# Advanced Management of Data
Exercise Topic 1:

Unified Modeling Language

Unified Modeling Language
Class Diagrams

- type of static structure diagram

- describes the structure of a system

- shows
  - system's classes
  - their attributes
  - operations (or methods)
  - relationships among objects

- usage in Database Design:

  1st main-phase: Conceptual Design
    - Remember: Construct a model of the data independent of all physical considerations

- also in the first exercises:

  2nd main-phase: Logical Design
    - Map the UML diagram to the relational model

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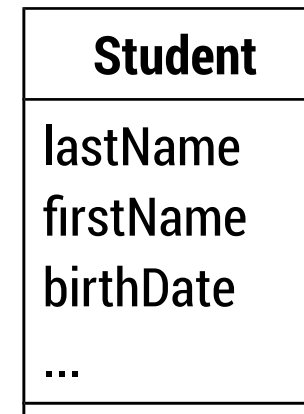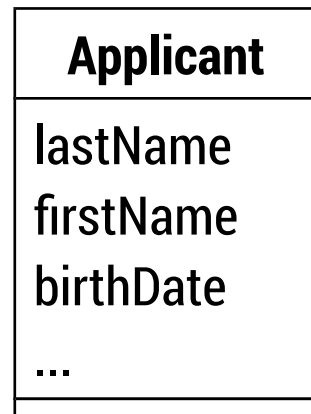
Some not-uncommen UML mistakes
What might be wrong?
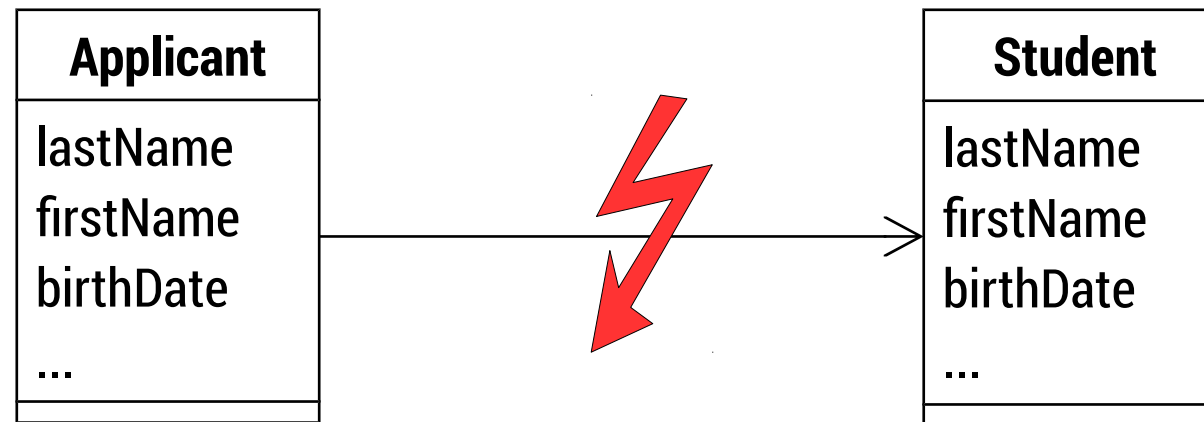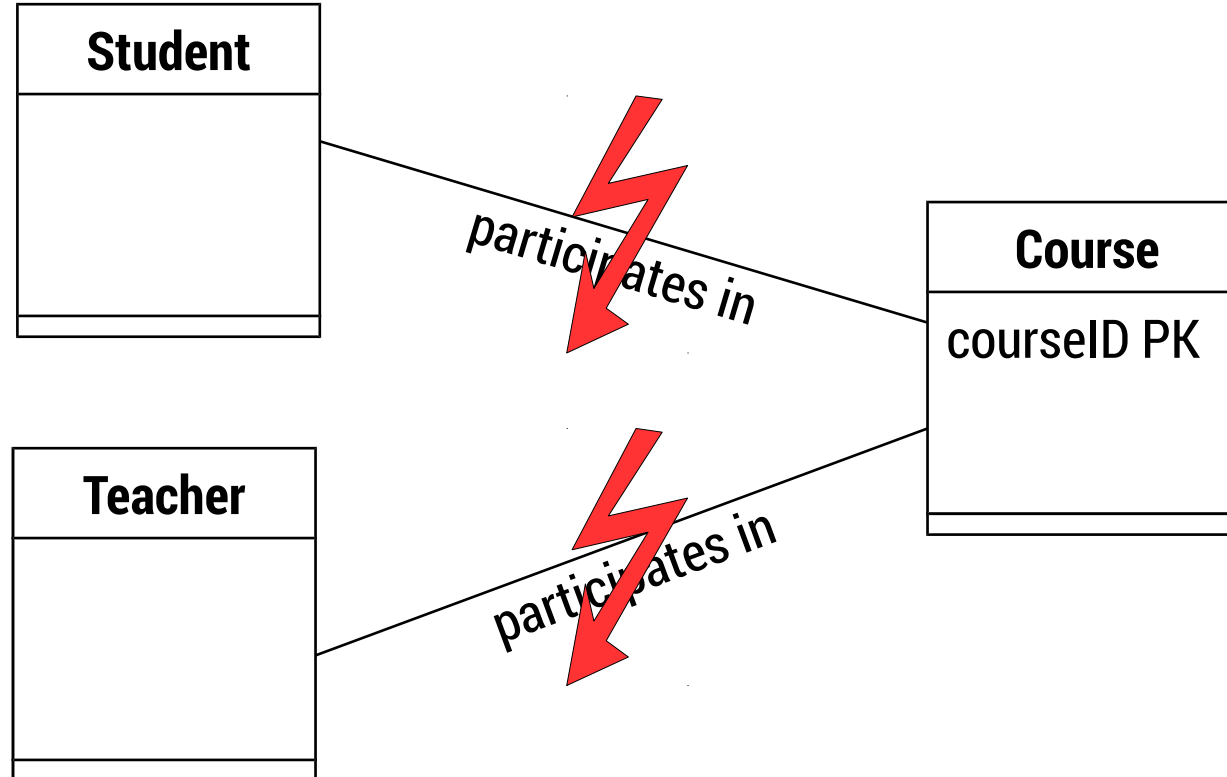
Some not-uncommen UML mistakes
UML diagrams do NOT represent control flow

