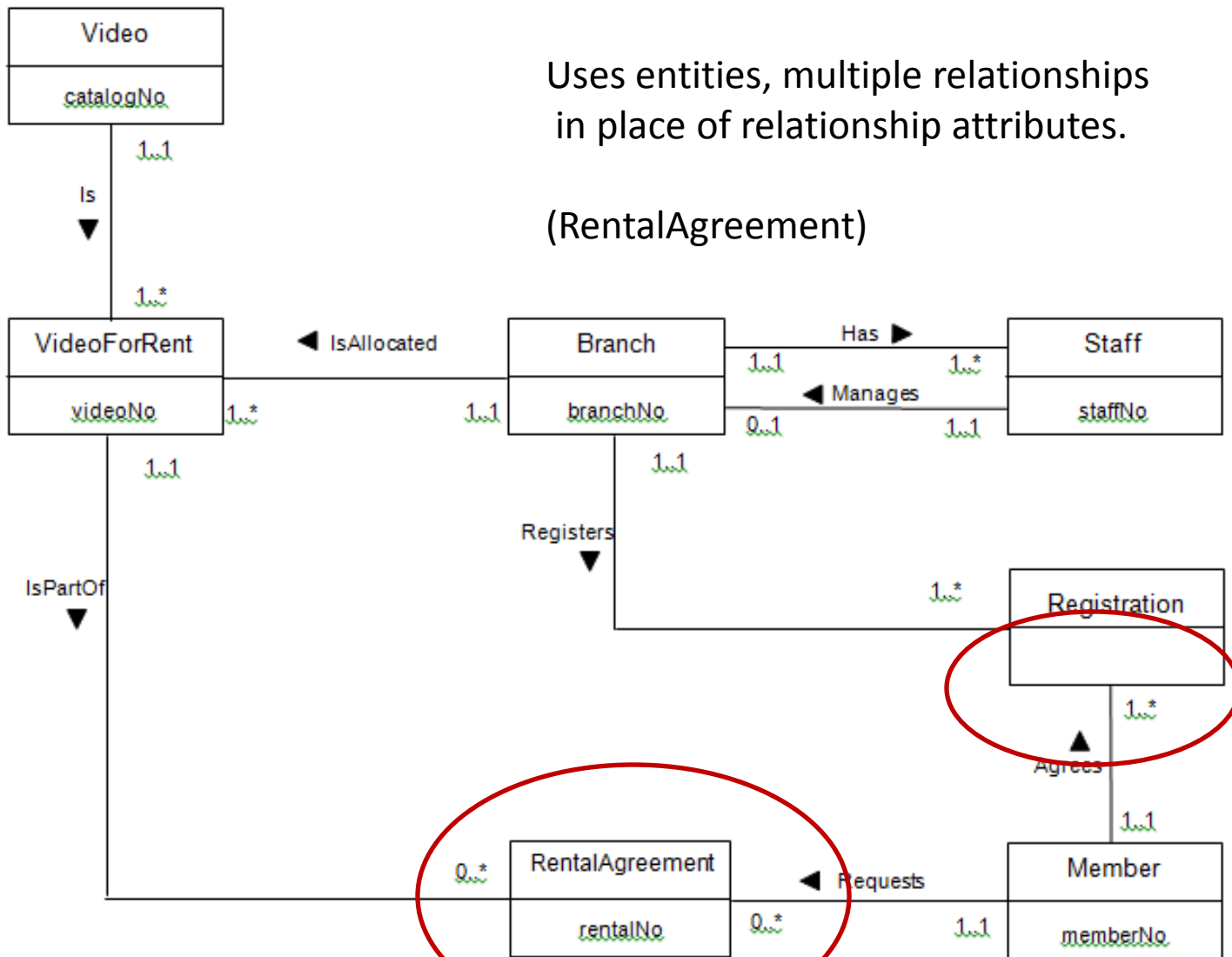


## Problem 12.12 (Video Store)

# 12.12

Uses entities, multiple relationships in place of relationship attributes.

(RentalAgreement)



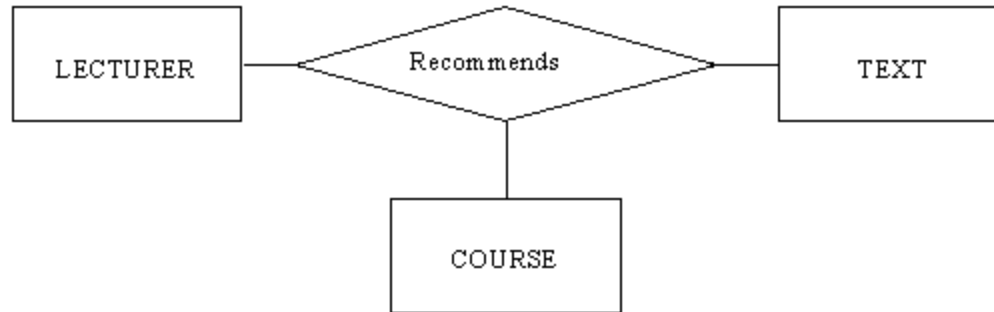
How to handle limit of 10 at a time?

An agreement is per movie or per collection?

Can a member really register multiple times?

