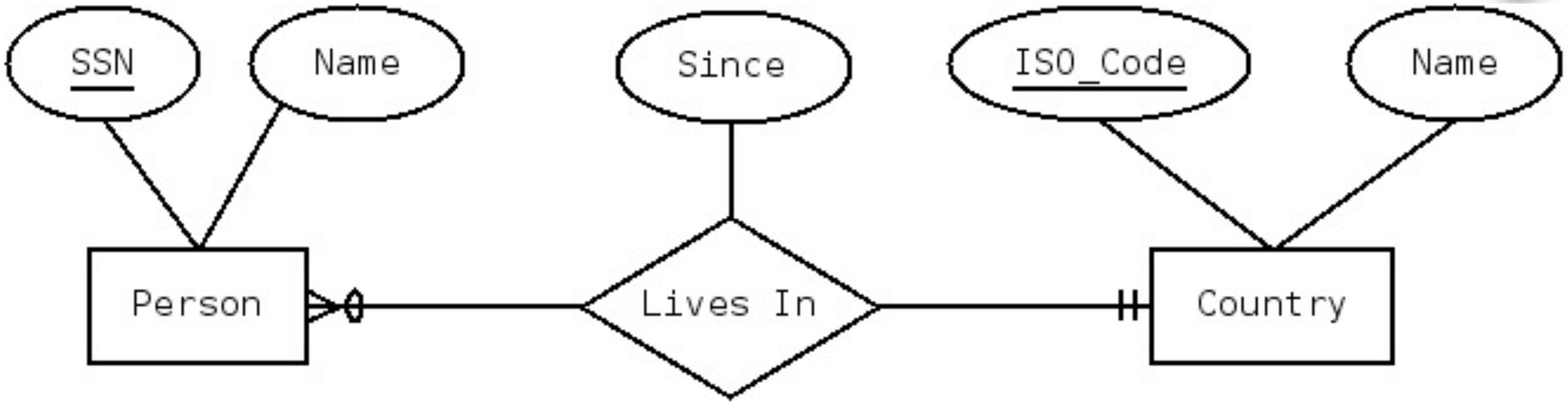
- For one-to-many (or one-to-one) relationships, put a foreign key on the side that relates to just one entity
- Put any relationship attributes on that same table too.



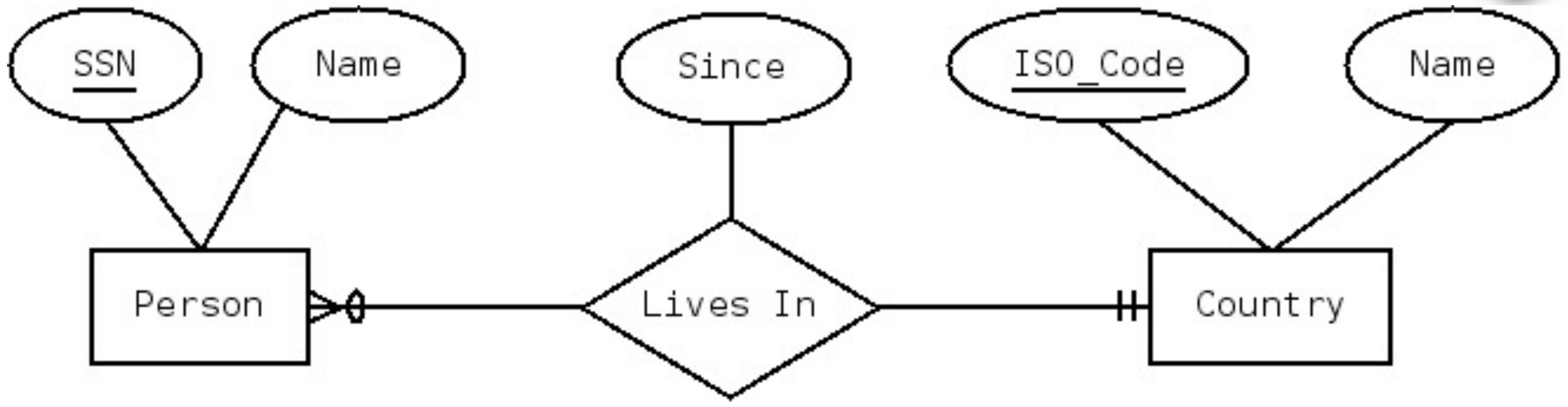


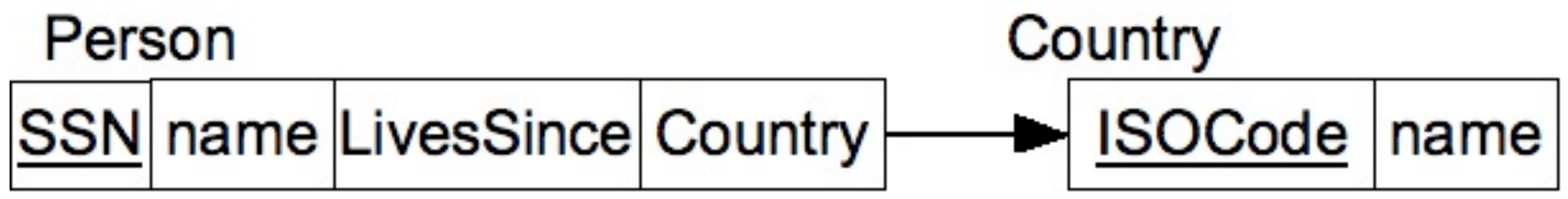
```
CREATE TABLE Program (
  Id INT PRIMARY KEY,
  Name VARCHAR(20)
);

CREATE TABLE Student (
  Id INT PRIMARY KEY,
  Name VARCHAR(50),
  Major INT REFERENCES Program(Id)
);
```

You try it



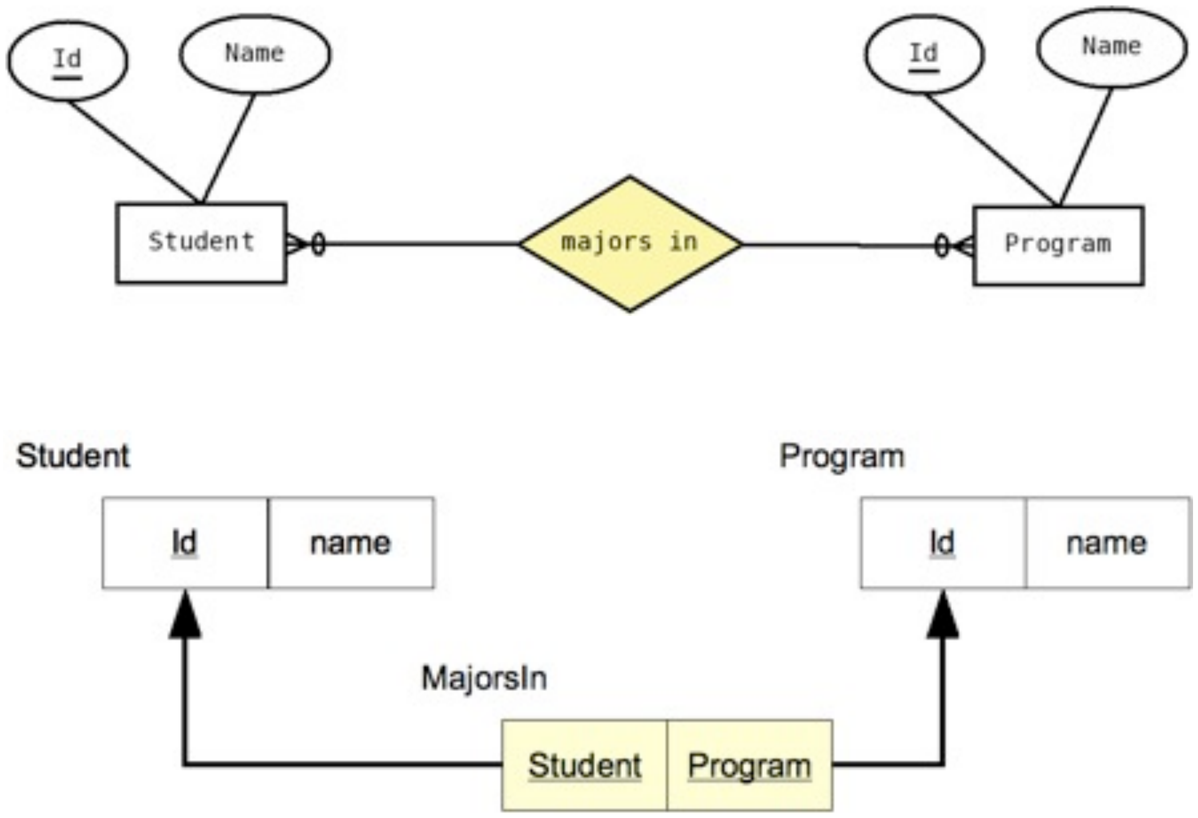
Solution


SSN
Name
Since
ISO_Code
Name
Person
Lives In
Country

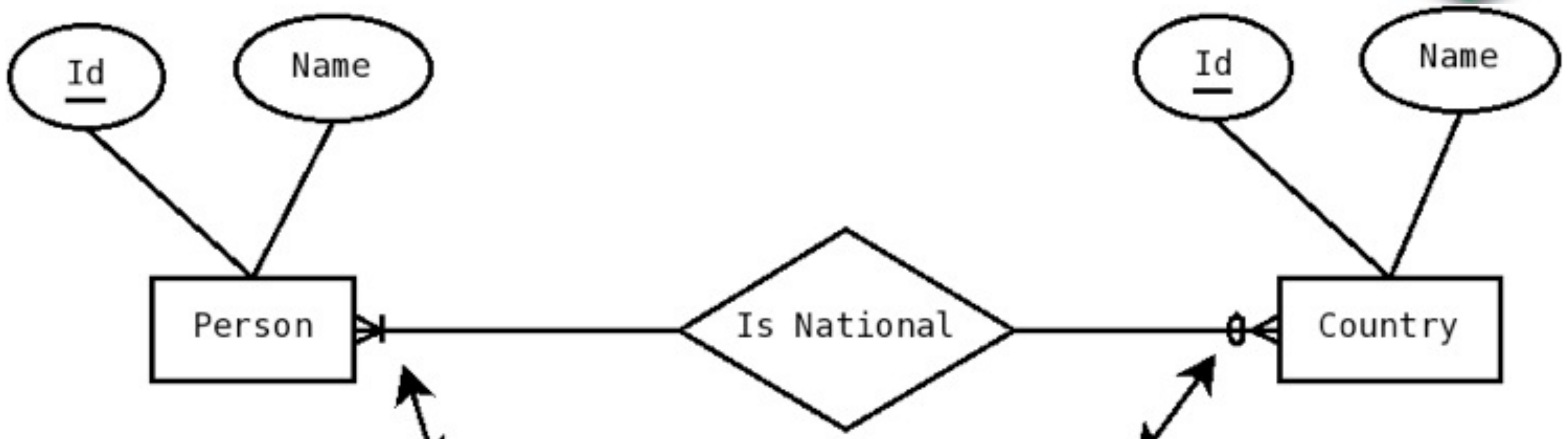

Person
SSN
name
LivesSince
Country
Country
ISOCode
name

many-to-many relationships

- For many-to-many, we need a new table representing the relationship
- This table has FKs to both entities