If upon acceptance, a record from "Applicant" were copied (perhaps with revisions) to "Student", we would NOT put an associative link between Applicant and Student for this reason – not because of CONTROL flow.
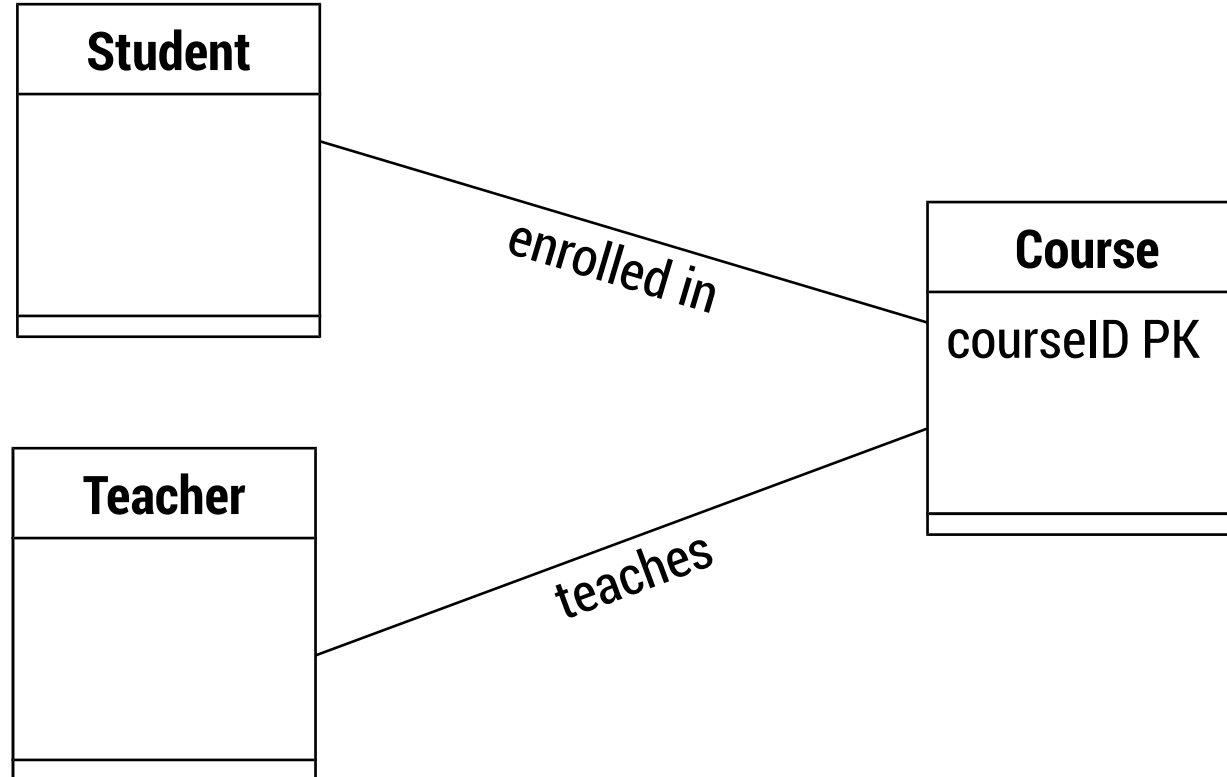
Applicant
lastName firstName birthDate ...