# Complex (> Binary) Relationships In E/R Models

# Ternary Relationship



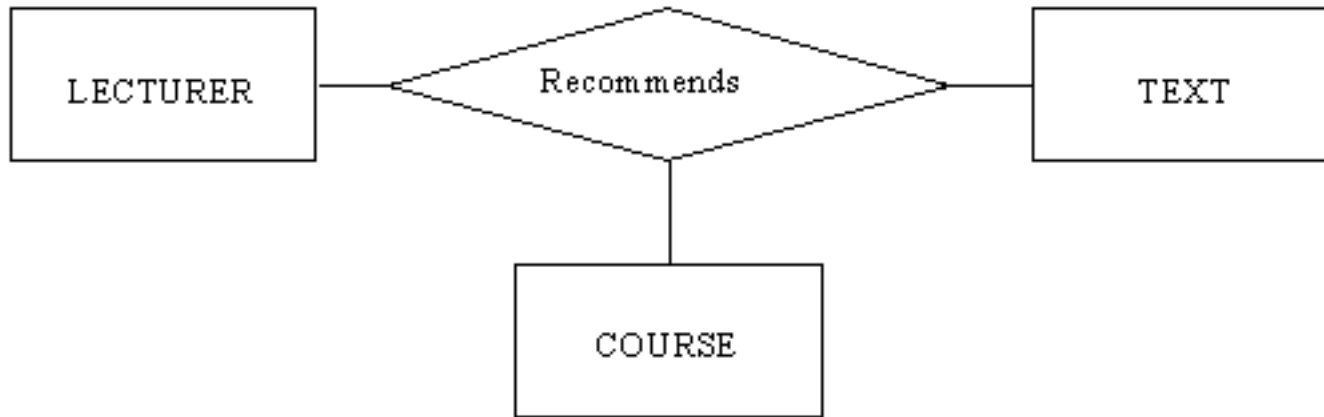
“A **lecturer** recommends **text(s)** for a particular **course**.”

Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

Yes, we can...

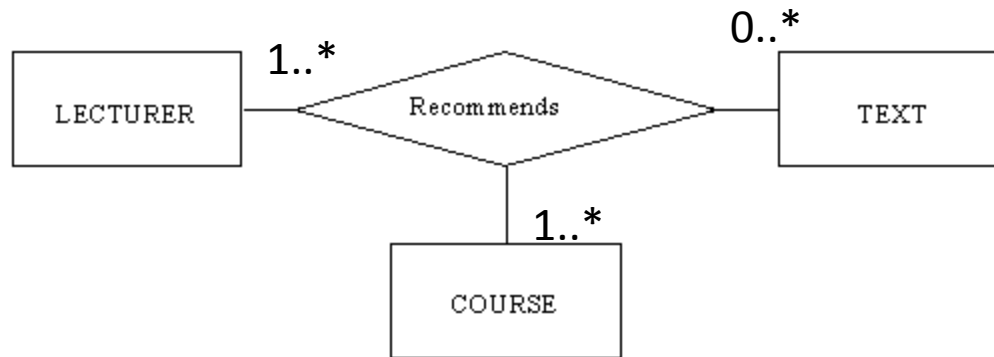
# Ternary Relationship Multiplicity



Ternary → three steps:

- 1) Given a particular lecturer and a particular course, what bounds on texts might we have?
- 2) Given a particular lecturer and text, what bounds on classes might we have?
- 3) Given a particular text and course, what bounds on lecturers might we have?

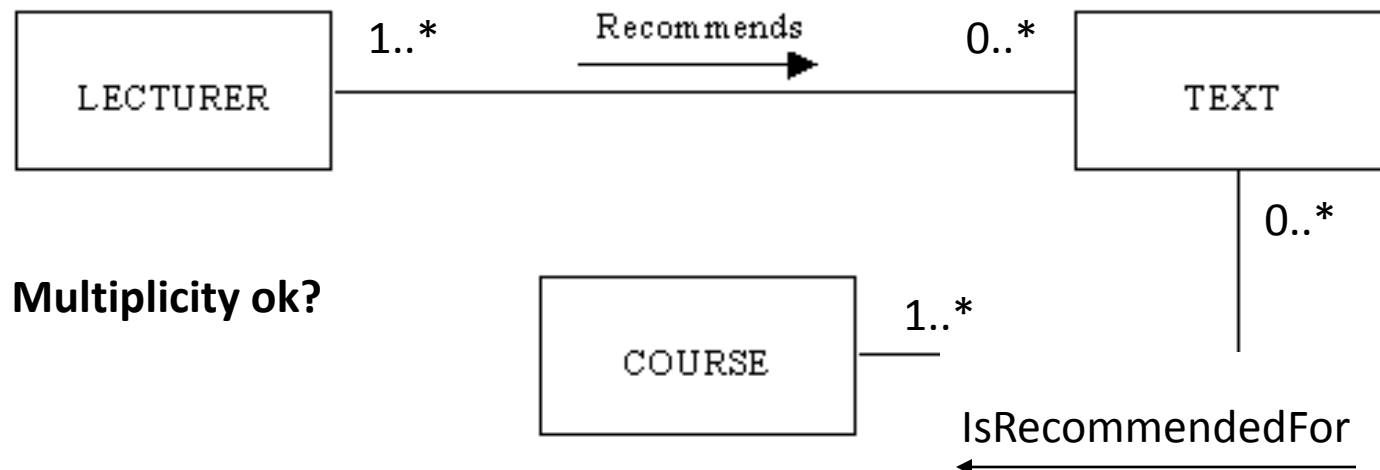
# Ternary Multiplicity



Ternary → three steps:

- 1) Given a particular lecturer and a particular course, what bounds on texts might we have?  
May not suggest any texts, or a whole bunch (0..\*)
- 2) Given a particular lecturer and text, what bounds on classes might we have?  
That suggestion has to hold for at least one course and could hold for more than 1
- 3) Given a particular text and course, what bounds on lecturers might we have?  
At least one lecturer make the recommendation, maybe more made the same?