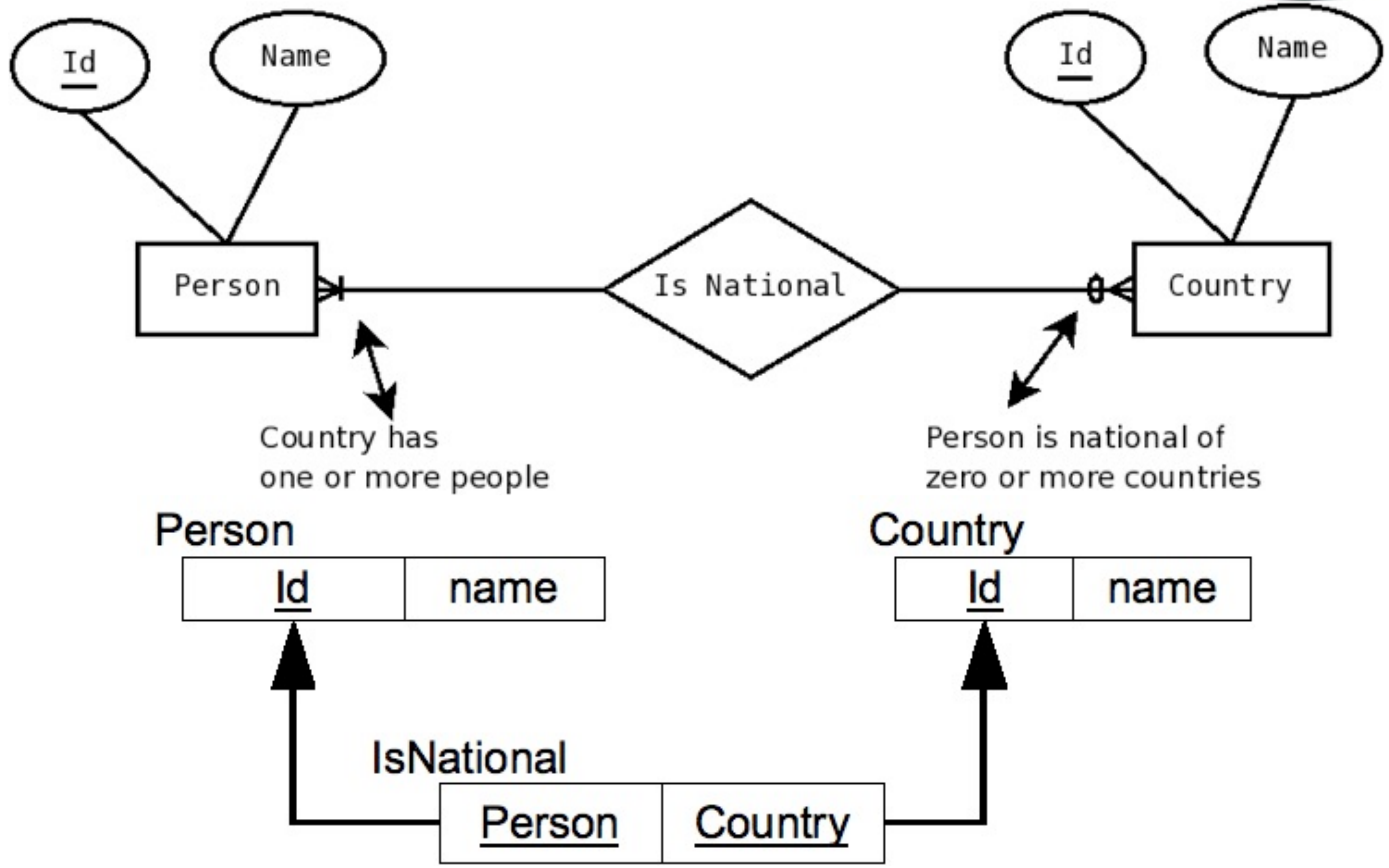
You try



Country has
one or more people

Person is national of
zero or more countries

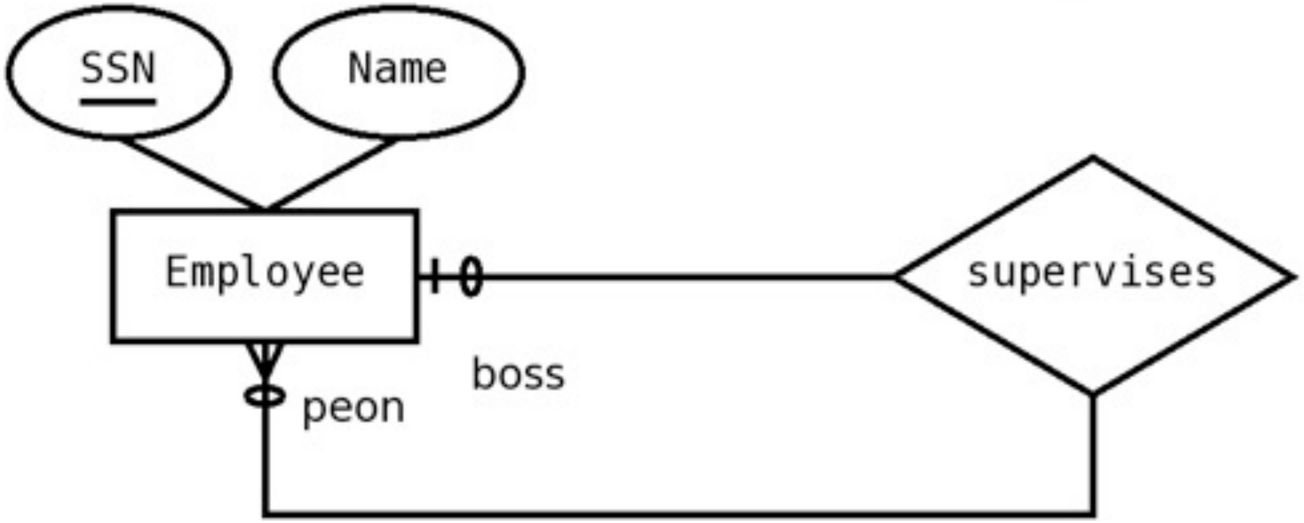
Solution

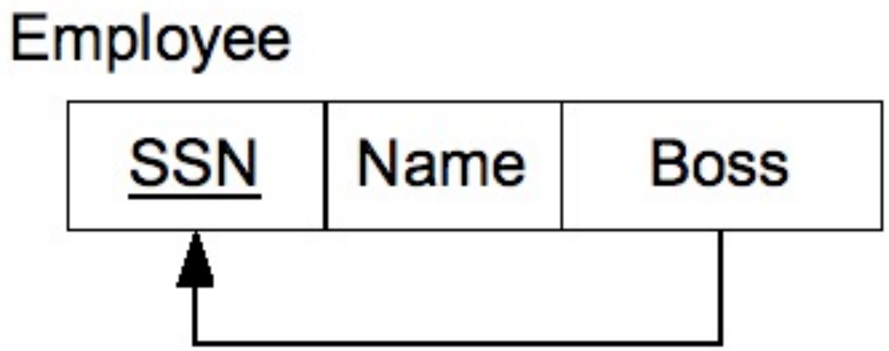


Id
Name
Id
Name
Person
Is National
Country
Country has one or more people
Person is national of zero or more countries
Person
Id
name
Country
Id
name
IsNational
Person
Country

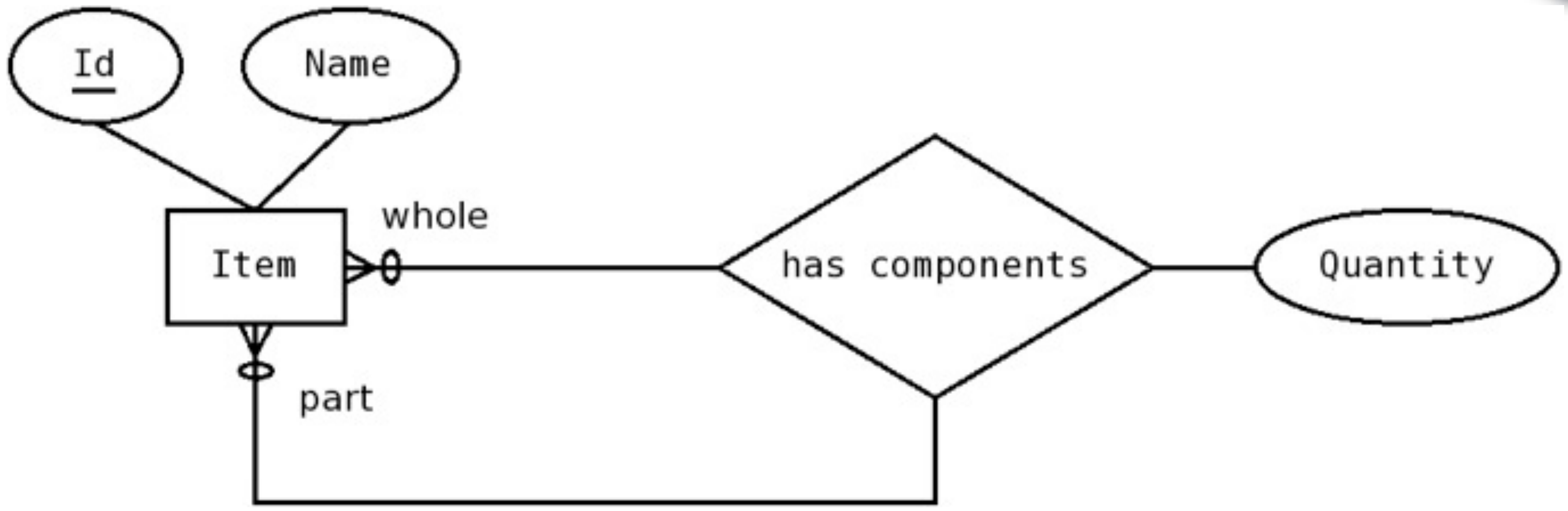
Recursive relationships

- Same as other relationships, except that FKs may go to the same table
- For one-to-many, the table has a reference to other rows of the *same* table.
- For many-to-many, the extra table has *two* FKs, both to the same table