Student
lastName firstName birthDate ...

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Some not-uncommen UML mistakes
What might be wrong?

Some not-uncommen UML mistakes
All relationships/associations (and classes) should have unique names

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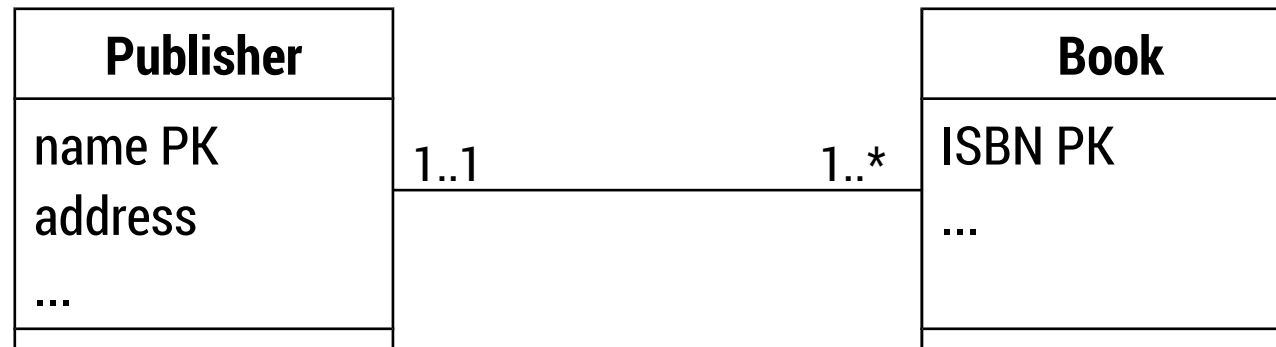
Some not-uncommen UML mistakes
What might be wrong?
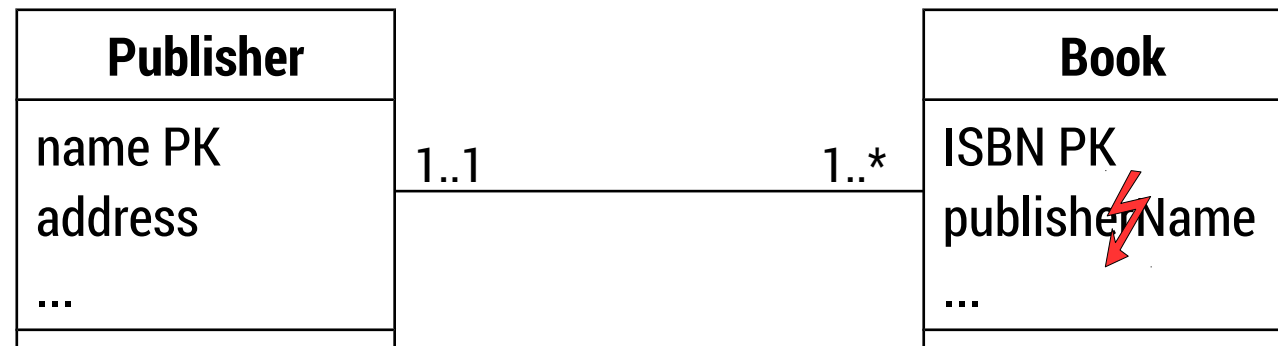
Some not-uncommen UML mistakes
Avoid implicit associations