# Problems with Binary Relationship Modeling of a True Ternary Relationship



A lecturer can recommend zero, 1, or multiple textbooks.

A text in the list is recommended by at least one lecturer, maybe more.

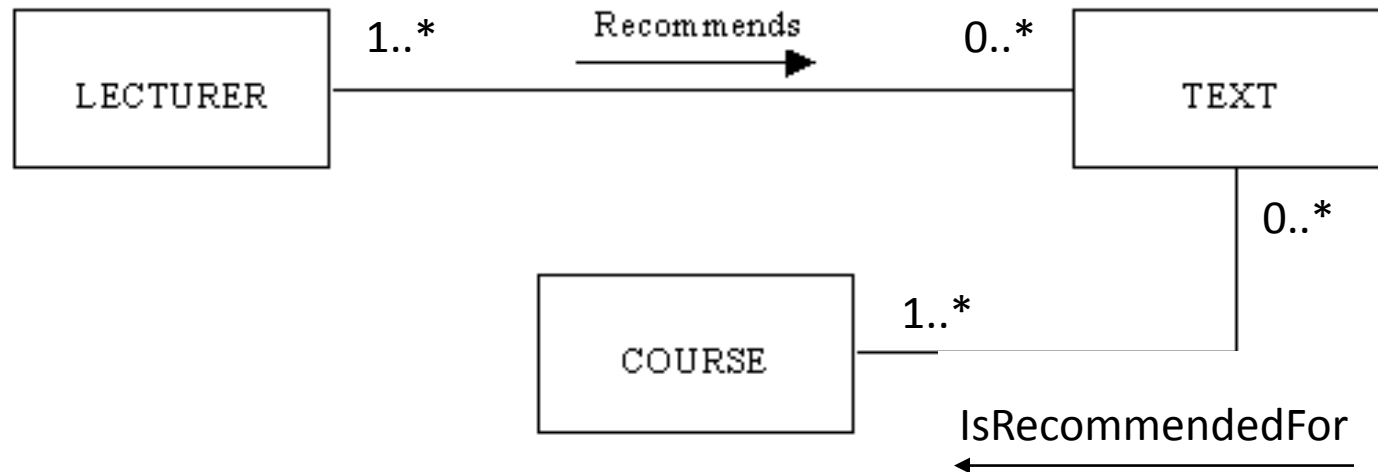
A text in the list is recommended for at least one course, maybe more.

A course may have had recommended for it zero, 1, or multiple textbooks.

Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

# Problems with Binary Relationship Modeling of a True Ternary Relationship



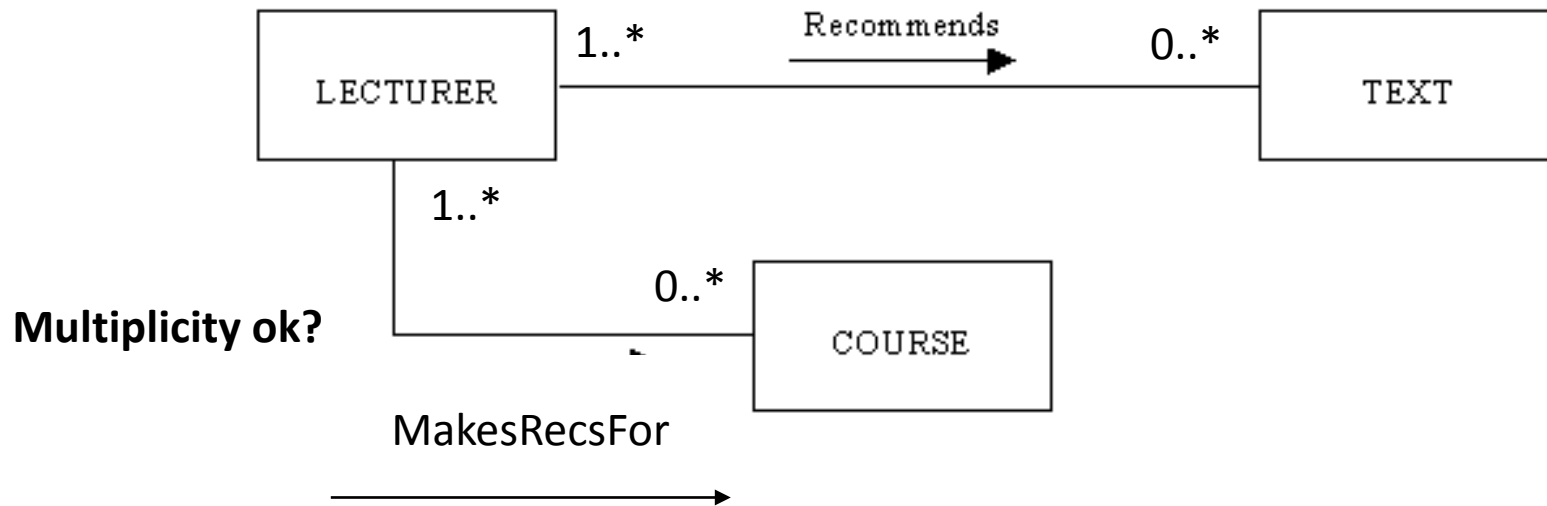
Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

