

Conceptual Modelling with UML Class Diagram

Erik Perjons



Questions to answer

- How can you create a conceptual model using UML Class Diagram?

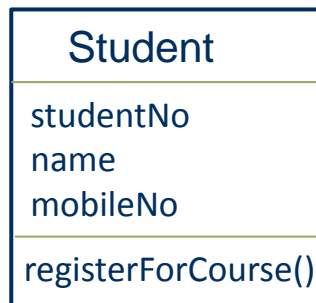


UML Class Diagram



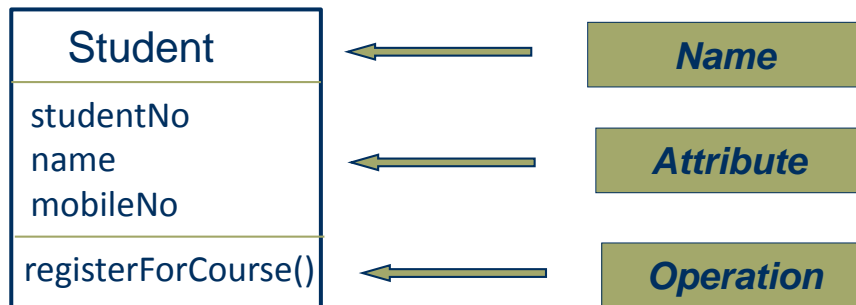
Class

- A class is shown as a rectangle with three compartments:
 - name of the class (use a noun in singular, first letter capital)
 - attribute(s) (use a noun in singular for each attribute, first letter lower case)
 - operation(s) (use a verb, first letter lower case)



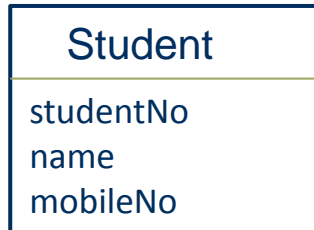
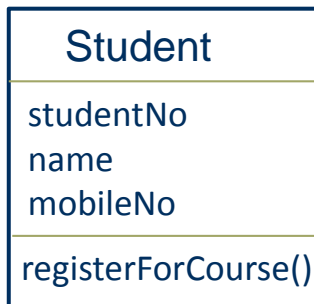
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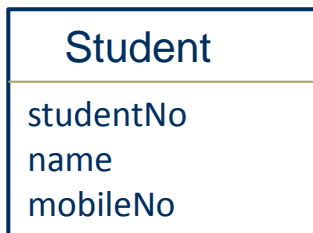
Class

- The class can be shown in three different variants
- We will use the variant in the middle showing the name of the class and the attributes



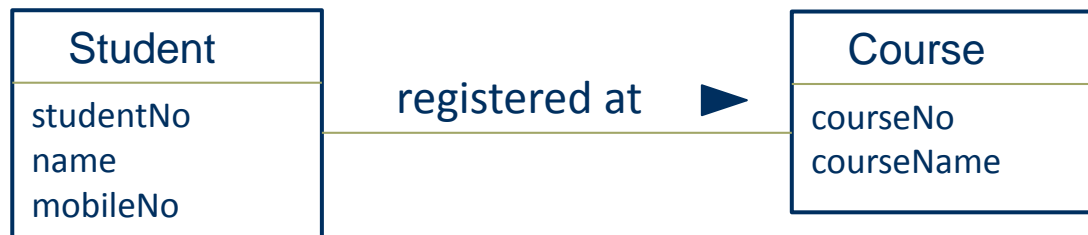
Class

- A class groups a set of things with common properties or characteristics
- An attribute is a descriptive property or characteristic of the class