the name of the publisher is an implicit association that is redundant

Publisher
name PK
address
...

1..1 ———————— 1..*

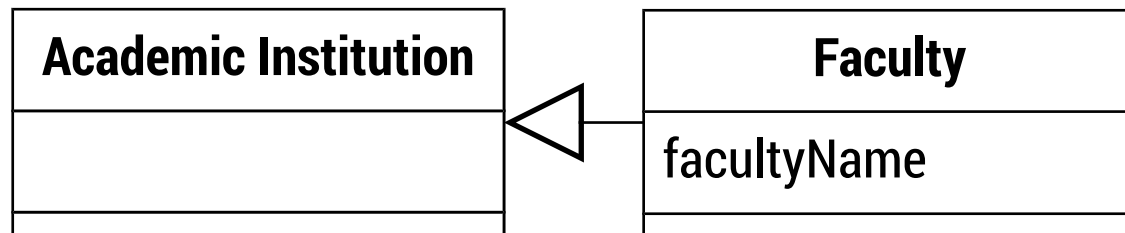| Book |
|---|
| ISBN PK |
| ... |

Some not-uncommen UML mistakes
What might be wrong?
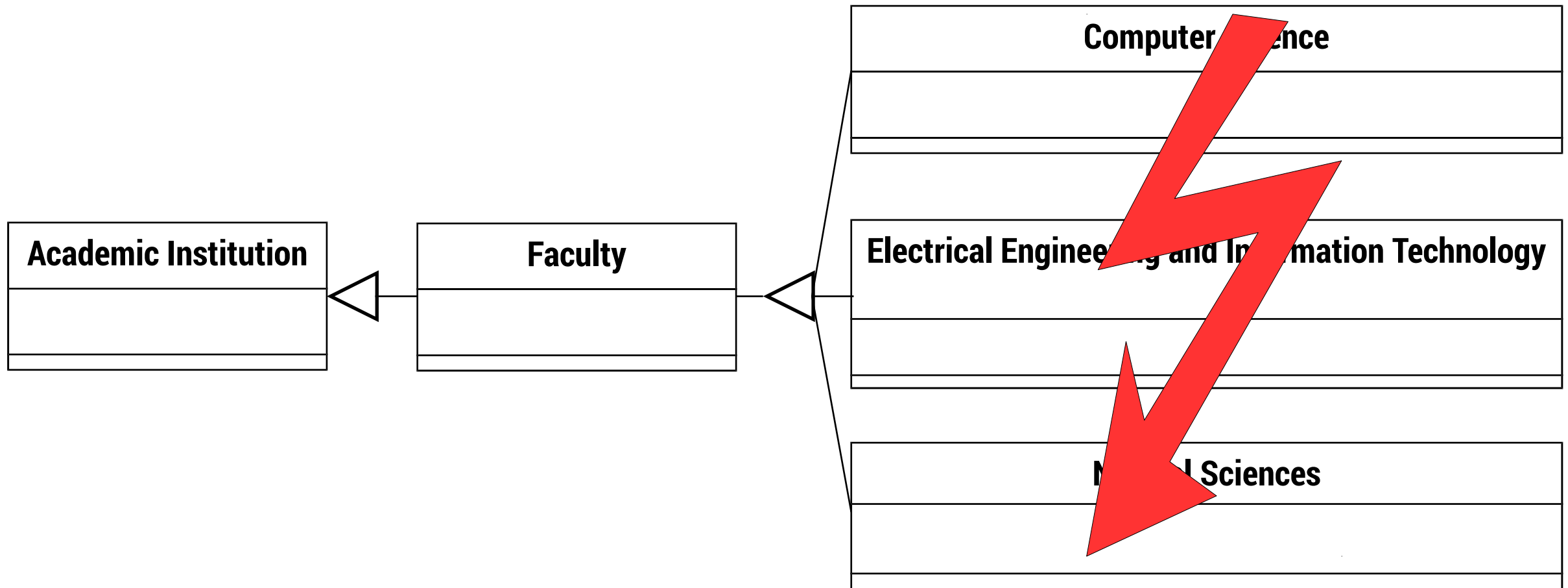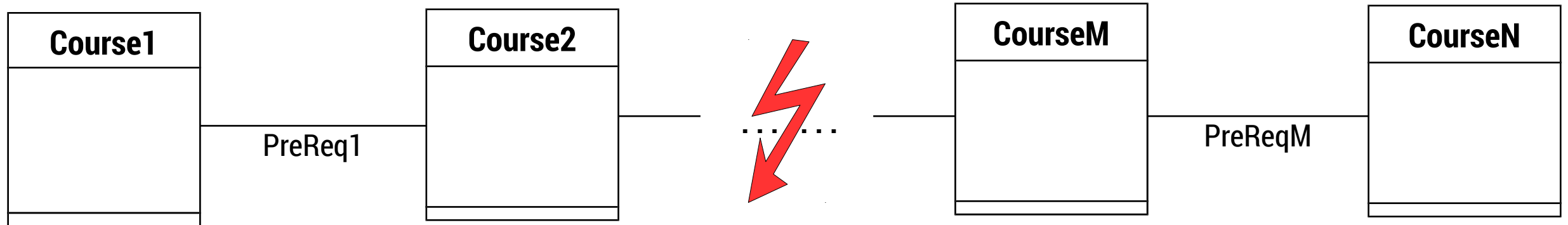
Some not-uncommen UML mistakes
UML diagrams show form of the data, not specifics about content

