



Equivalence problem of UML composites

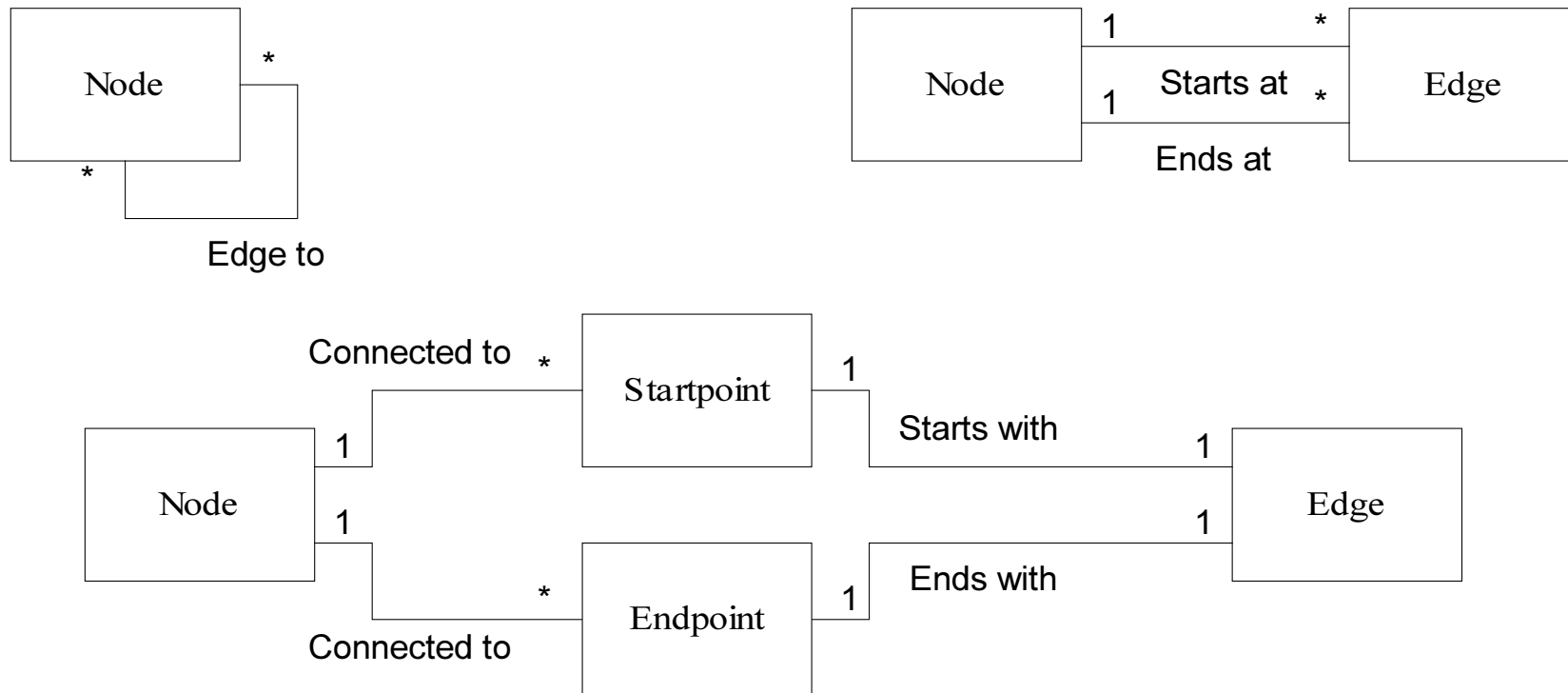
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Plan of presentation