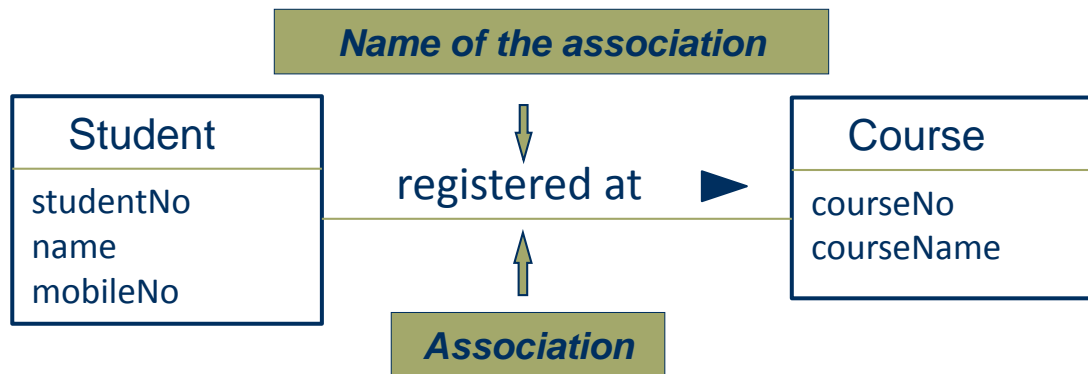
Association

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- In order to support interpretation of the association, it should be given a name – preferably in form of a verb or verb phrase – and it should also be visualized in which direction the name should be read



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Association

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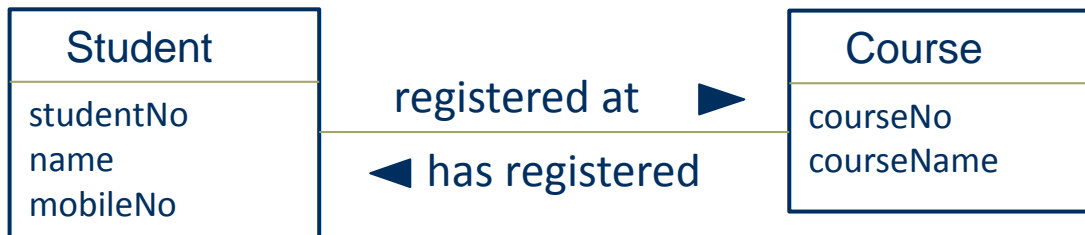
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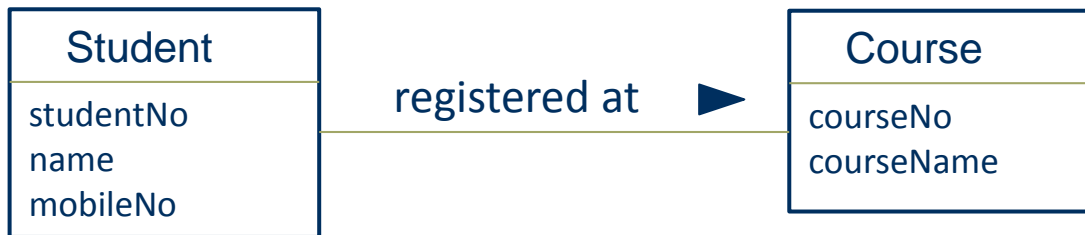
Association

- Only the name of the association in one direction is usually shown, but there is possible to use names in both direction



Association

- Association shows the roles the objects of the classes can play towards each other
- There is a role in each direction of the association:
 - Student plays the role of being registered at course(s)
 - Course plays the role of having registered student(s)



