Formal Specification of Software

UML Object Diagrams

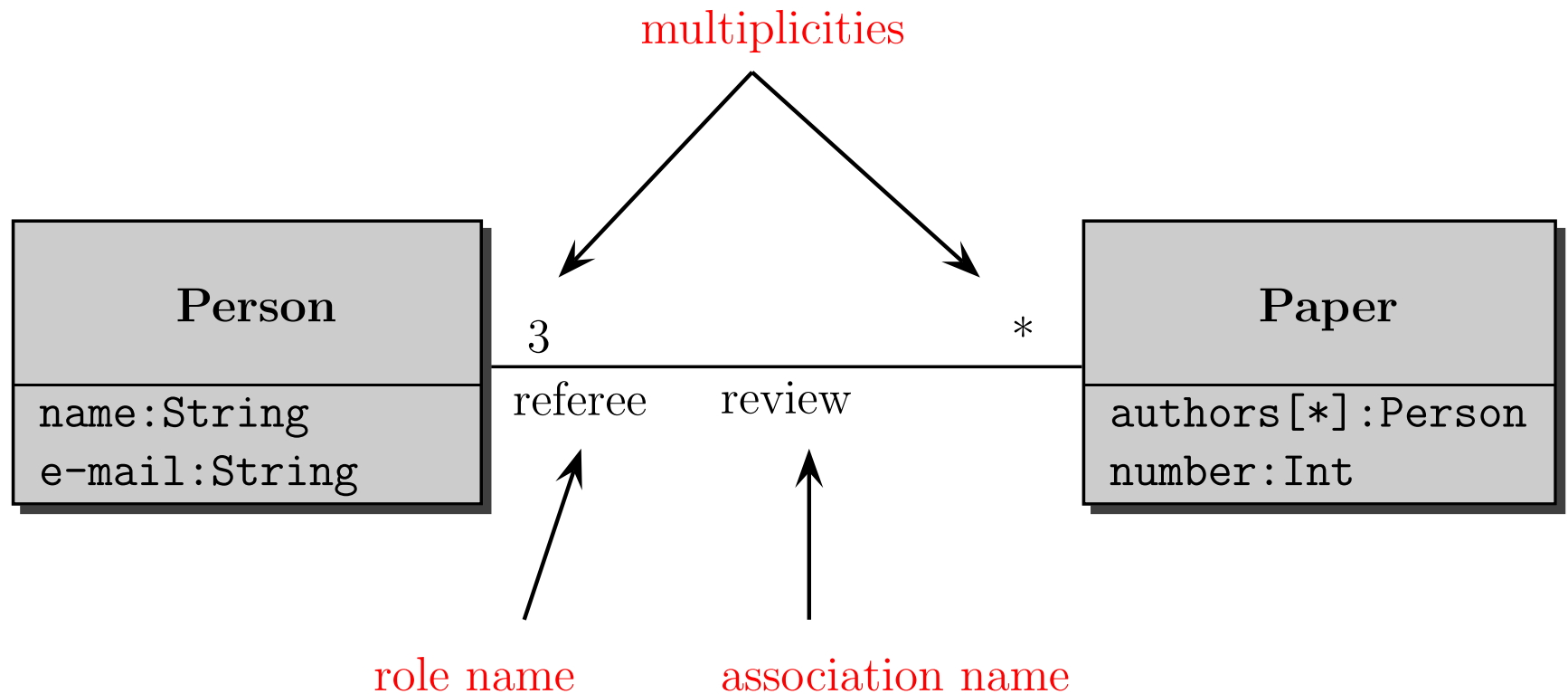**Bernhard Beckert**

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