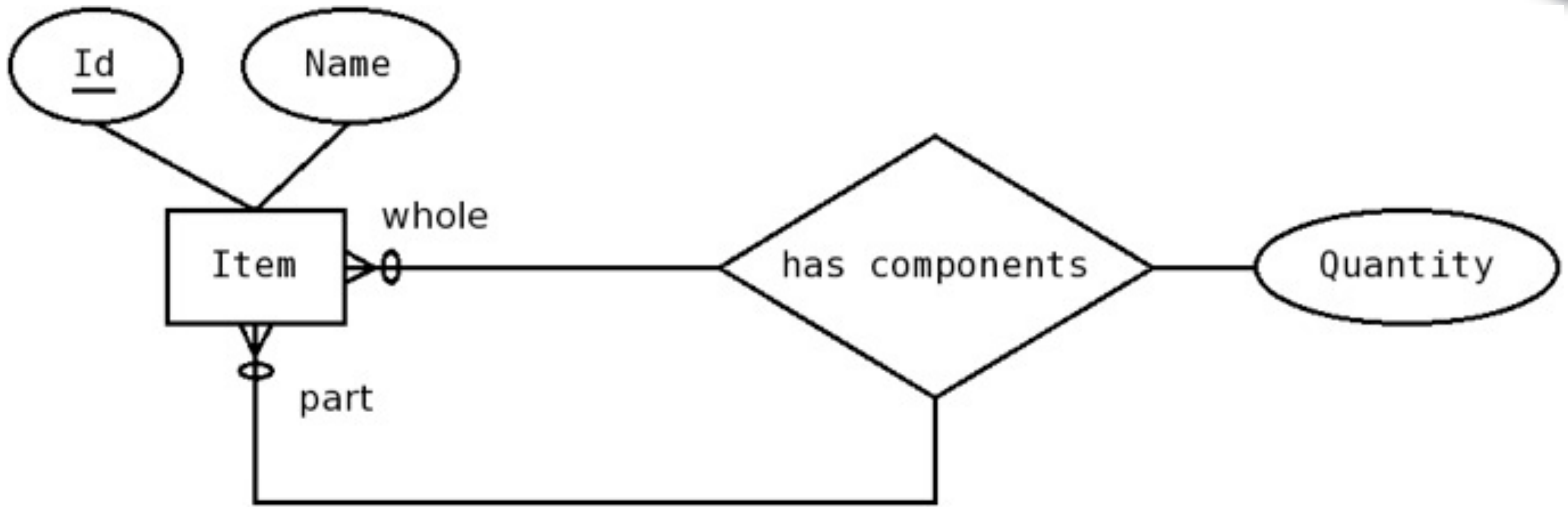


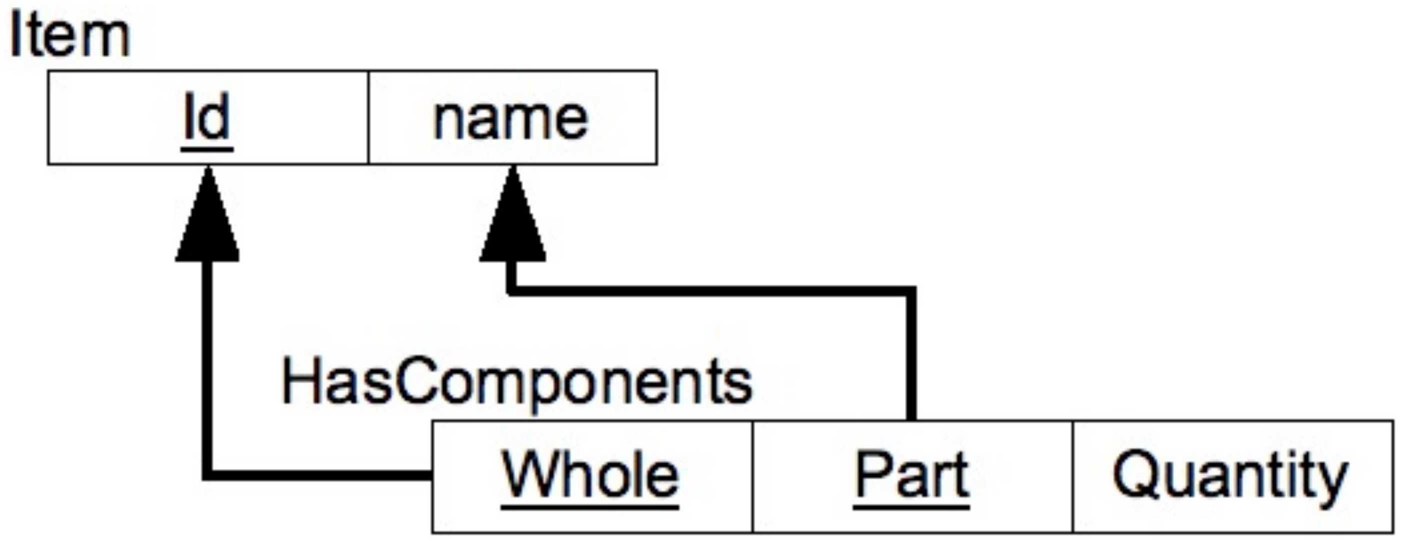


You try



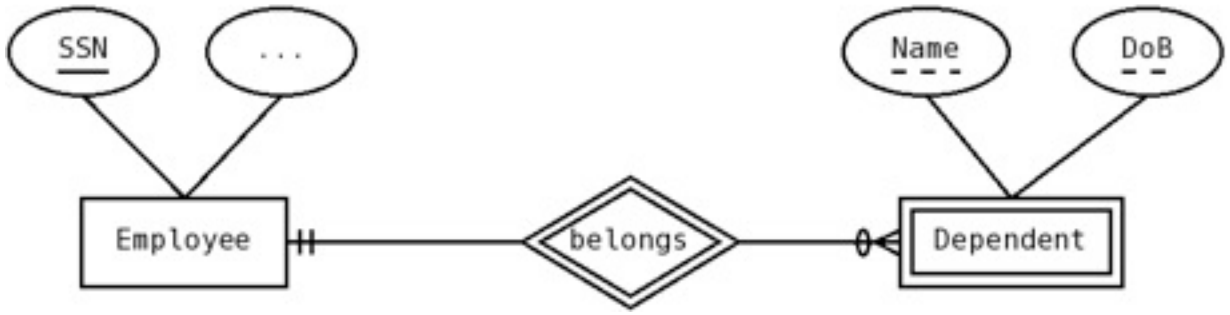
Solution

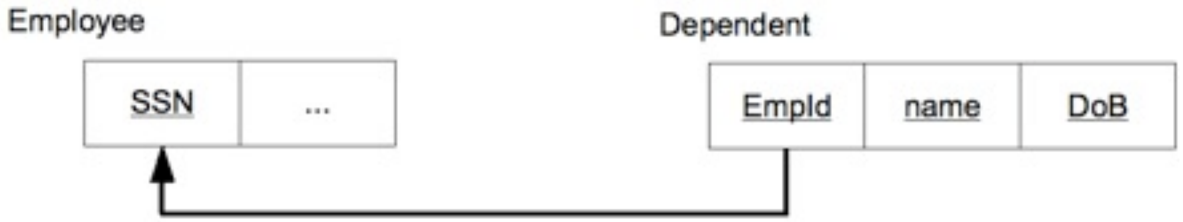

Id
Name
Item
whole
has components
Quantity
part


Item
Id
name
HasComponents
Whole
Part
Quantity

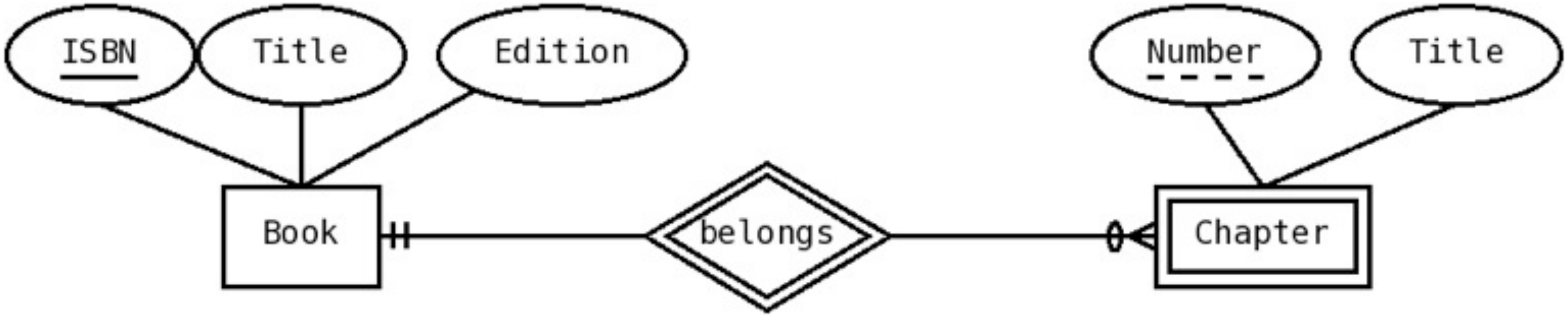
Weak Entities

- Transform the strong entity normally
- For the weak entity, the primary key becomes the identifier, plus the primary key of the identifying entity
- Notice this takes care of the identifying relationship