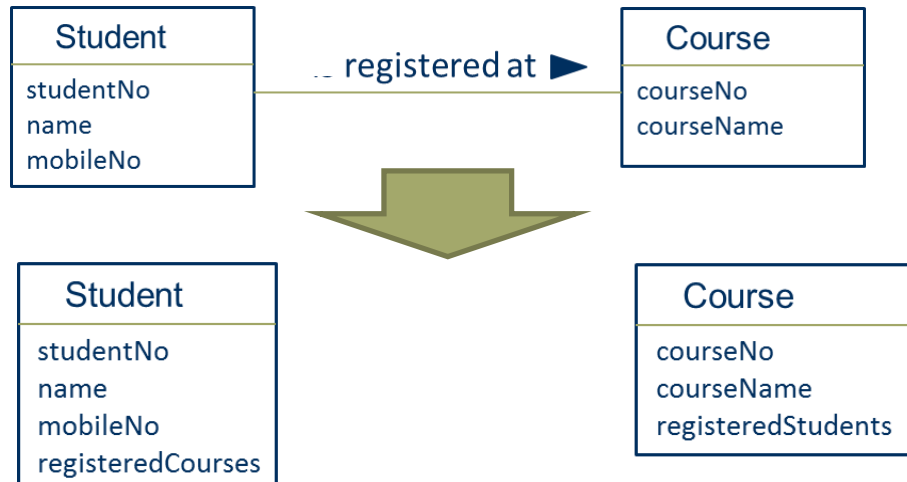
Association

- There could be more than one association between the same classes (therefore, naming of association is important)



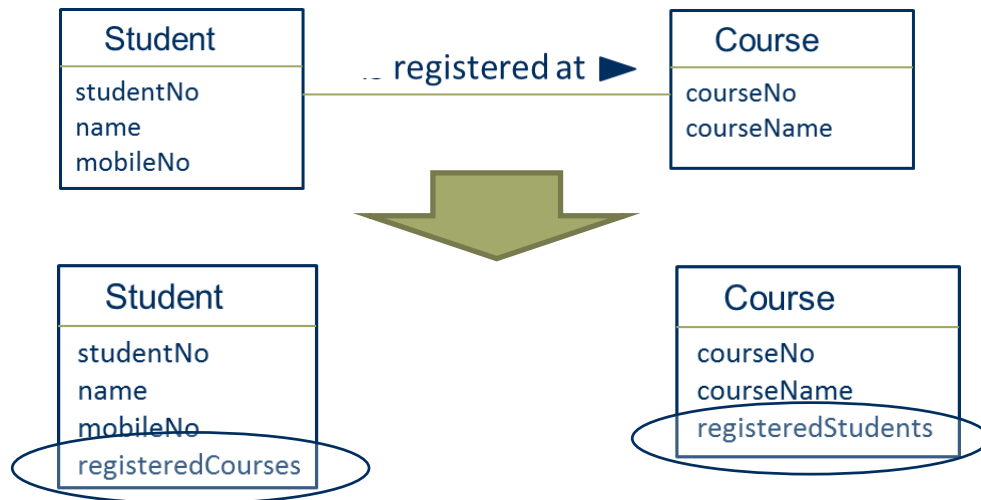
Association

- Attribute and association are both properties of a class, so if an association is not shown it needs to be represented as attribute in the both of the classes (since an association has two directions)



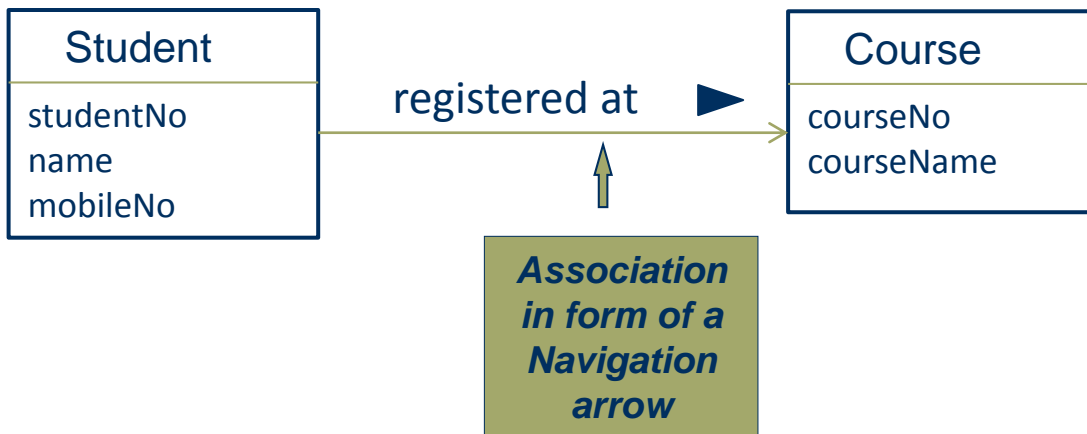
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Association