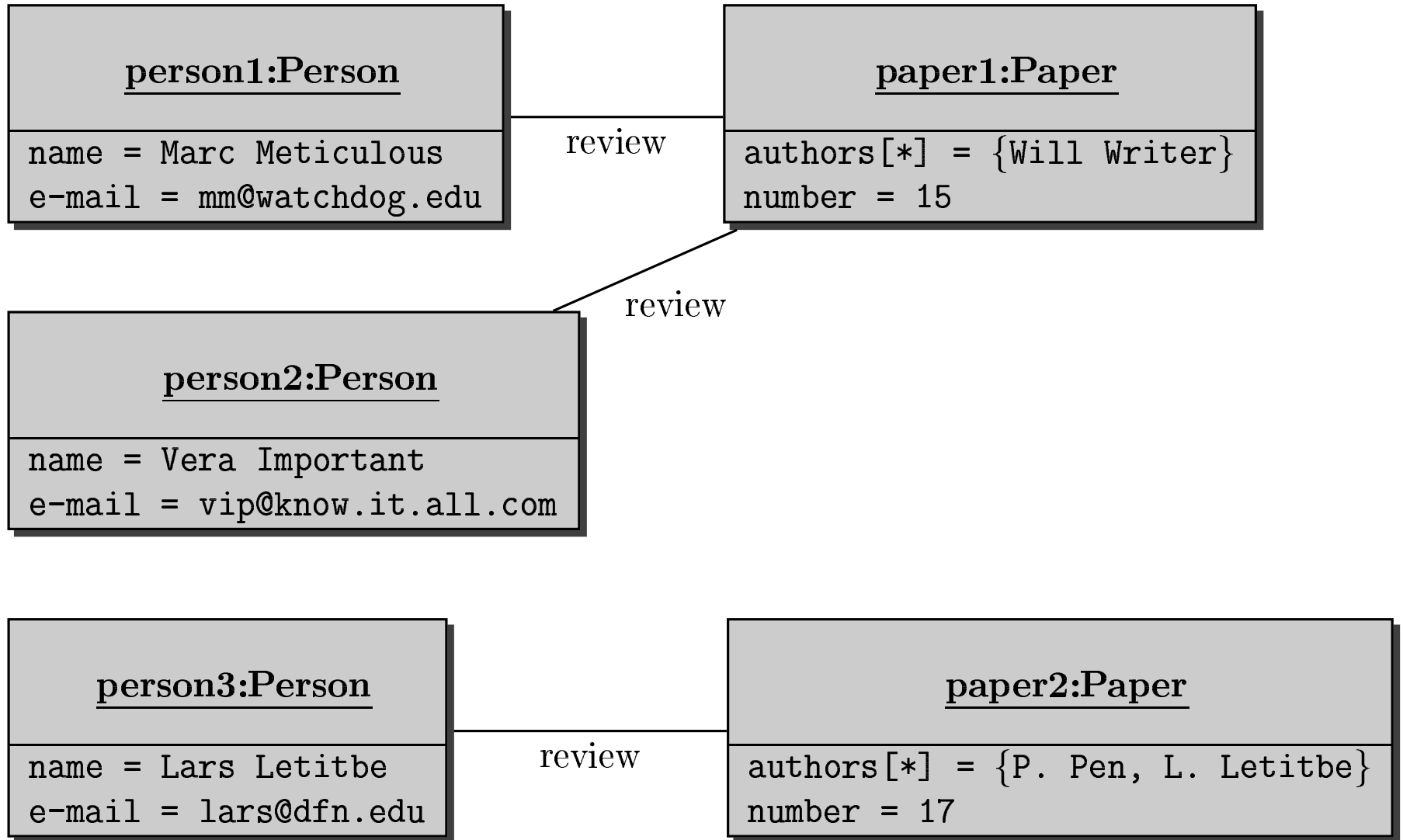# A Class Diagram

multiplicities

Person		Paper
name:String	3	authors[*]:Person
e-mail:String	referee review *	number:Int