No. We could get a list of what Fulp recommended, and what a list of what books are recommended for 112. That does not reveal exactly what Fulp recommended for CSC 112, even if a book recommended by Fulp is a book recommended for CSC 112. Assume Fulp recommends BookX for CSC 111 and Turkett recommends same BookX for CSC 112. In model above, we know BookX is recommended for 112, but can't distinguish whether Turkett or Fulp recommended it.



# Problems with Binary Relationship Modeling of a True Ternary Relationship



A lecturer can recommend zero, 1, or multiple textbooks.

A text is recommended by at least one lecturer, maybe more.

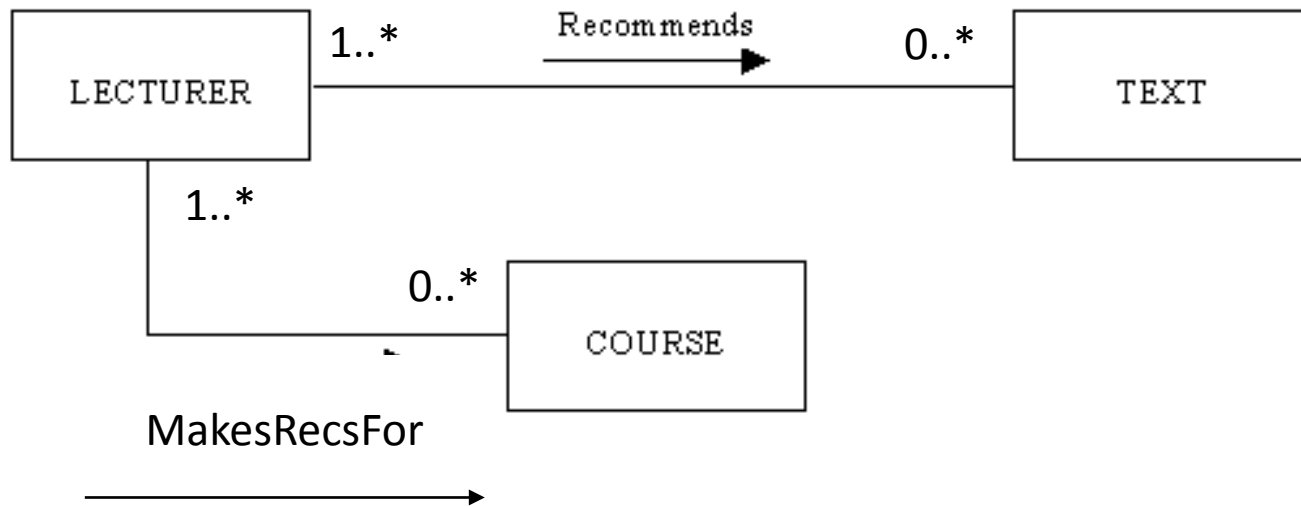
A lecturer makes recommendations for zero, one, or multiple course(s).

A course has recommendations made by at least one lecturer, maybe more.

Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

# Problems with Binary Relationship Modeling of a True Ternary Relationship



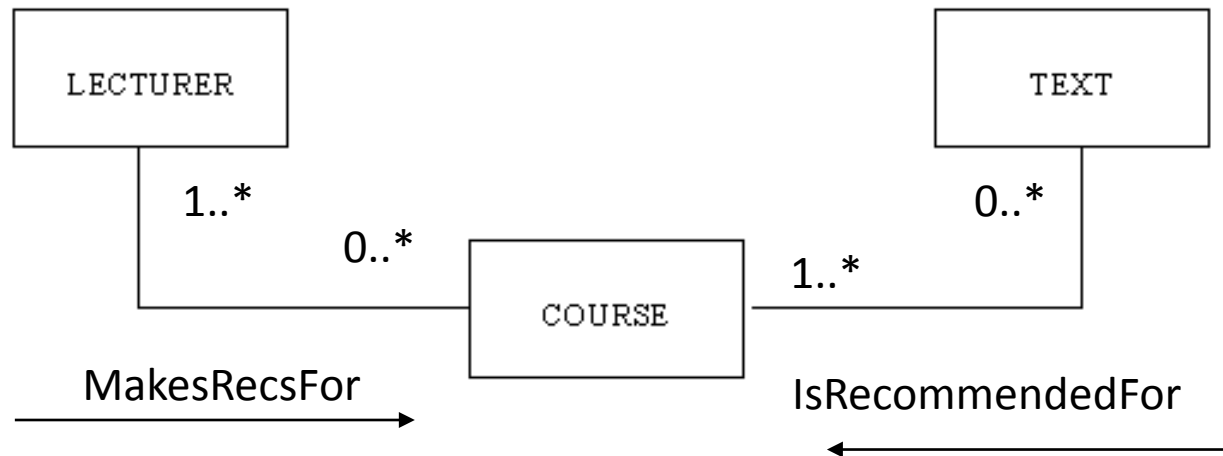
Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

No. We can get a list of what texts Fulp recommended, and whether or not Fulp made a rec for 112, but can't ascertain which of the texts Fulp recommended were for 112.