- It is possible to specify that an association only has one direction by introducing a navigation arrow – but that should not be used in this course



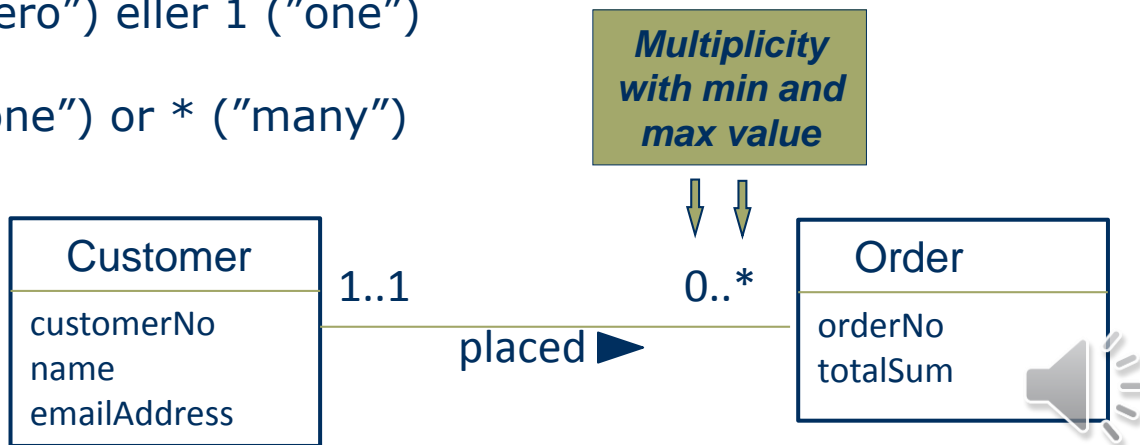
Multiplicity

- Multiplicity describes how many objects (minimum and maximum) of a class that can be linked to objects of another class – in both directions of the association
- Minimum can be 0 ("zero") or 1 ("one")
- Maximum can be 1 ("one") or * ("many")