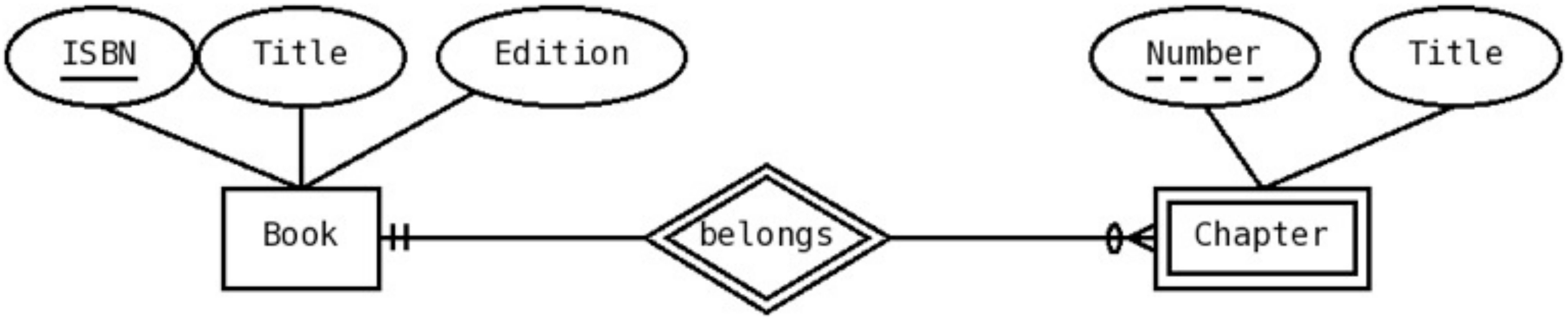


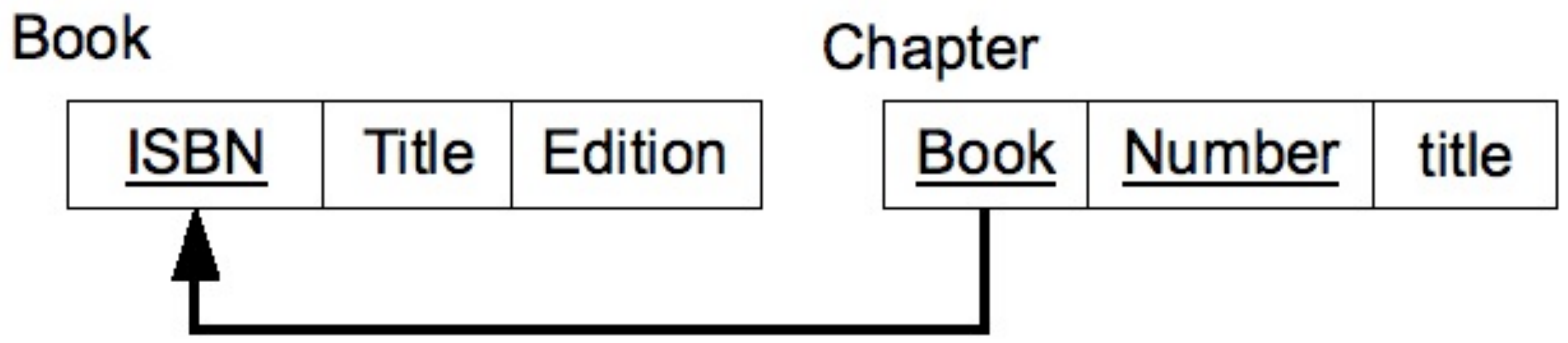


You try it



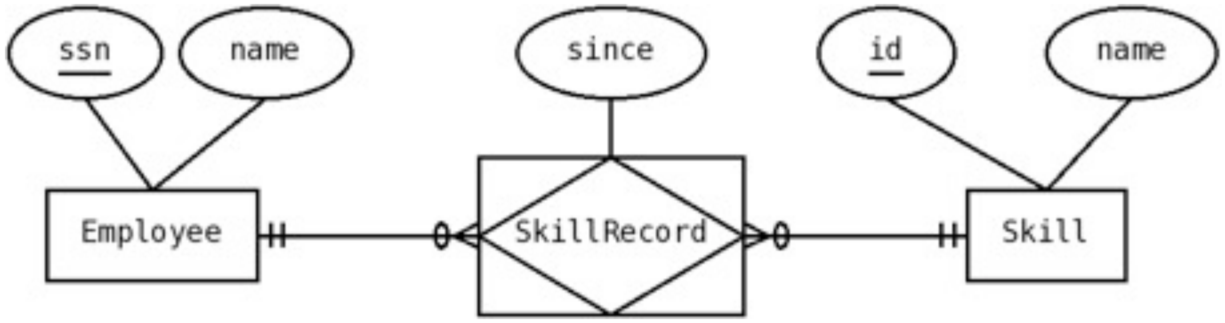
Solution

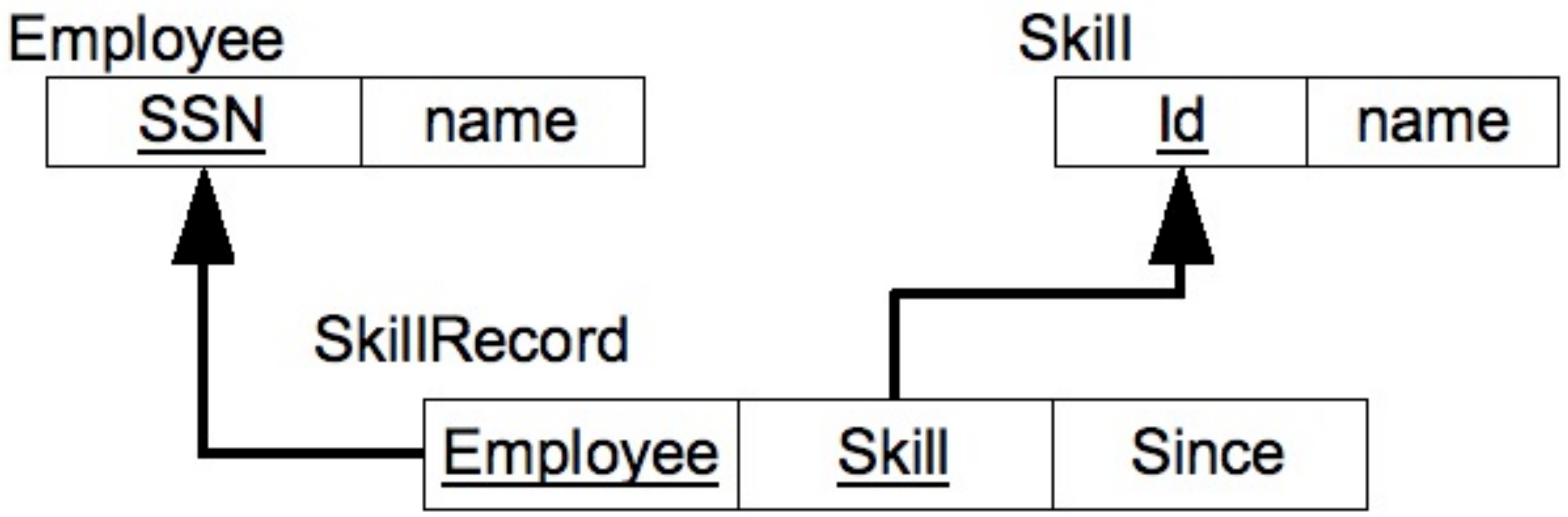

ISBN
Title
Edition
Number
Title
Book
belongs
Chapter


Book
Chapter
ISBN
Title
Edition
Book
Number
title

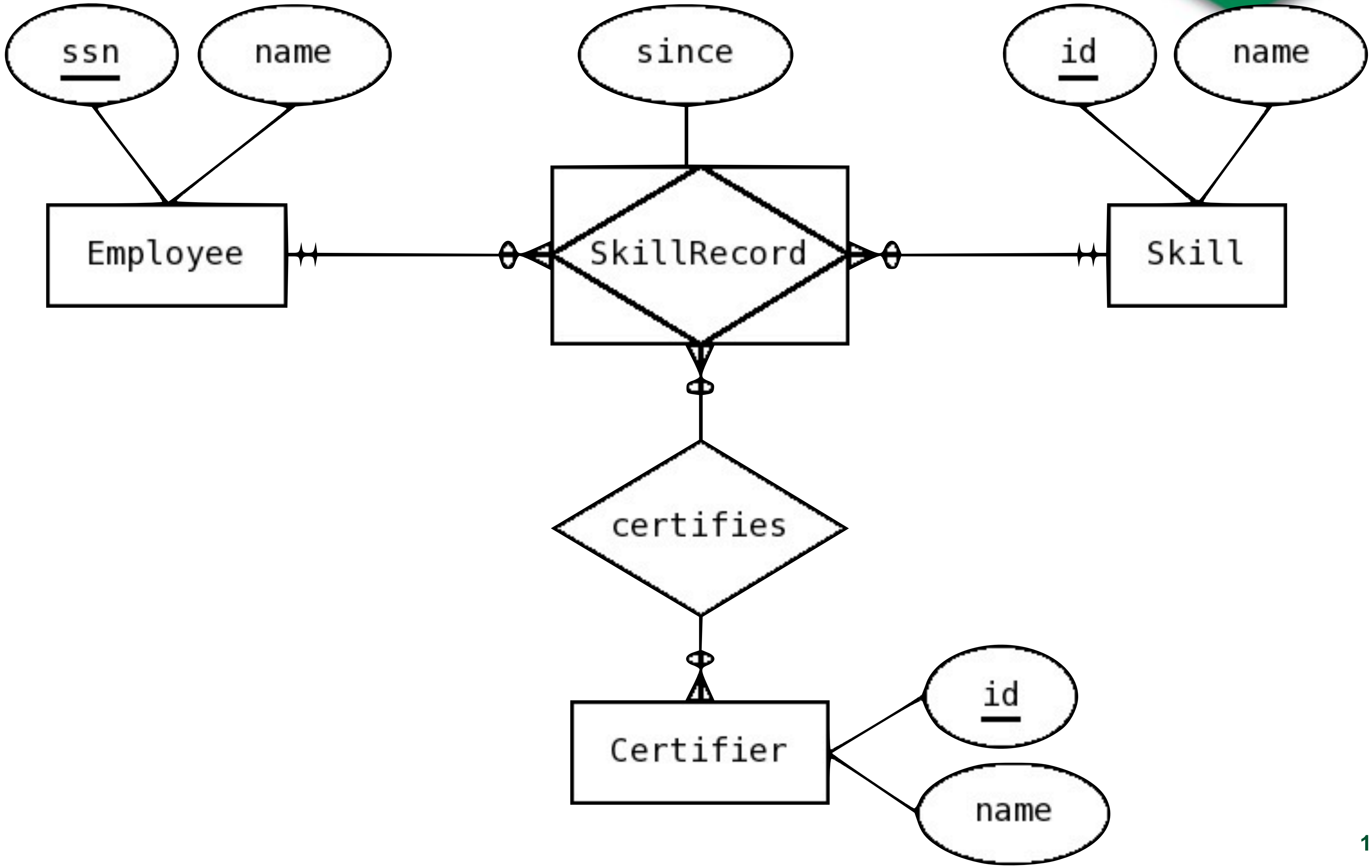
Associative Entities

- Make a table for the associative entity
- Has FKs to the tables it associates
- Its primary key is the combination of the FKs to the entities it associates