if you have a class that you intend to have only one entry in it, then that one "entry" is better represented as the value of an attribute

Academic Institution

Faculty
facultyName

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Some not-uncommen UML mistakes
What might be wrong?

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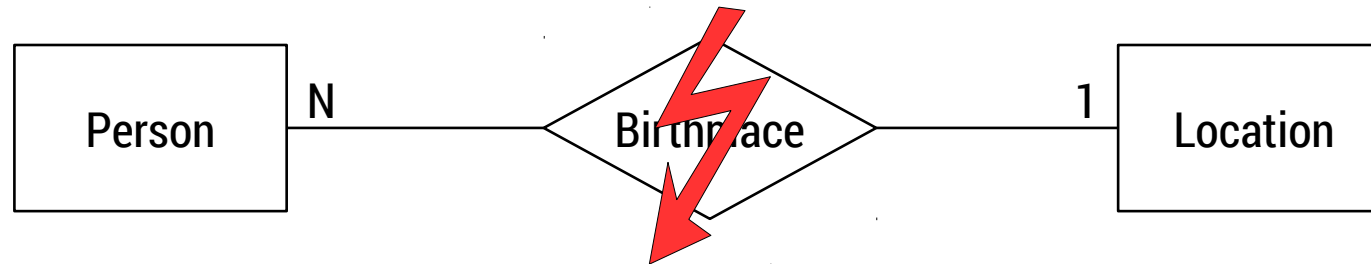
Some not-uncommen UML mistakes
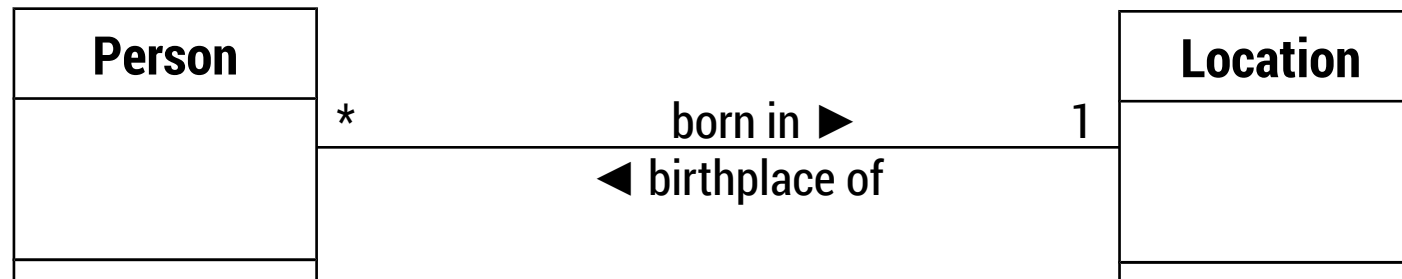# UML diagrams have a well defined number of classes and relationships
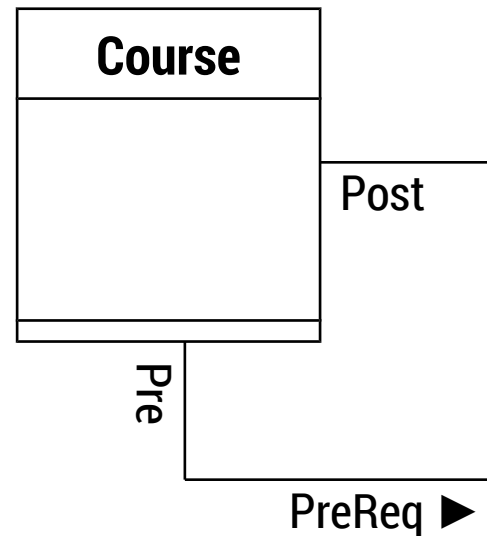
Some other UML mistakes
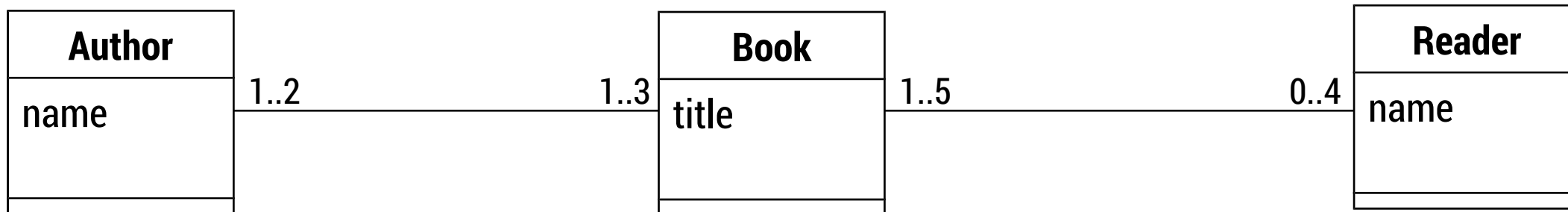# What might be wrong?

Some other UML mistakes
Use UML and not Chen's notation for entity-relationship modeling

Consider the following UML diagram

| Author | | 1..2 | 1..3 | Book | | 1..5 | 0..4 | Reader | |
| name | | | | title | | | | name | |

- **If there are 6 authors,**
  - what's the minimum and maximum number of books?
  - what's the minimum and maximum number of readers?

- **If there are 6 readers,**
  - what's the minimum and maximum number of books?
  - what's the minimum and maximum number of authors?

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Draw an UML diagram that models this information

There is an online rental video shop. Customers of this shop may log in with their customer ID and their password. Then they can rent films, that each have a different name and a rental fee, but they may only watch it, if they have enough prepaid balance with the shop.

Consider the following UML diagram
True or False?

a) No two companies can have the same name.

b) No two employees can have the same name.

c) No two companies can be at the same address.

d) No two employees can work at the same address.

e) Each employee works for at least one company.

f) No employees work for more than one company.

g) Each company has at least one employee.

h) Two employees with the same name cannot work for the same company.

i) Two employees with the same name cannot work for different companies.

Company		Employee
name PK	◆————*	name
address		salary