A knight can have a
sword, to realize which
we used aggregation.

How can we distinguish
kinds of swords?

At a strike, a decision
needs to be taken based
on the kind of a knight
and kind of a sword.

Sword efficiency
depends on its kind,
but also on the kind of
the knight who
handles it.

In which class to make this
decision?

1. In the Knight class
2. In the Sword class
3. Outside these classes

Flexibility problems
occur in object-
oriented code, too

Code flexibility can
be improved by
applying design
patterns

A design pattern is being
chosen according to the
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problem situation: the
nature of contradicting
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What if we would transfer
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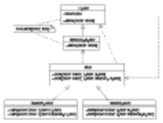
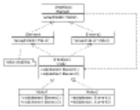


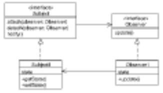


Visitor

adding operations to the
objects of certain classes
without having to
change them

contradicting
forces

Observer



observing objects have to be notified of a
change in the state of the observed object,
and it has to be possible to add them without
a need to modify the observed object

Christopher Alexander

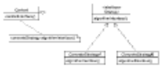
The Timeless Way of Building

A Pattern Language

Context

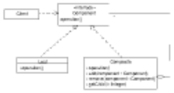
Independent Regions
...
House Cluster
House for a Small Family
Alcoves
...

Strategy (Policy)



there are (and can be added) different
strategies of solving a given problem,
and the context of their application
has to be ready for this

Composite



elements may be composite
and atomic,
and the way of accesing them
has to be uniform

Lecture 3:

Design Patterns

Valentino Vranić

Ústav informatiky, informačných systémov
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OOP 2018/19
26. 2. 2019