# Problems with Binary Relationship Modeling of a True Ternary Relationship

Multiplicity ok?



A lecturer makes recs for zero, one, or more course(s)

A course has a rec made by at least one lecturer.

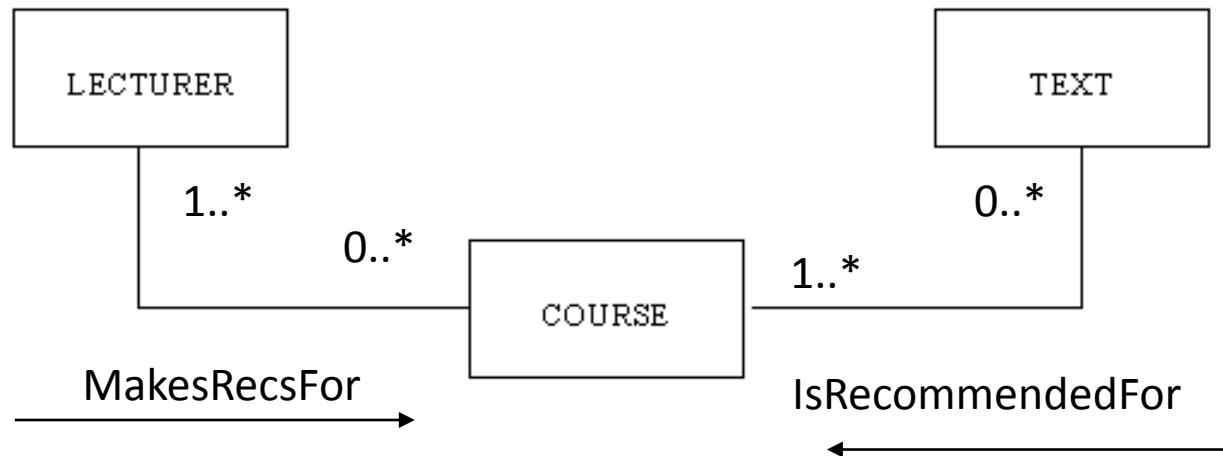
A text is recommended for at least one course

A course has zero, one, or more text recommendations for it.

Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

# Problems with Binary Relationship Modeling of a True Ternary Relationship



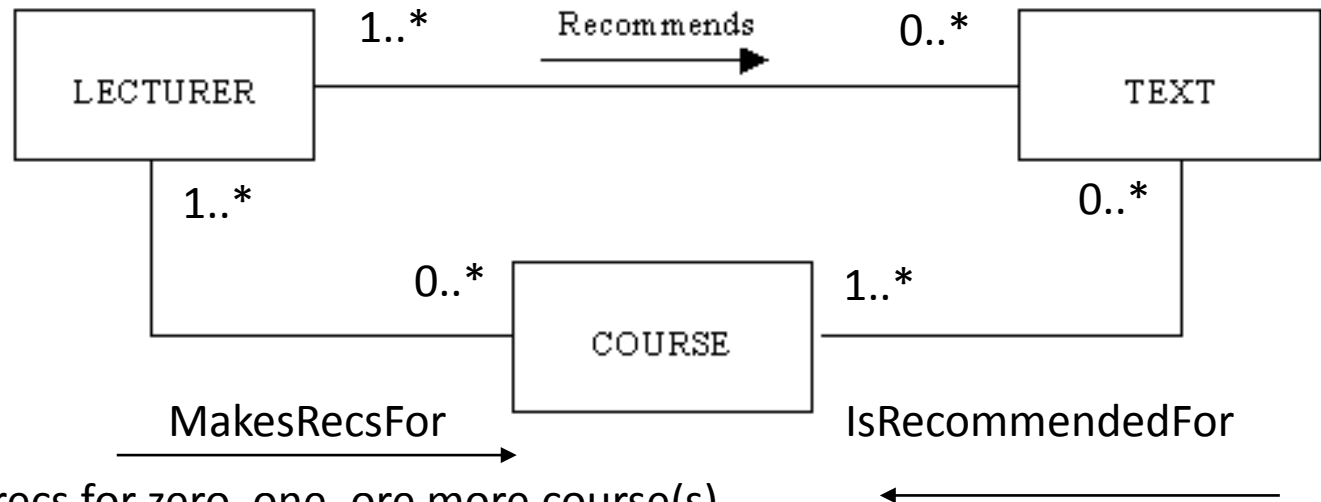
Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

No. We can determine whether or not Fulp made a rec for 112 for and a list of which texts are recommended for 112, but one can't distinguish which out of that list of recommended texts was Fulp's.

# Problems with Binary Relationship Modeling of a True Ternary Relationship

Multiplicity ok?