role name   association name

An Object Diagram

person1:Person
name = Marc Meticulous
e-mail = mm@watchdog.edu

review

paper1:Paper
authors[*] = {Will Writer}
number = 15

review

person2:Person
name = Vera Important
e-mail = vip@know.it.all.com

person3:Person
name = Lars Letitbe
e-mail = lars@dfn.edu

review

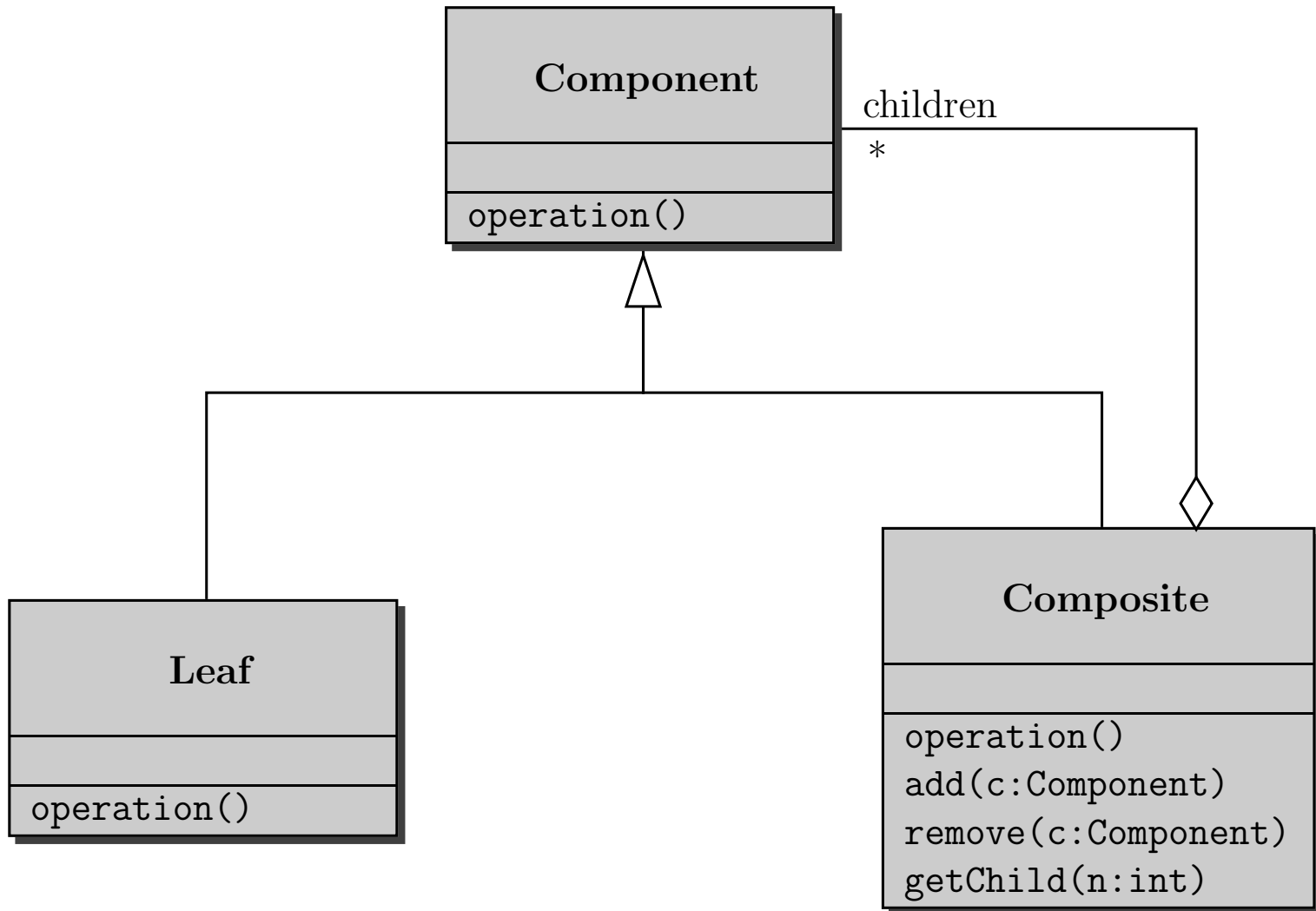| paper2:Paper |
|---|
| authors[*] = {P. Pen, L. Letitbe} |
| number = 17 |

Conformance

Definition

An object diagram D_{obj} conforms to a class diagram C if

- **The values of attributes in D_{obj} are of the type specified in C**

- **D_{obj} observes the multiplicity constraints of C**

- **The associations occuring in D_{obj} are declared in C**

The Composite Pattern Revisited

Object Diagrams Representing Lists

```
element1:Composite
    |
  child
    |
element2:Composite
    |
  child
    |
element3:Leaf
```

```
element1:Composite
    |
  child
    |
element2:Composite
    |
  child
    |
element3:Leaf
    |
  child
    |
element4:Leaf
```