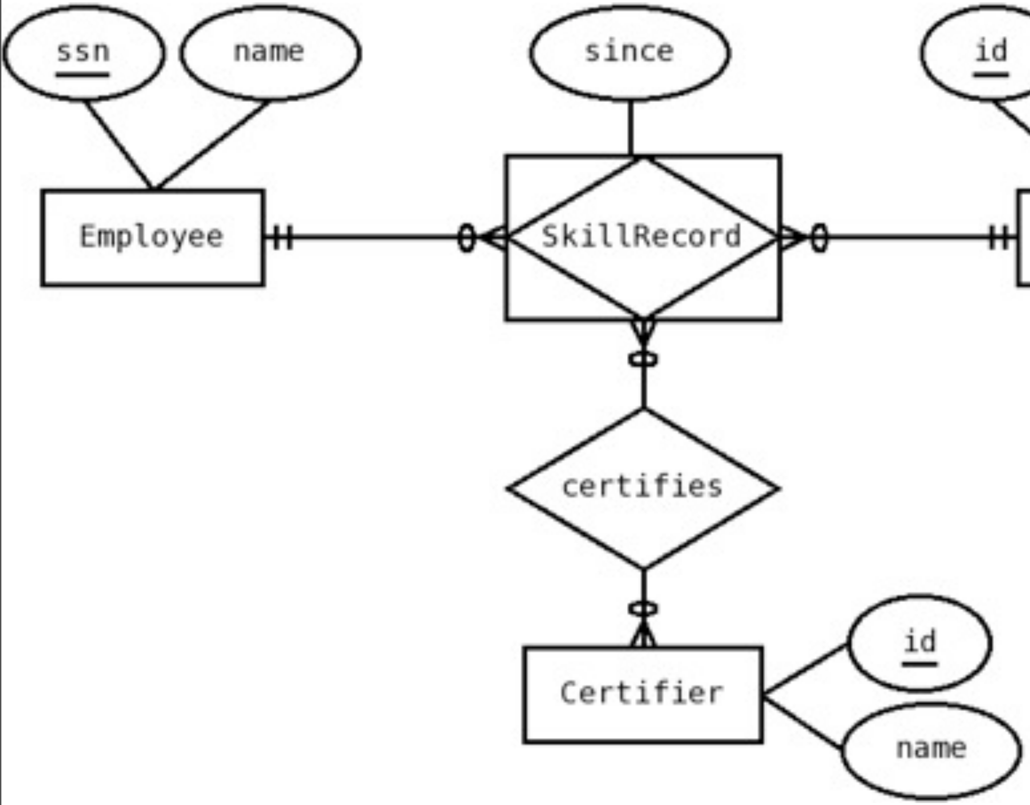


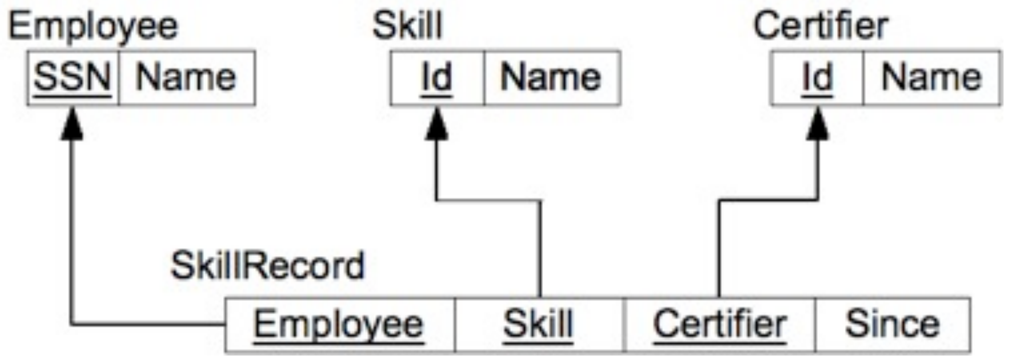


You try

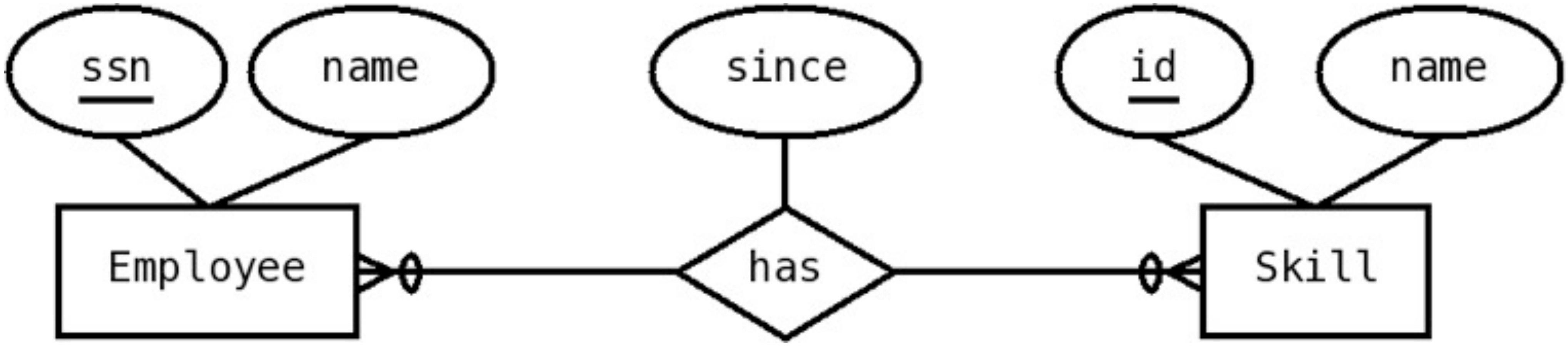

ssn
name
since
id
name
Employee
SkillRecord
Skill
certifies
Certifier
id
name

Solution

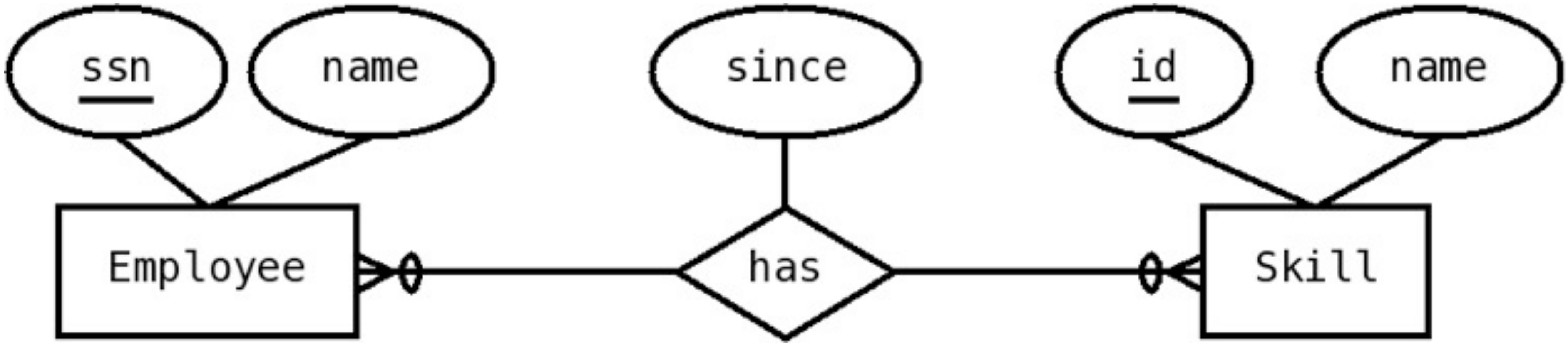

ssn
name
since
id
name
Employee
SkillRecord
Skill
certifies
Certifier
id
name

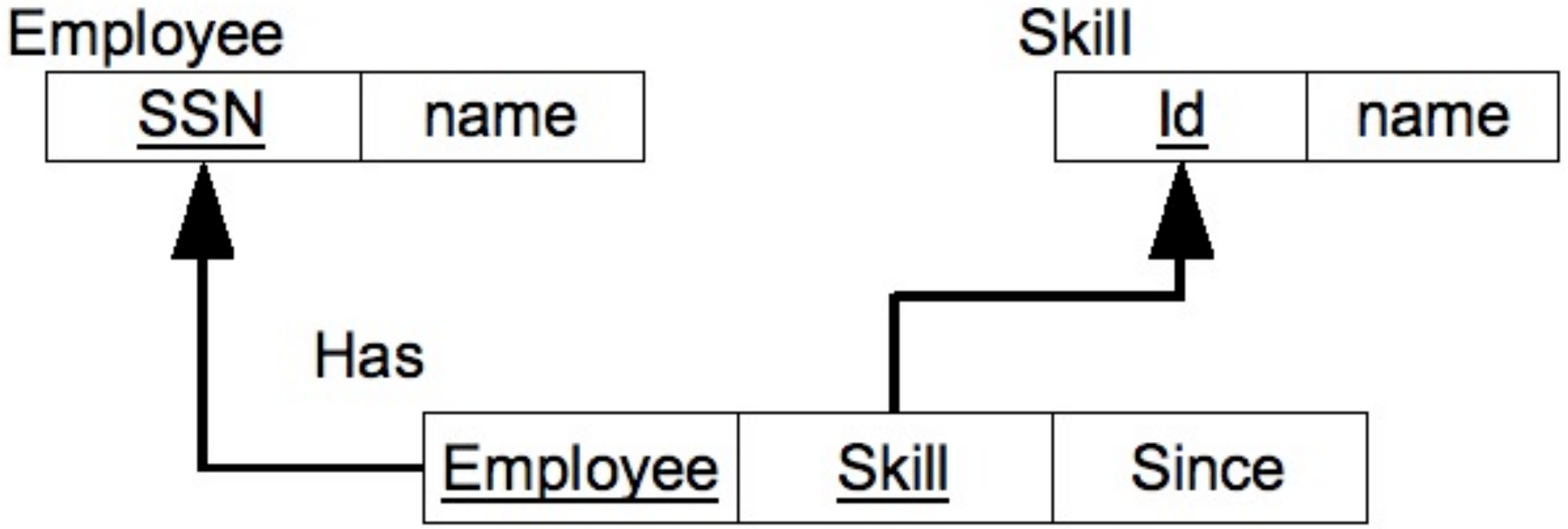

Employee
SSN
Name
Skill
Id
Name
Certifier
Id
Name
SkillRecord
Employee
Skill
Certifier
Since