A lecturer makes recs for zero, one, or more course(s)

A course has a rec made by at least one lecturer.

A text is recommended for at least one course

A course has zero, one, or more text recommendations for it.

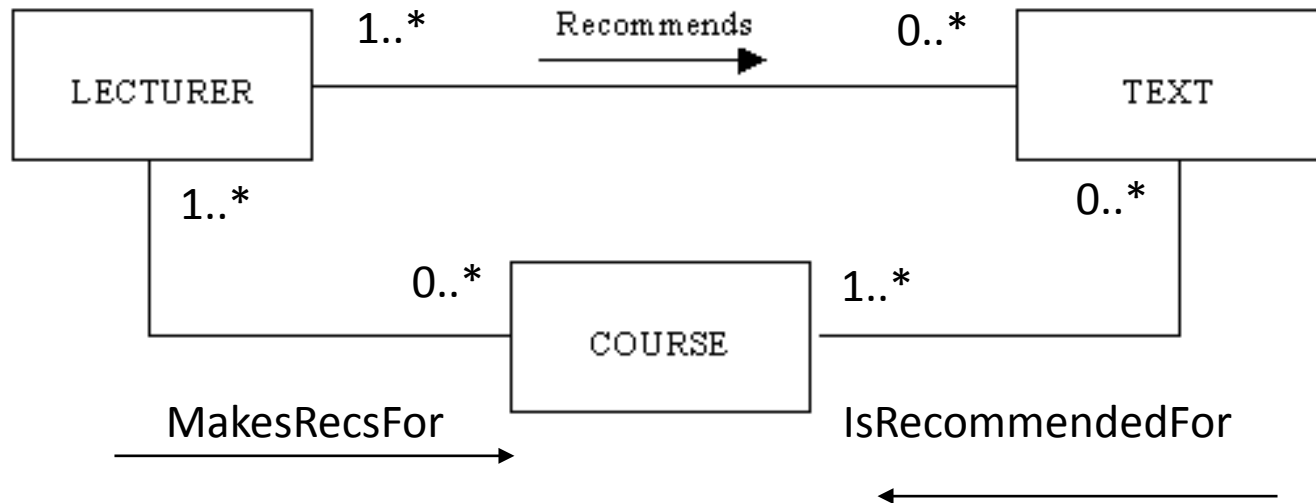
A lecturer recommends zero, one, or more texts.

A text is recommended by at least one lecturer.

Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

# Problems with Binary Relationship Modeling of a True Ternary Relationship



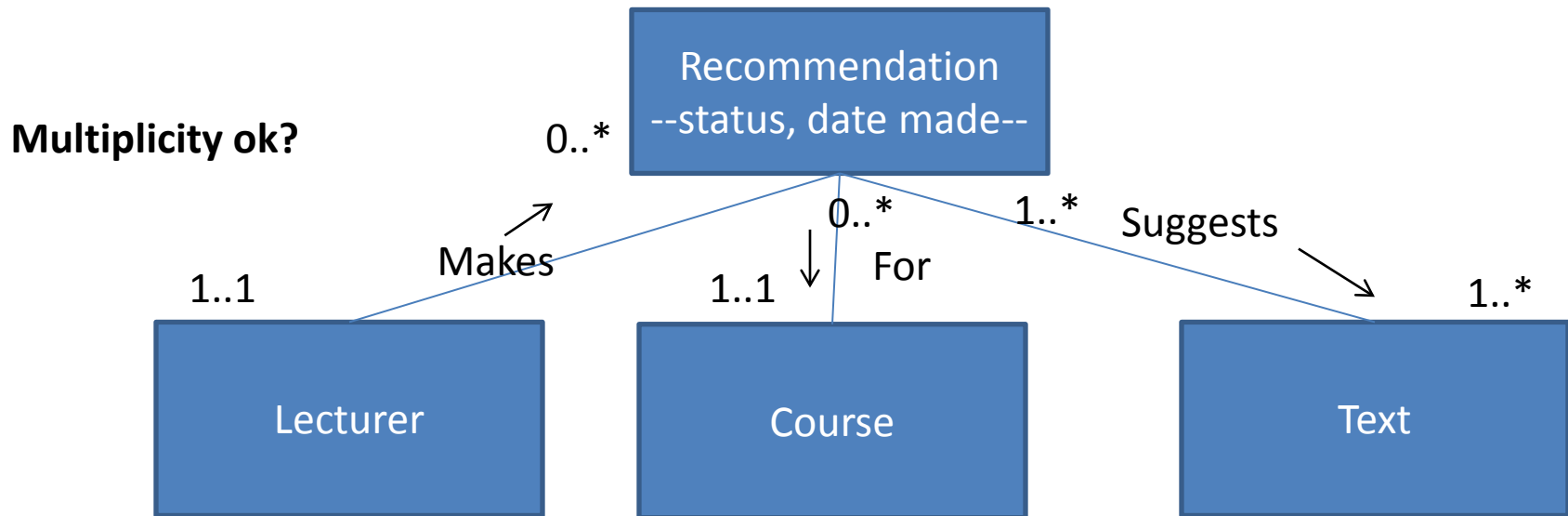
Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

No. We can get a list of texts Fulp recommends, we can determine whether or not Fulp made a rec for 112, and we can get a list of texts recommended for 112.