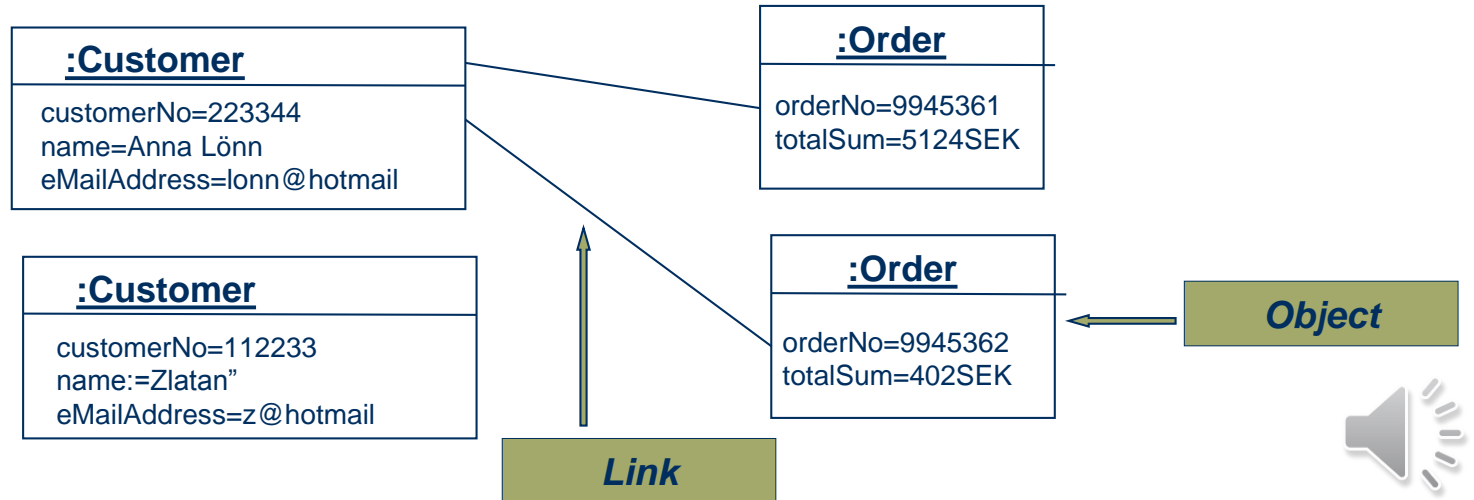
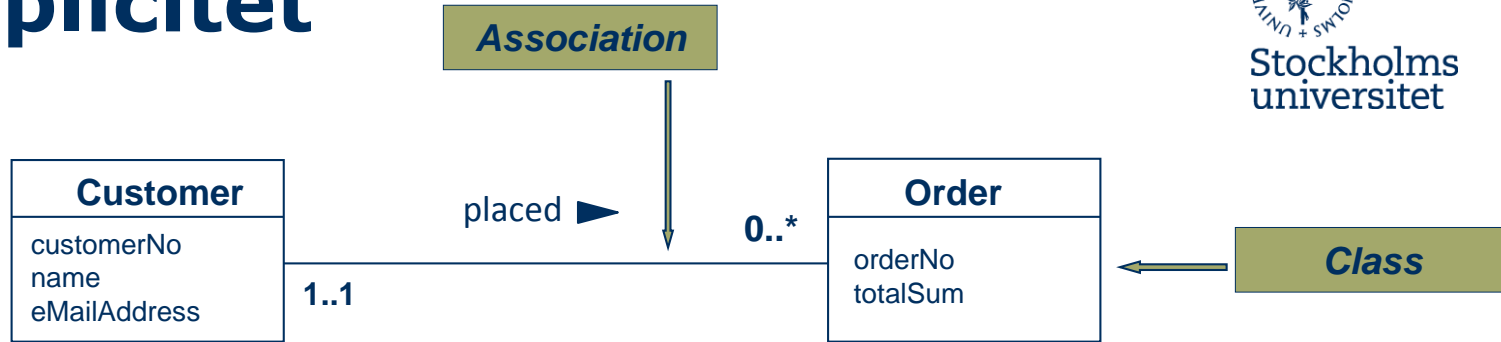


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Multiplicitet



Multiplicity

- *Multiplicity in the direction from Customer to Order:* An object of a class Customer can minimum be linked to 0 and maximum to many
- *Multiplicity in the direction from Order to Customer:* An object of a class Customer can minimum be linked to 1 and maximum to 1, that is, exactly one



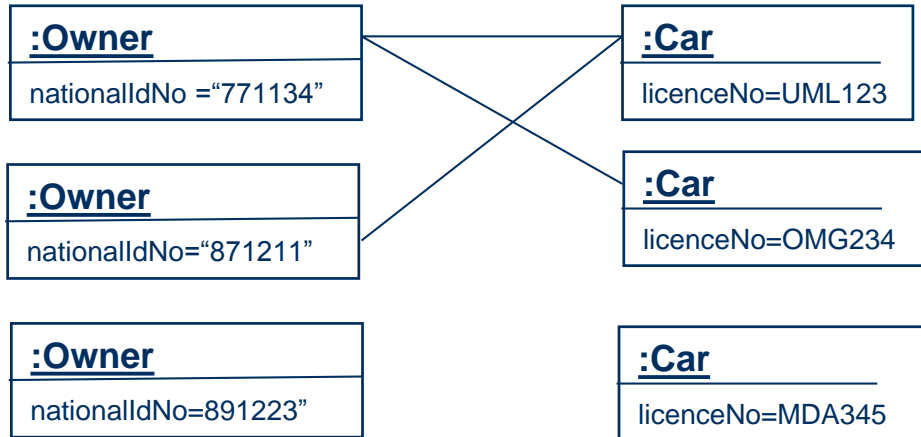
Multiplicity

- A guideline to use for helping you deciding multiplicity:
- Use the phrase: "**One object of** Customer **is linked to minimum** {zero or one} **and maximum** {one or many} **object(s) of** Order", and (in the other direction): "**One object of** Order **is linked to minimum** {zero or one} **and maximum** {one or many} **object(s) of** Customer"