Exercise

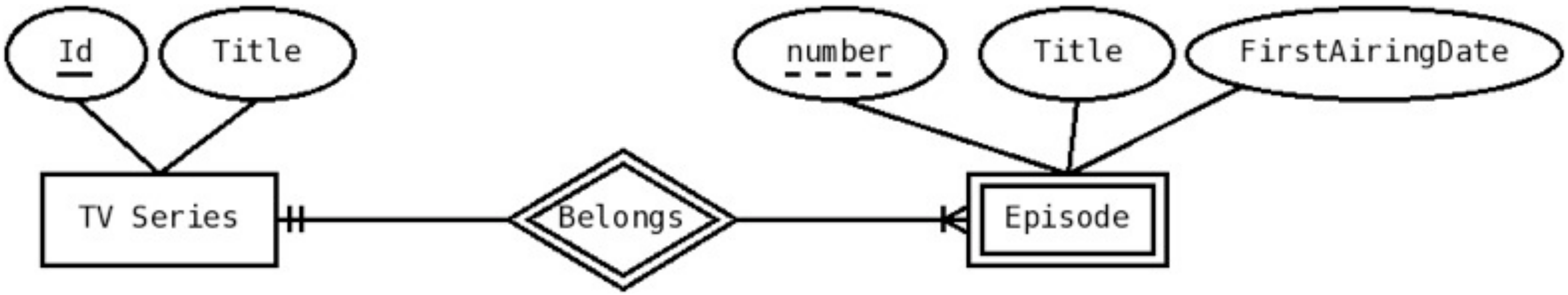


Solution

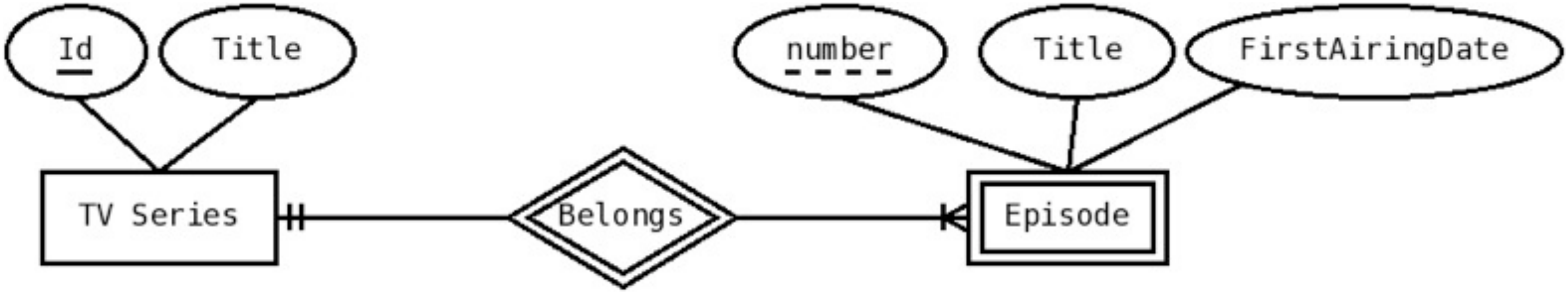

ssn
name
since
id
name
Employee
has
Skill

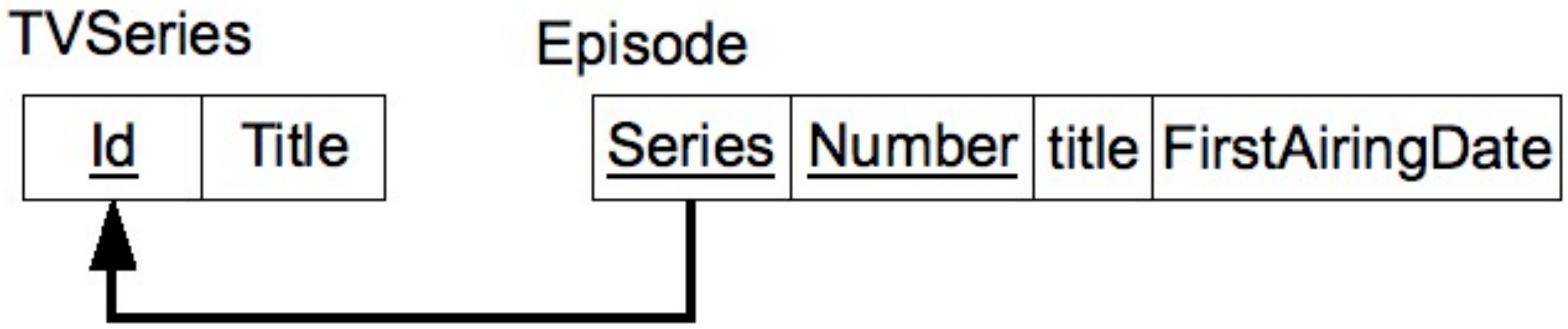

Employee
SSN
name
Skill
Id
name
Has
Employee
Skill
Since

Exercise

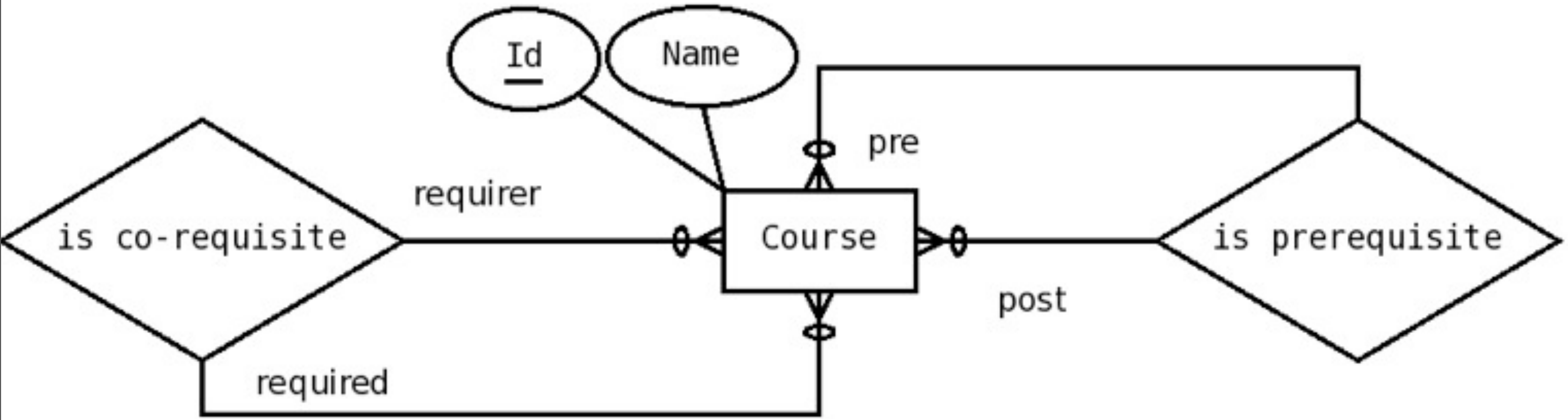

Id
Title
TV Series
Belongs
number
Title
FirstAiringDate
Episode

Solution

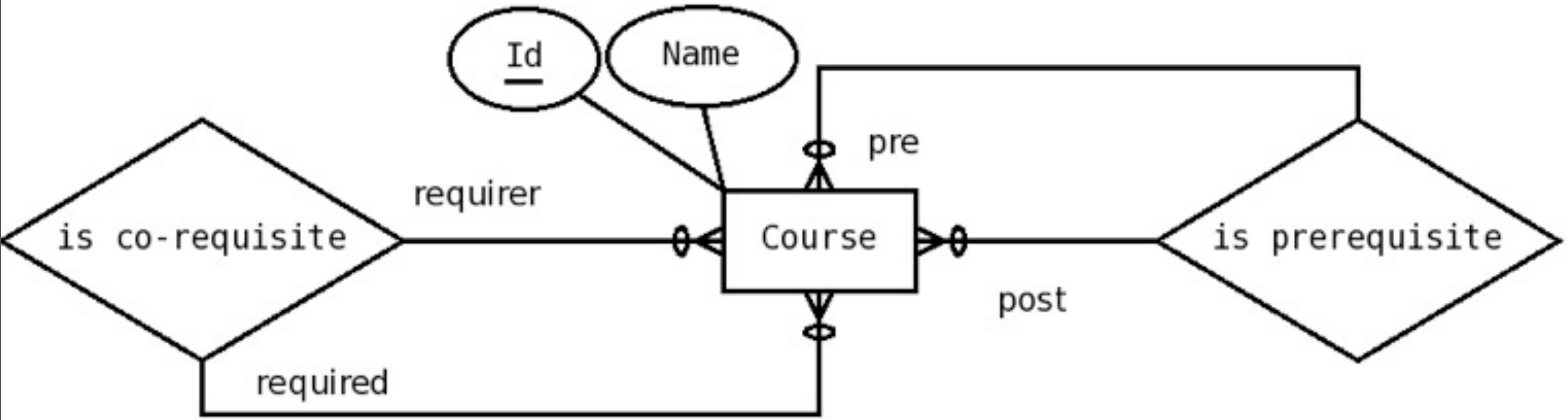

Id
Title
TV Series
Belongs
number
Title
FirstAiringDate
Episode