Assume he did make a rec for 112 of BookX, and a rec for 111 of BookY. Assume Turkett makes a recf for 112 of BookY. BookX and BookY are both in Fulp's list and both in the 112 list, and we can't disambiguate out of that what Fulp recommended.

# What If We Add Another Entity?



A recommendation is made by one lecturer.

A lecturer can make zero, one, or more recommendations.

A recommendation is made for one course.

A course may have zero, one, or more recommendations made for it.

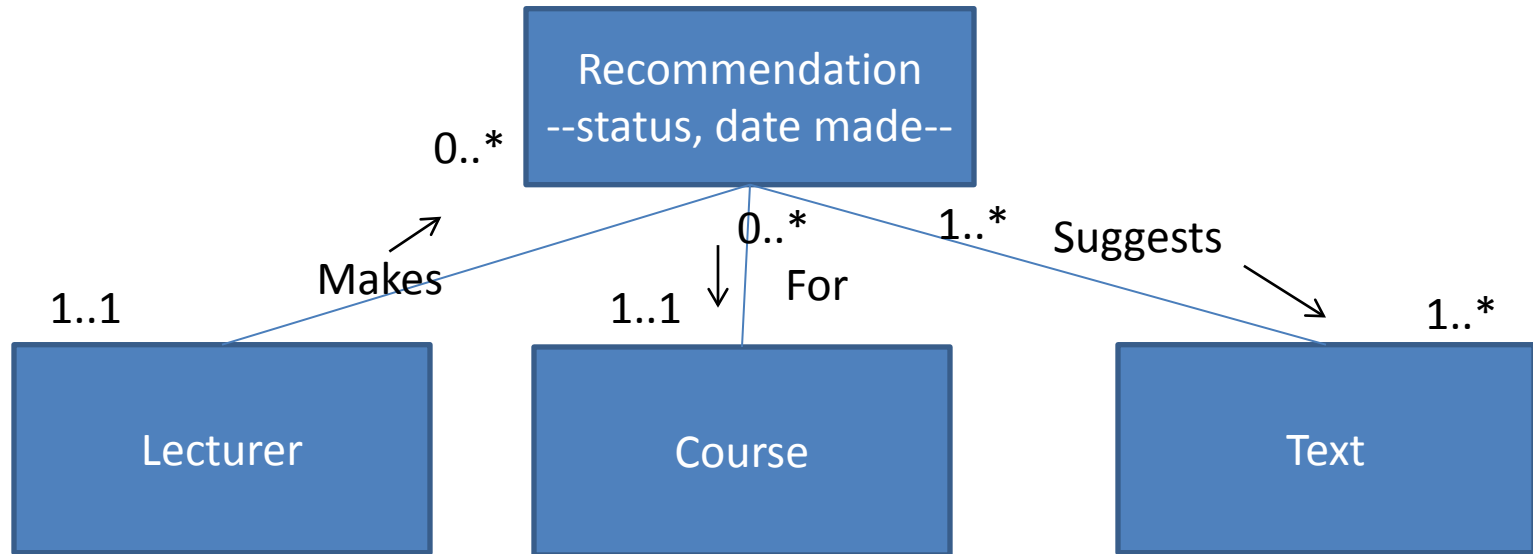
A text is included in one or more recommendations.

A recommendation includes one or more textbooks.

Can we answer this question?

*Which text does Prof. Fulp recommend for CSC 112?*

# What If We Add Another Entity?



Can we answer this question?

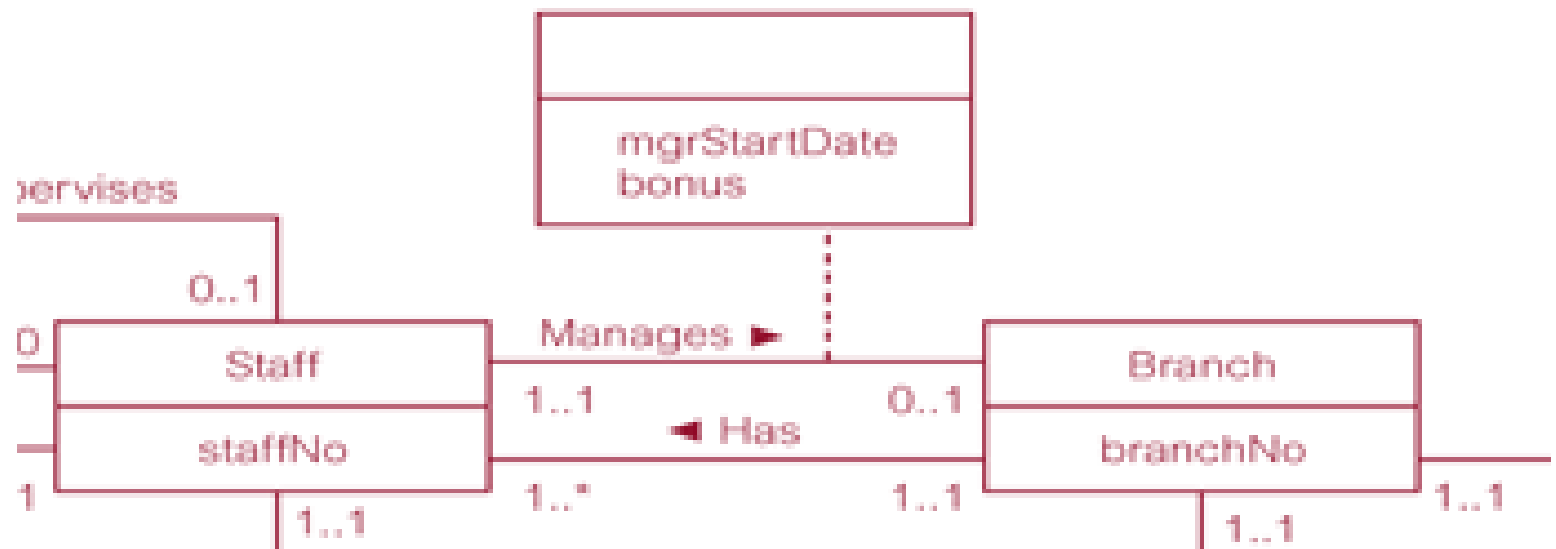
*Which text does Prof. Fulp recommend for CSC 112?*