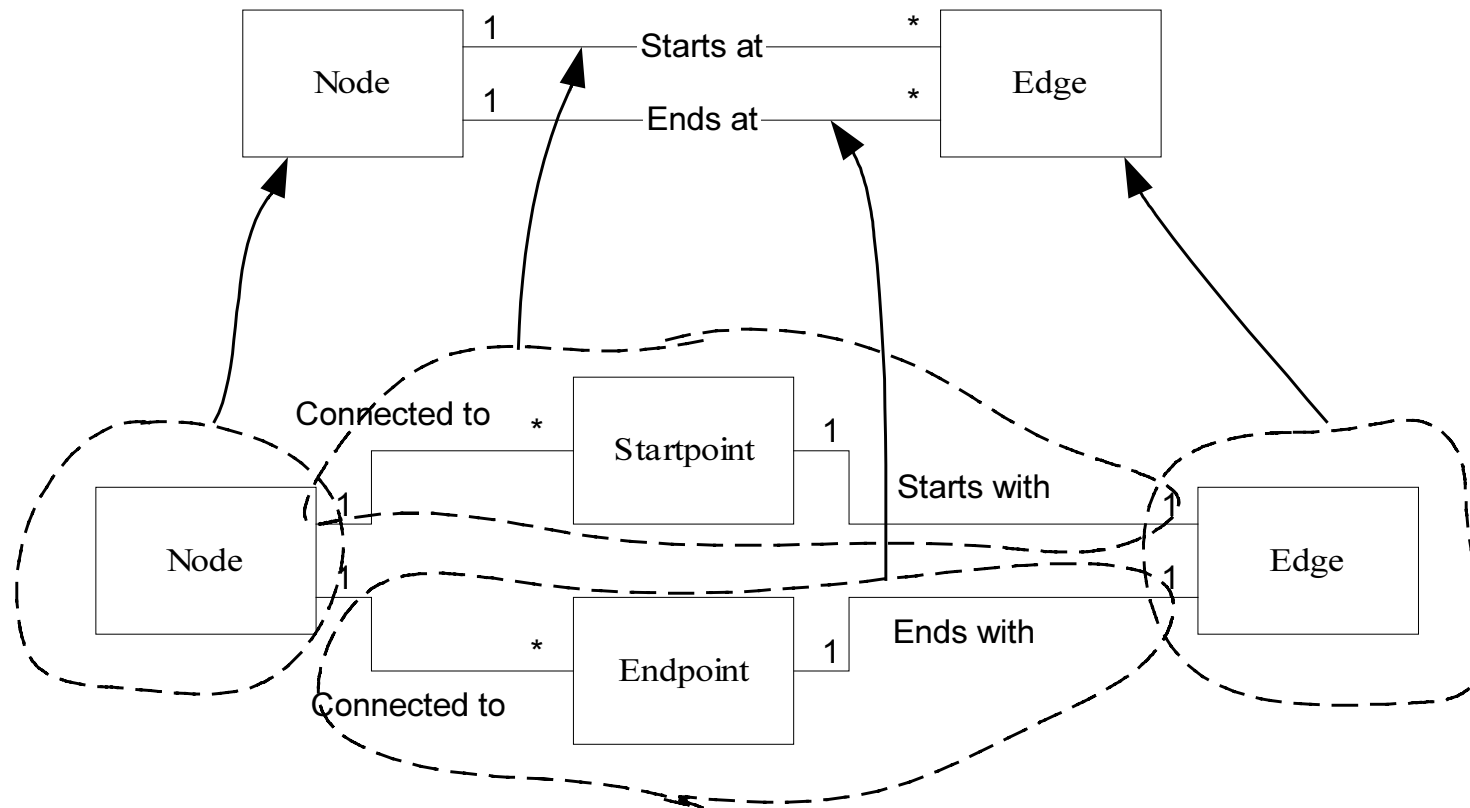


- ⌘ Context - intuitive equivalence of class diagrams
- ⌘ Problem - equivalence of UML composites
- ⌘ Solution - canonization of class diagrams