TVSeries
Id
Title
Episode
Series
Number
title
FirstAiringDate

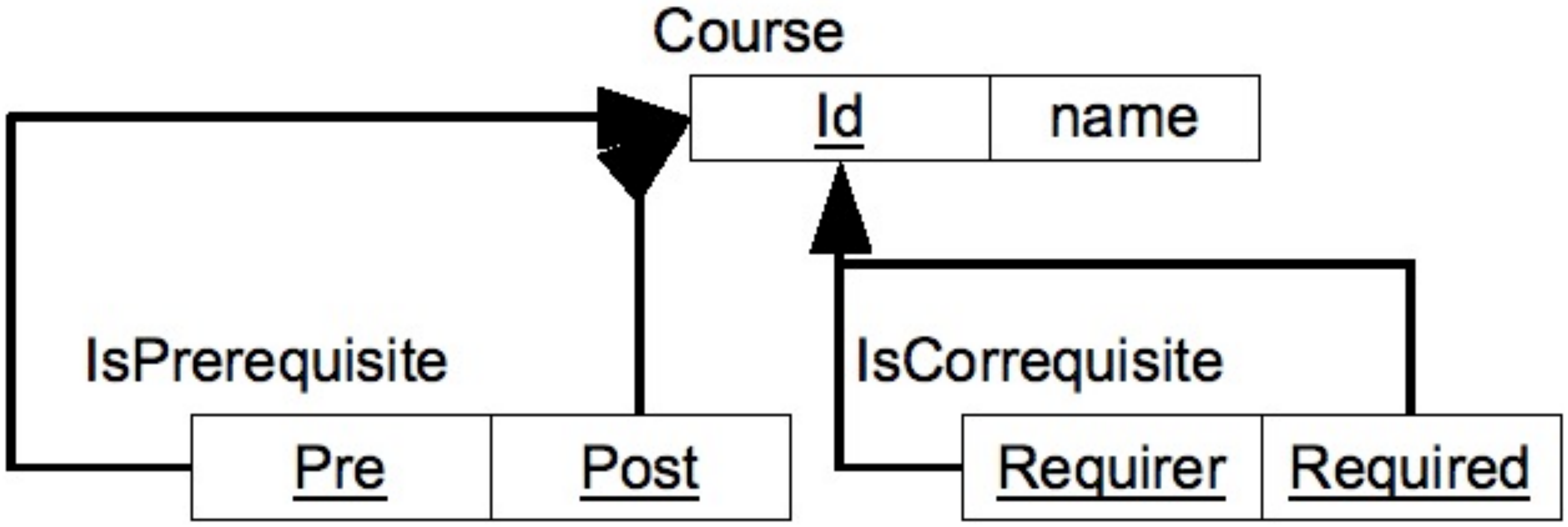
Exercise


Id
Name
pre
requirer
is co-requisite
Course
is prerequisite
post
required

Solution

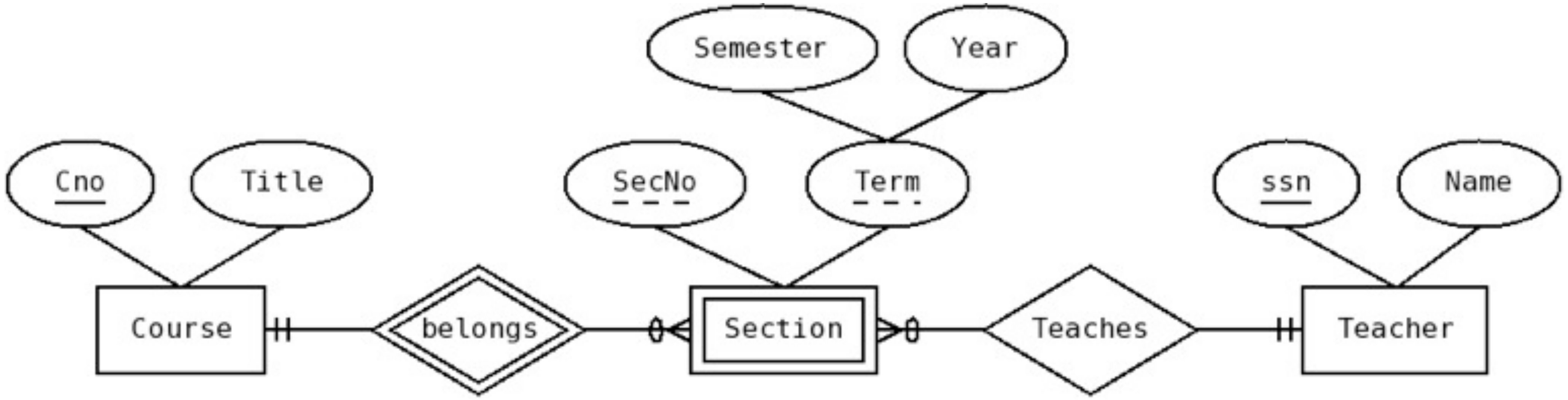


Id
Name
pre
requirer
is co-requisite
Course
is prerequisite
post
required

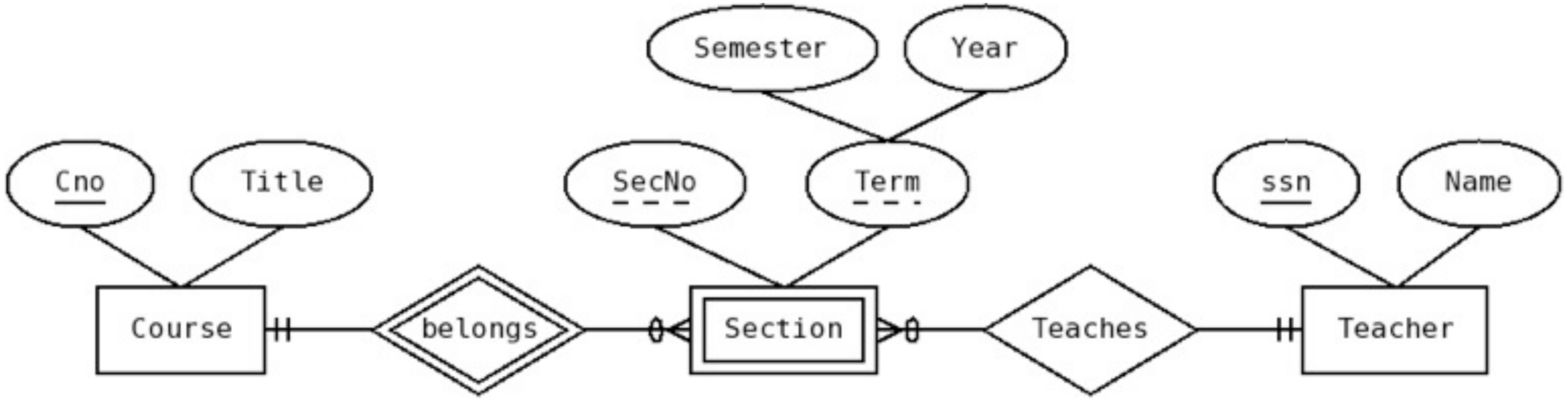


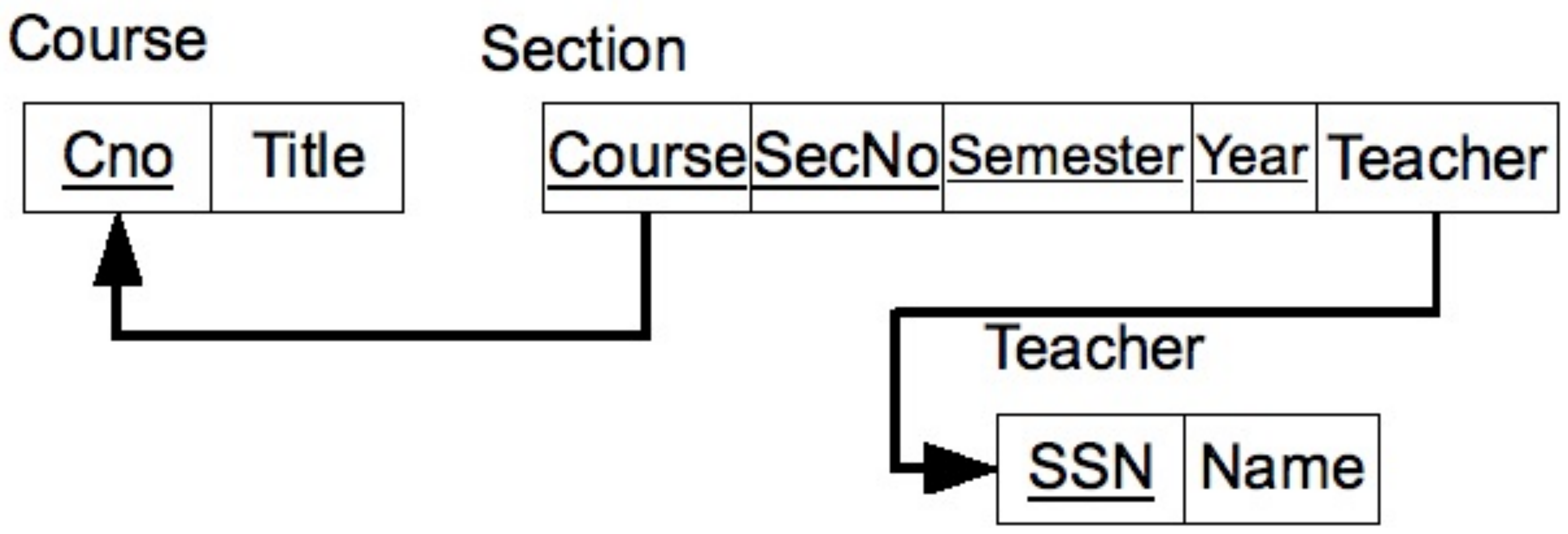
Course
Id
name
IsPrerequisite
Pre
Post
IsCorrequisite
Requirer
Required