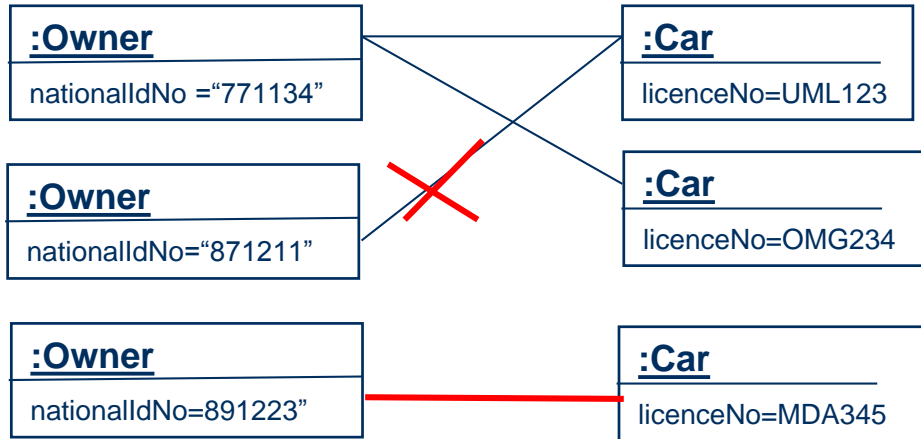
Multiplicity Exercise

Your task: Find the violation of multiplicity rules and correct the multiplicity



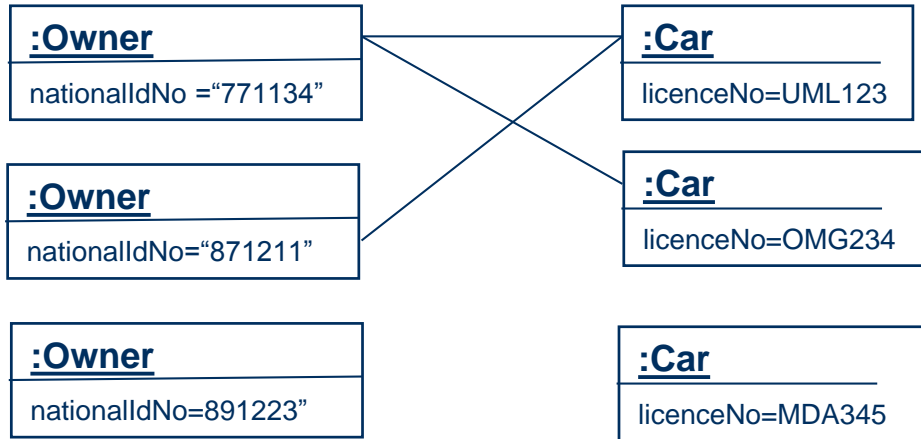
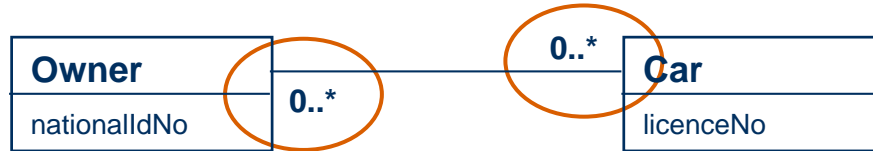
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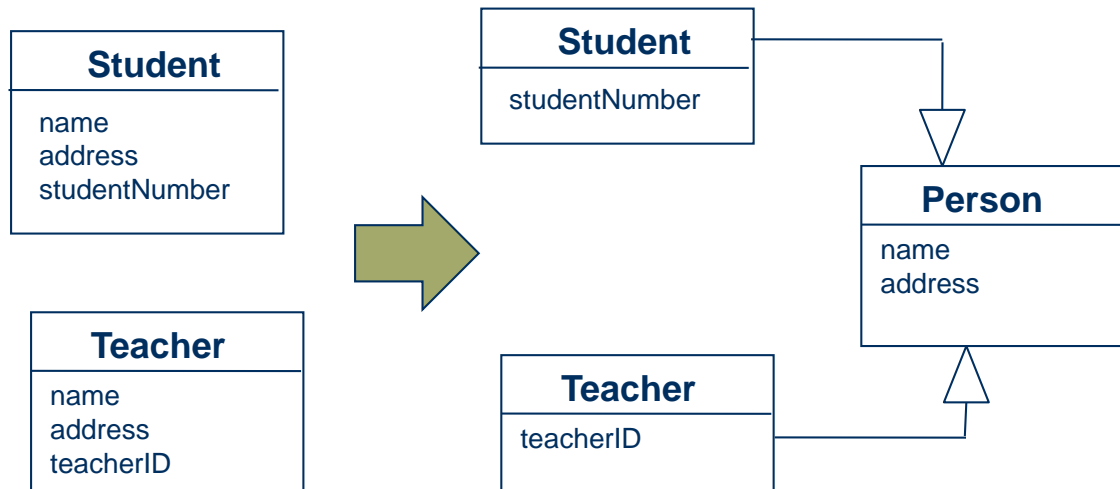