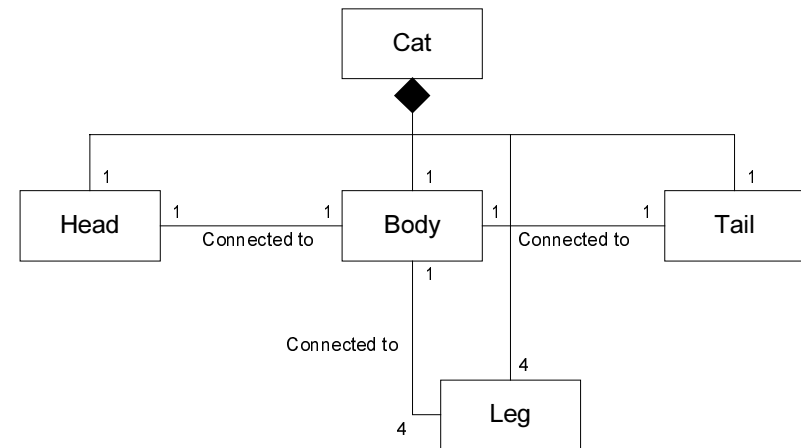
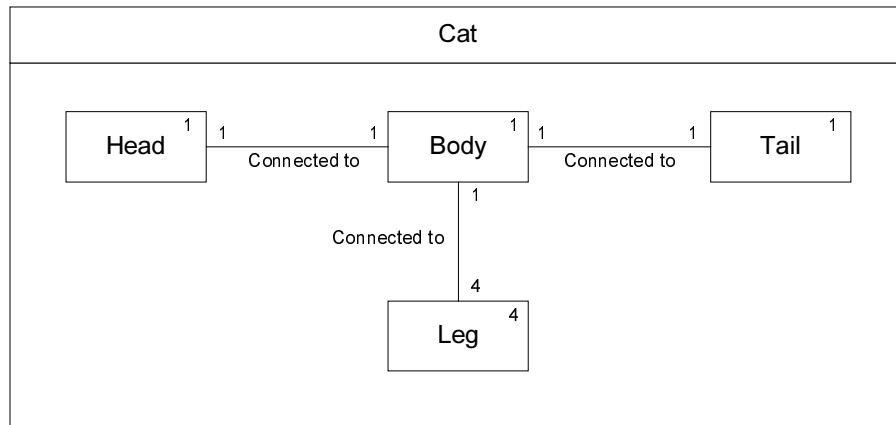
Intuitive Equivalence



Definition of new concepts

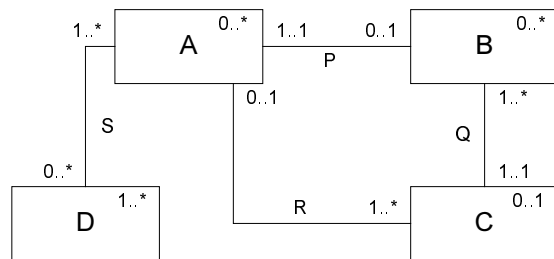


UML composites

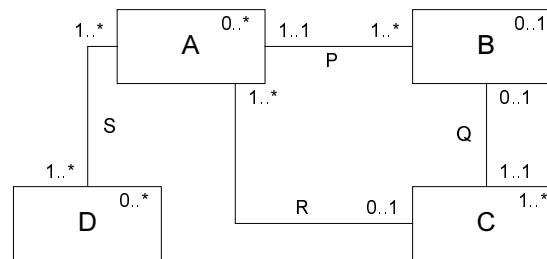


Equivalence of Composites

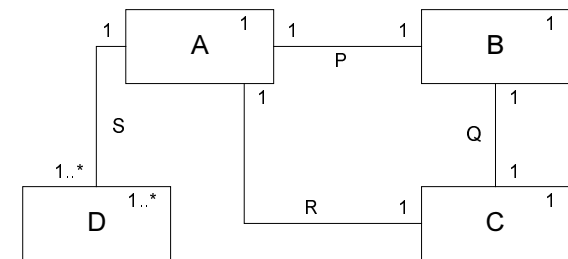
⌘ Two composite class diagrams are equivalent if they describe the same set of instance diagrams



(a)



(b)



(c)

The Language Restriction



Working subset of class diagram language:

⌘ classes with multiplicity

⌘ binary associations

⌘ four multiplicity intervals

1..1 0..1 1..* 0..*

The Main Result



A theorem is proven:

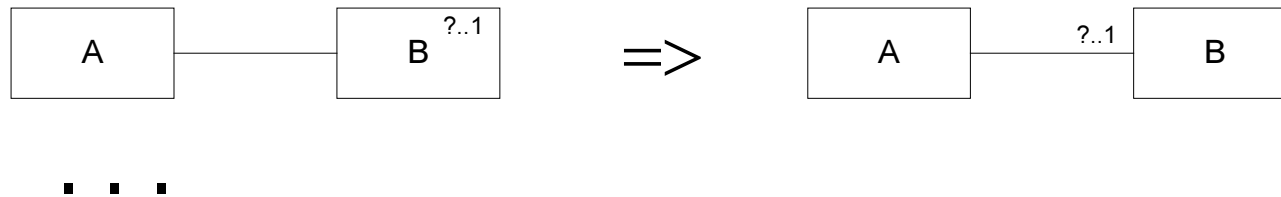
- ⌘ There exists an algorithm that solves the equivalence problem for composite class diagrams

Canonization Rules

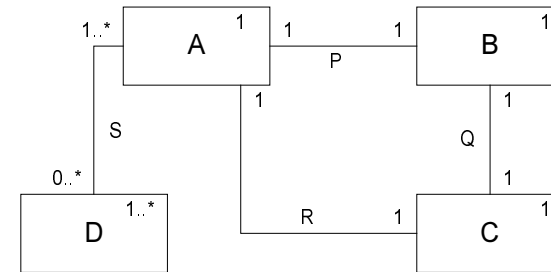
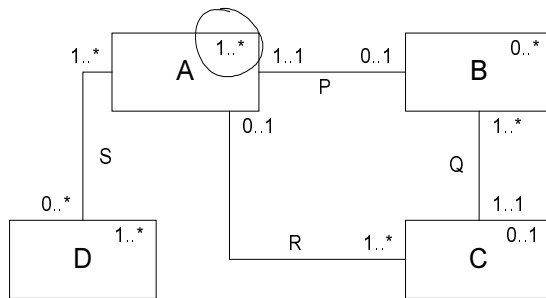
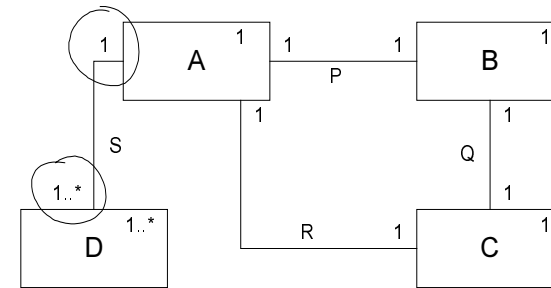
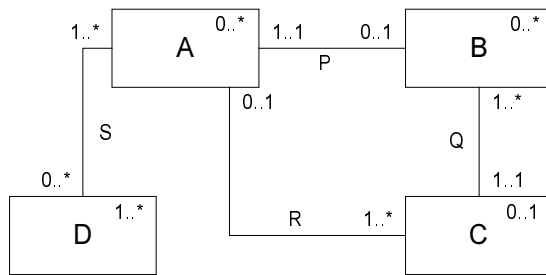
⌘ System of inequalities

$$\begin{array}{c}
 \leq \\
 \frac{0..1}{1} \quad \frac{1}{1..*} \\
 \hline
 0..1 \quad 1..*
 \end{array}
 \quad
 \frac{1}{1} = \frac{1}{1}
 \quad
 \begin{array}{c}
 \geq 1 \\
 \boxed{1..?}
 \end{array}
 \quad
 \begin{array}{c}
 \leq 1 \\
 \boxed{?..1}
 \end{array}$$

⌘ 4 local transformation rules



Example of Canonization



$$\begin{cases} a \geq 1 \\ a \geq b, b \geq c, c \geq a \\ c \leq 1 \end{cases}$$

\Rightarrow

$$a = b = c = 1$$

Equivalence of Composites