Exercise

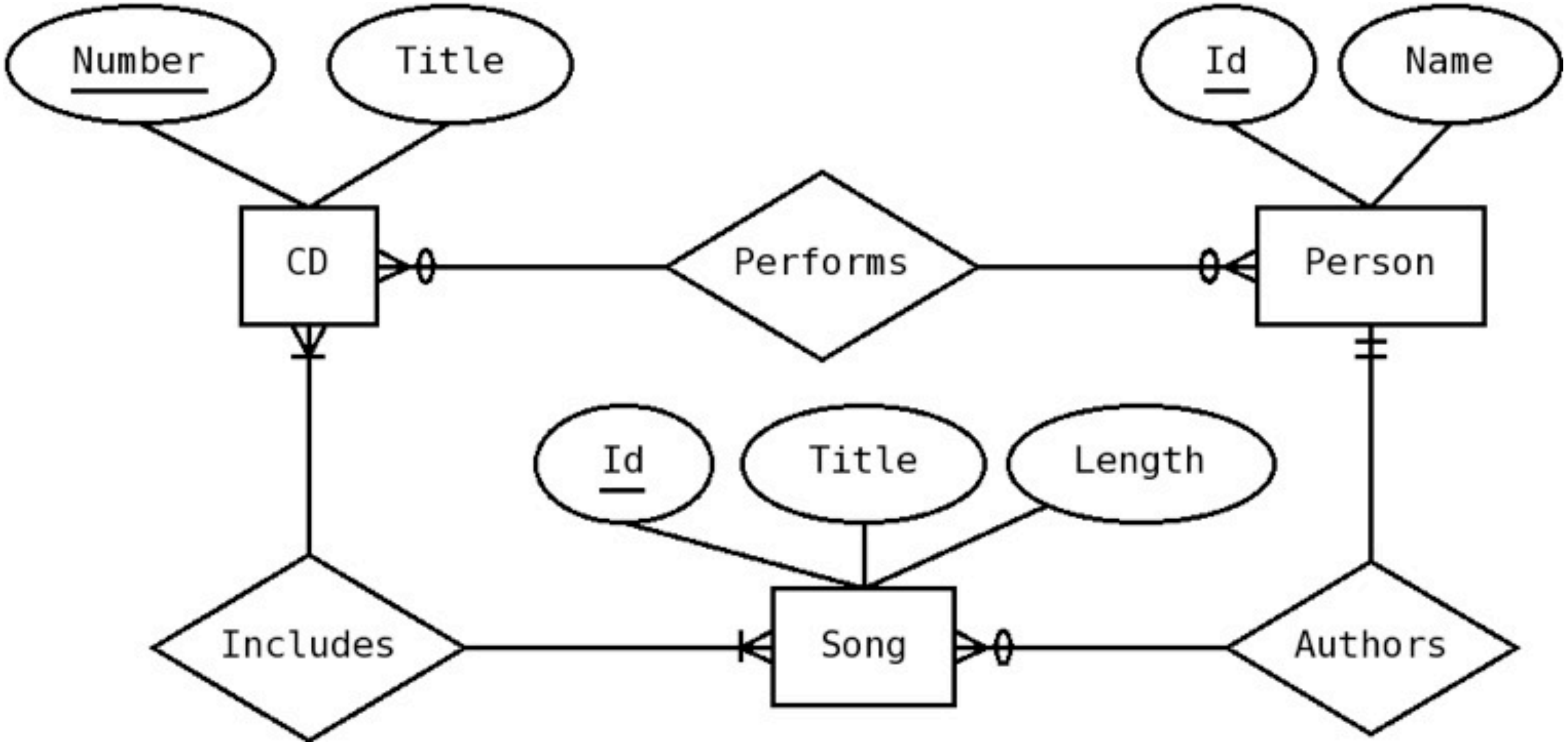

Semester
Year
Cno
Title
SecNo
Term
ssn
Name
Course
belongs
Section
Teaches
Teacher

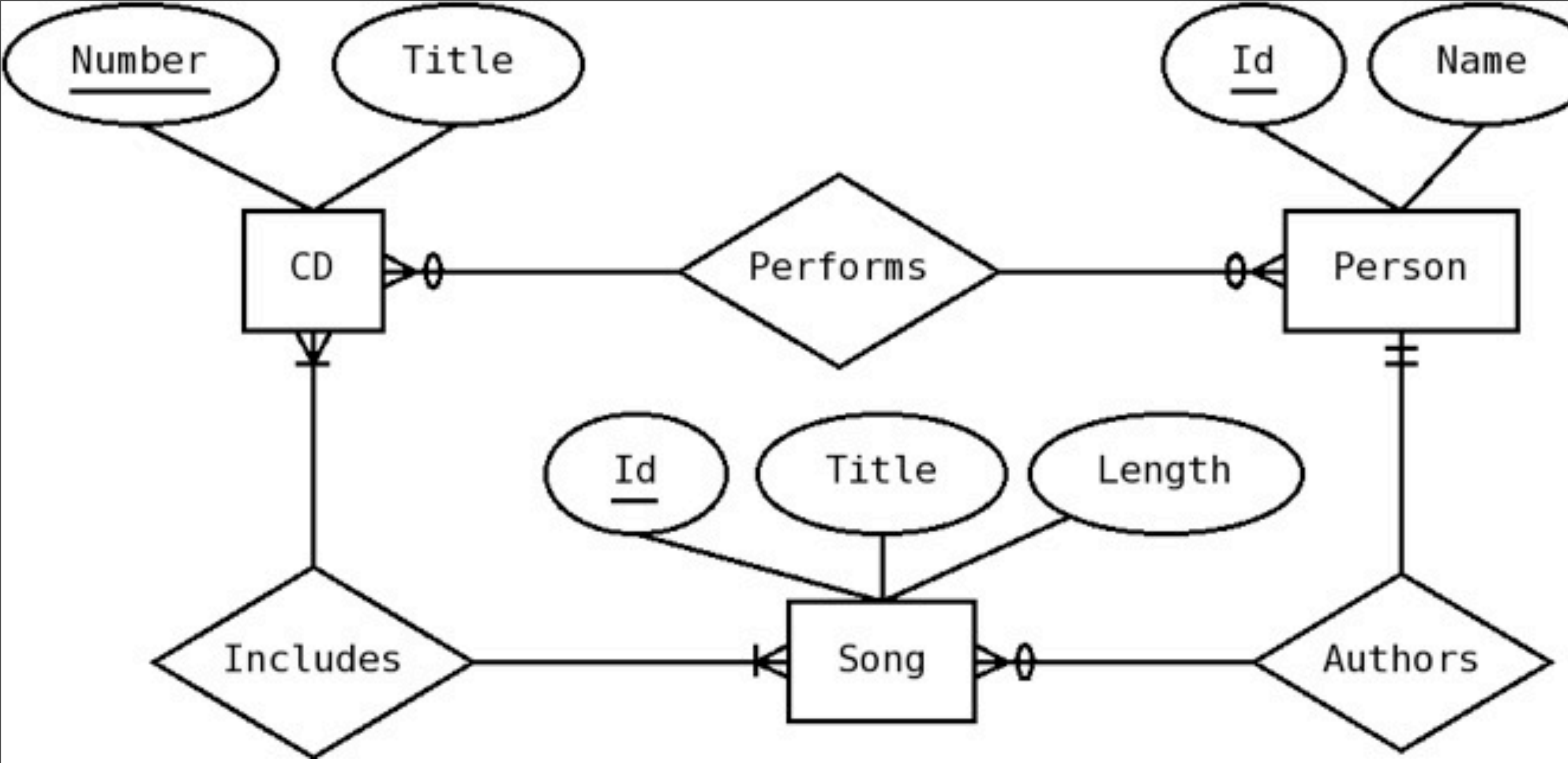
Solution


Semester
Year
Cno
Title
SecNo
Term
ssn
Name
Course
belongs
Section
Teaches
Teacher

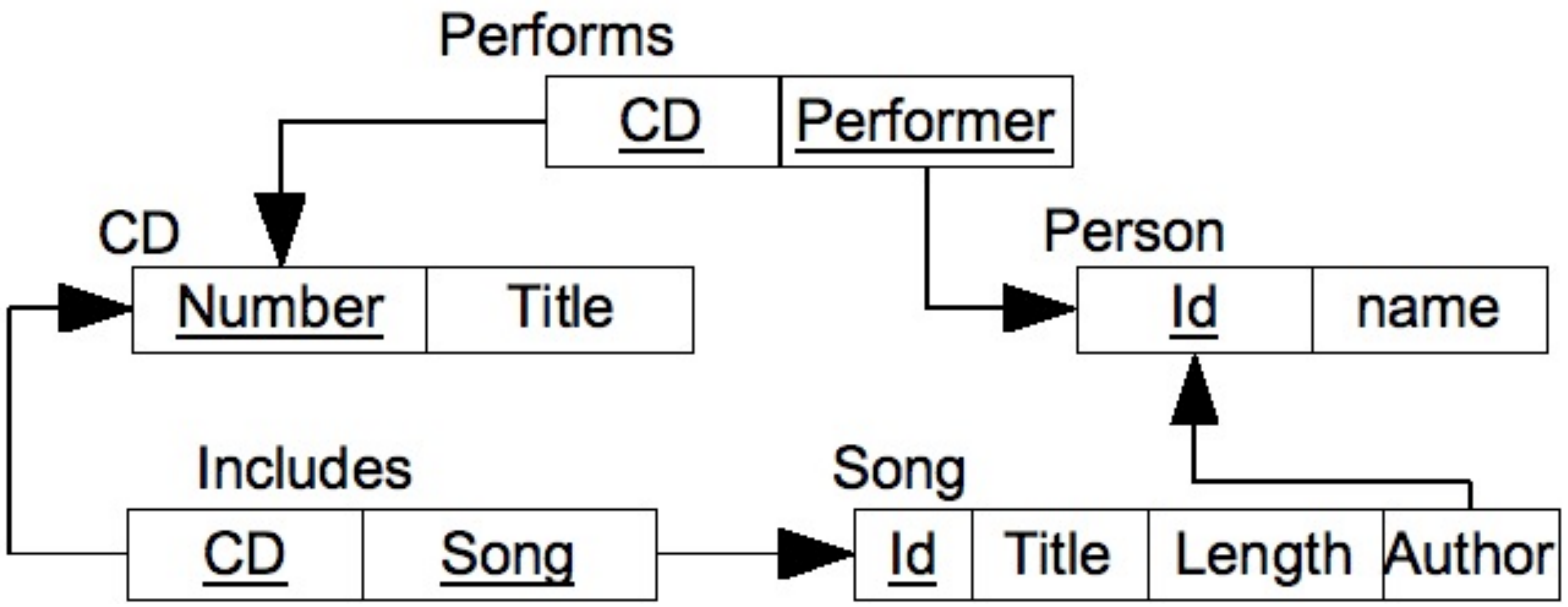

Course
Cno
Title
Section
Course
SecNo
Semester
Year
Teacher
Teacher
SSN
Name

Exercise


Number
Title
Id
Name
CD
Performs
Person
Id
Title
Length
Includes
Song
Authors



Number
Title
Id
Name
CD
Performs
Person
Id
Title
Length
Includes
Song
Authors



Performs
CD
Performer
CD
Number
Title
Person
Id
name
Includes
CD
Song
Song
Id
Title
Length
Author