Yes... we can obtain the list of recommendations Fulp made. From that, we can ascertain the course associated with each recommendation (a given rec relates to one course), and the textbooks associated with each recommendation (a given rec relates to 1 or more books).

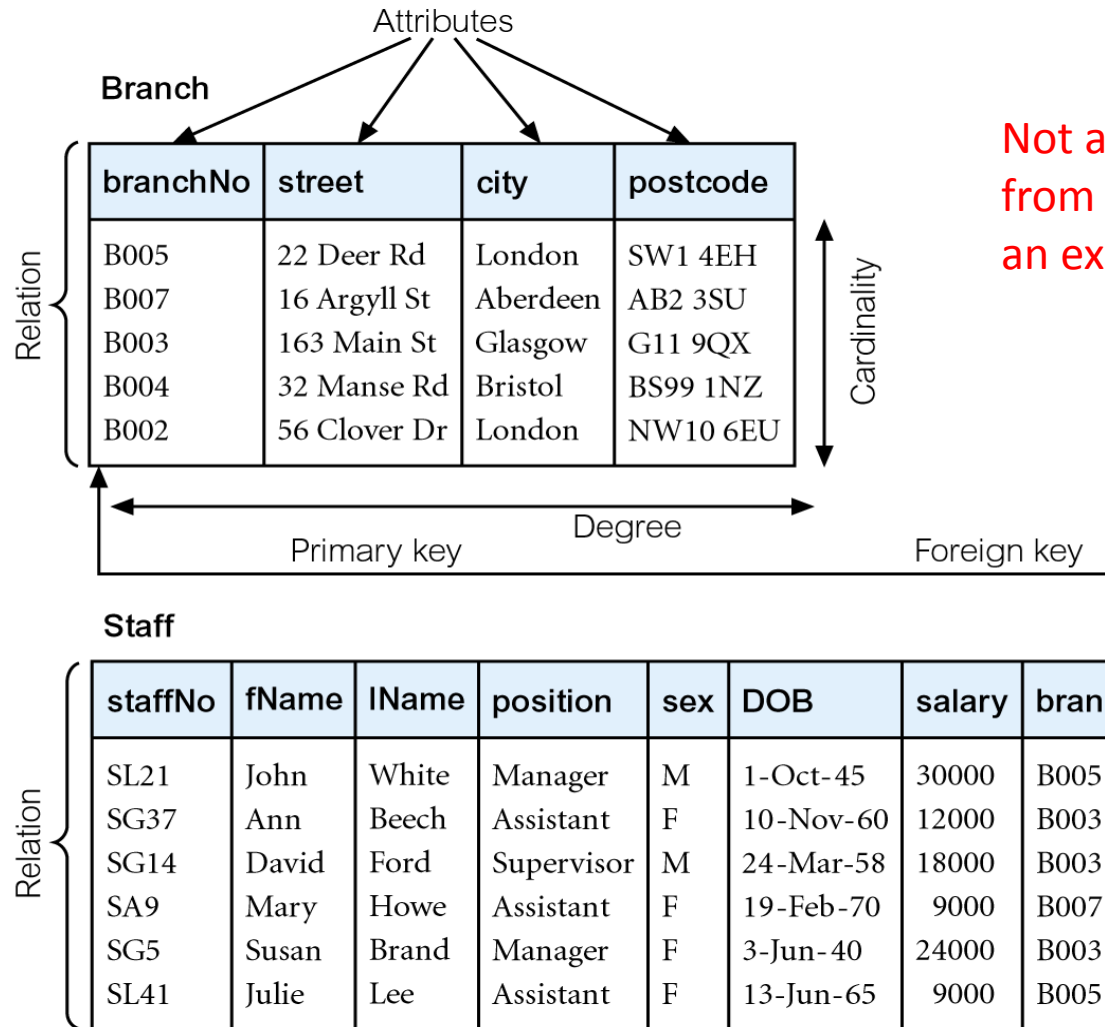


# Relational Models

# DreamHome Staff & Branch



# Two Examples of Relations With Annotations



Not a complete mapping  
from previous slide, just  
an example