Multiplicity

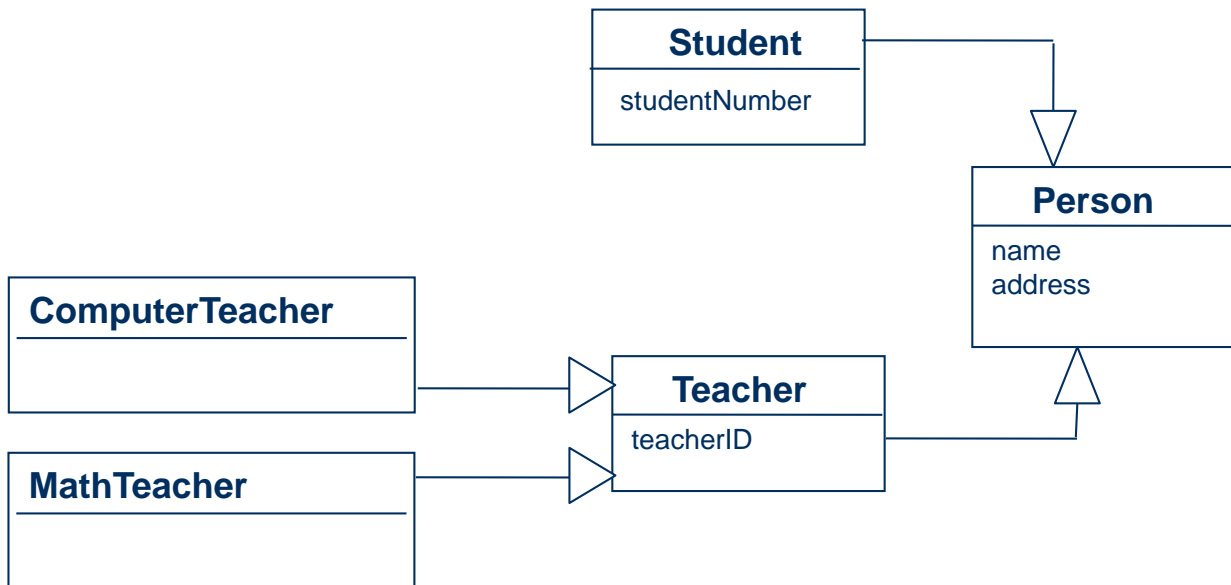
- Commonly, multiplicity described business rules in the organization (for example, a order must be placed by exactly one customer)



Modelling Generalization in UML



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