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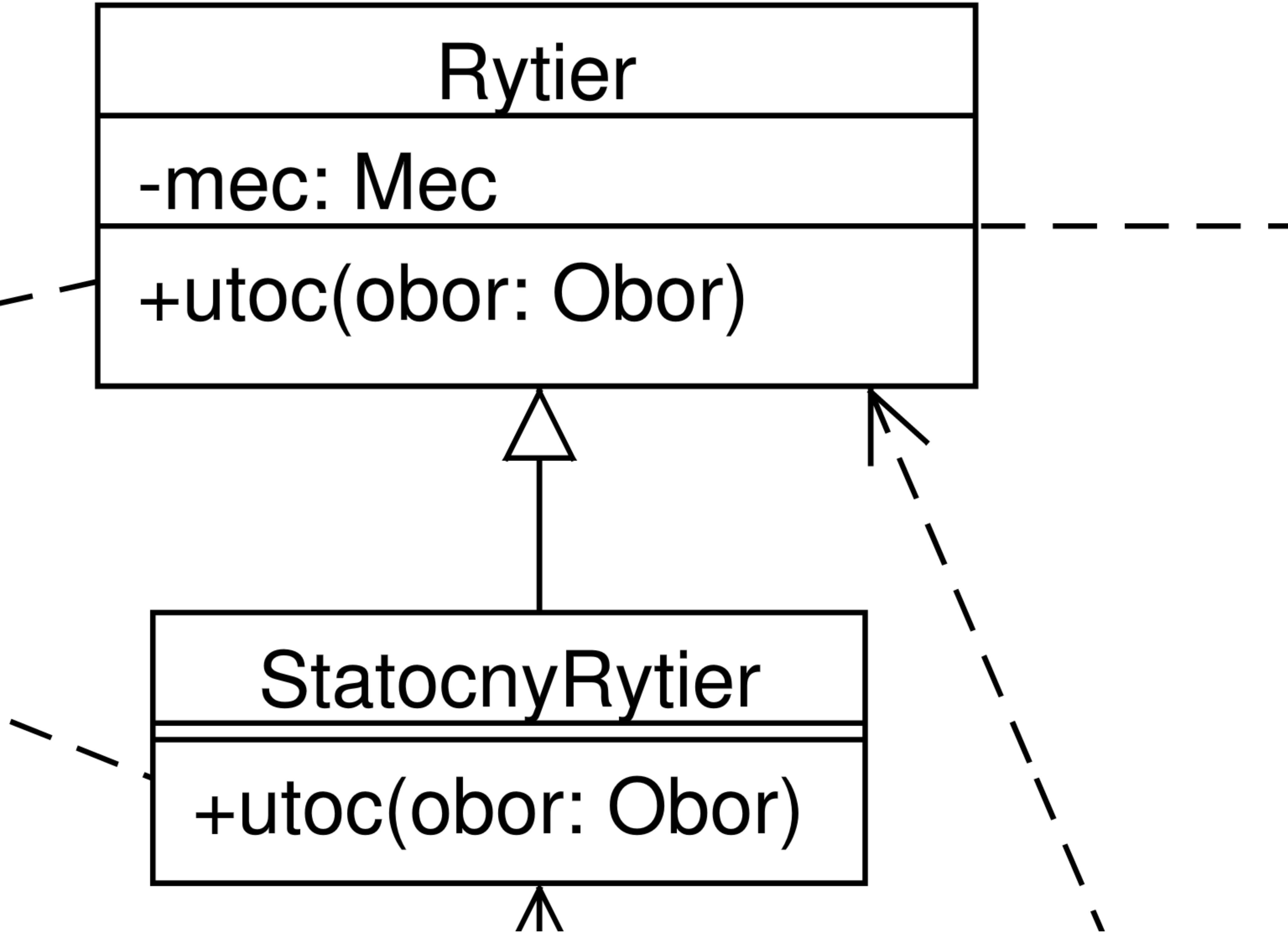
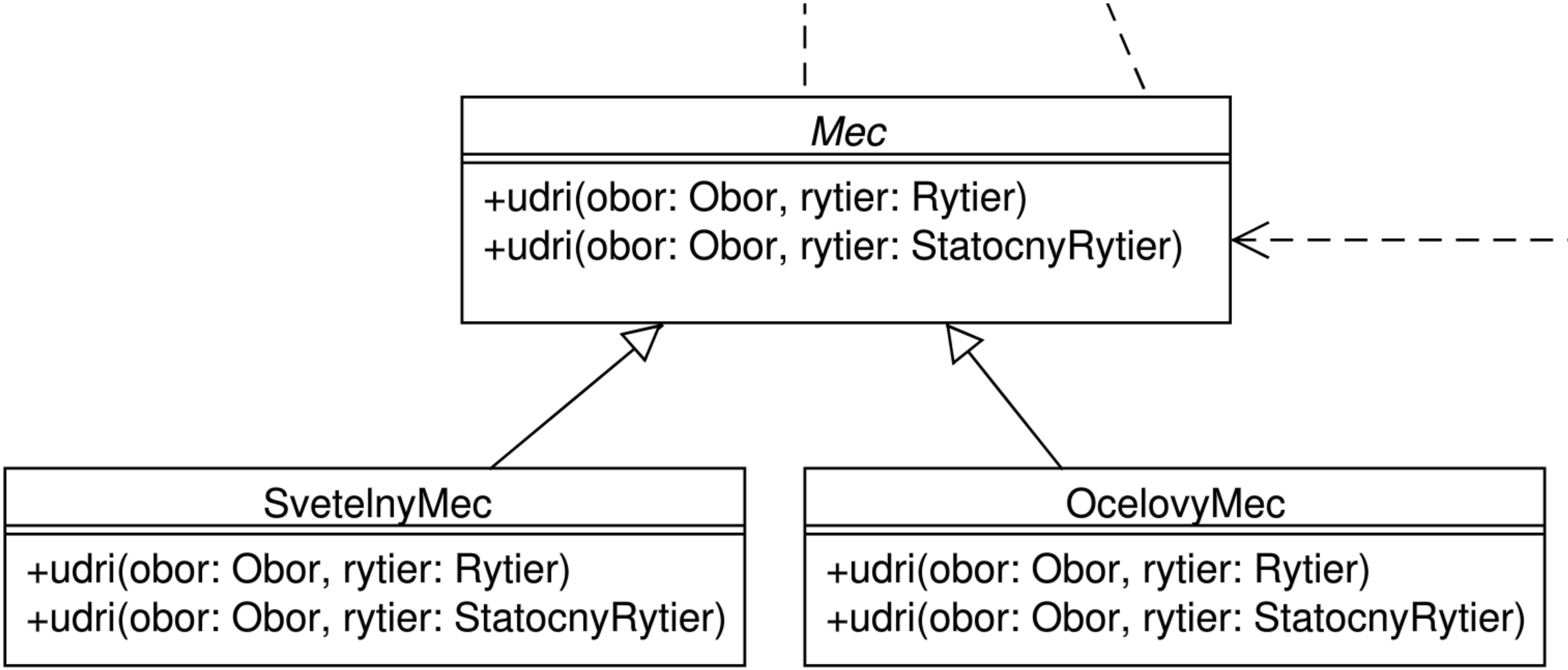
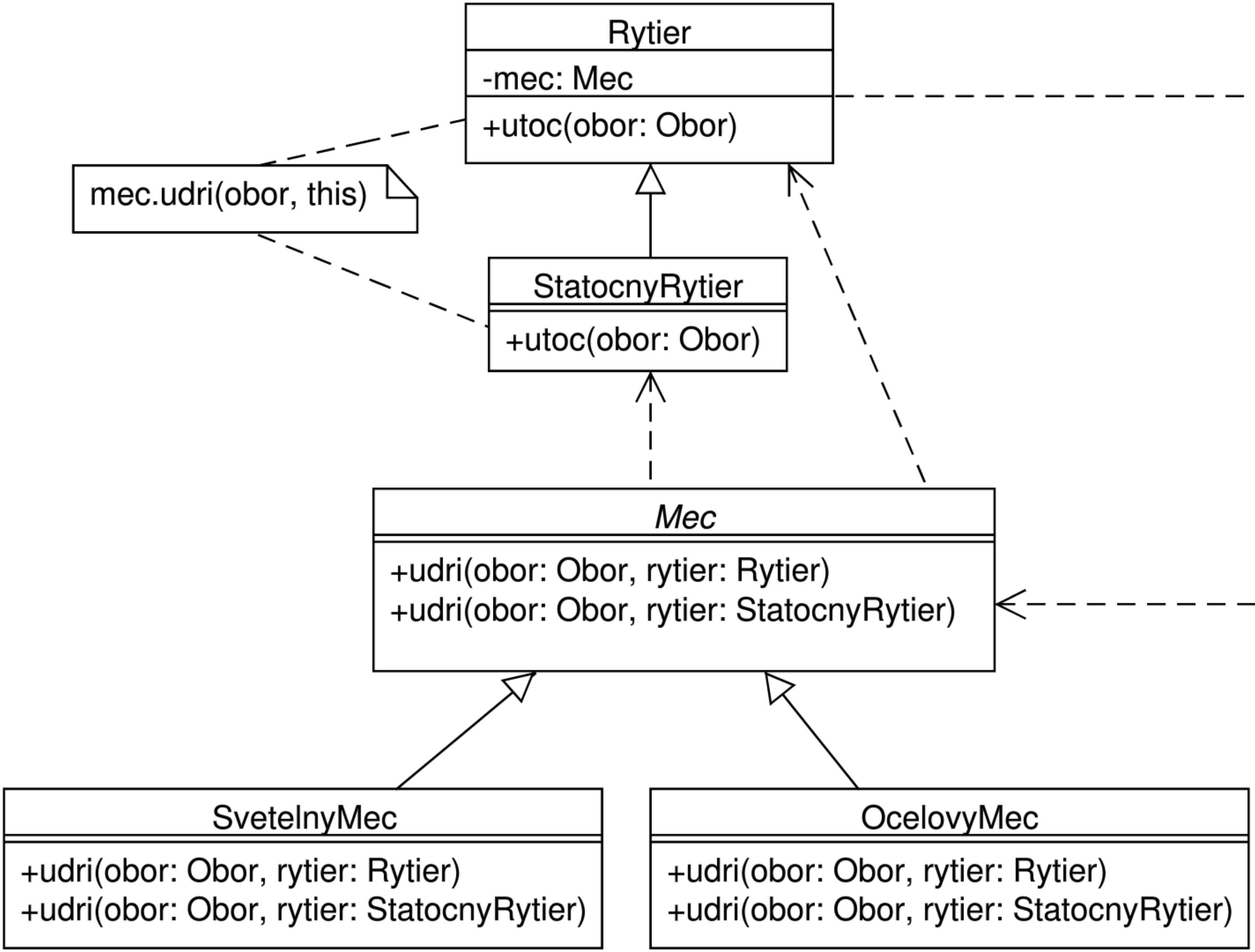

Rytier
-mec: Mec
+utoc(obor: Obor)
StatocnyRytier
+utoc(obor: Obor)


Mec
+udri(obor: Obor, rytier: Rytier)
+udri(obor: Obor, rytier: StatocnyRytier)
SvetelnyMec
+udri(obor: Obor, rytier: Rytier)
+udri(obor: Obor, rytier: StatocnyRytier)
OcelovyMec
+udri(obor: Obor, rytier: Rytier)
+udri(obor: Obor, rytier: StatocnyRytier)


Rytier
-mec: Mec
+utoc(obor: Obor)
mec.udri(obor, this)
StatocnyRytier
+utoc(obor: Obor)
Mec
+udri(obor: Obor, rytier: Rytier)
+udri(obor: Obor, rytier: StatocnyRytier)
SvetelnyMec
+udri(obor: Obor, rytier: Rytier)
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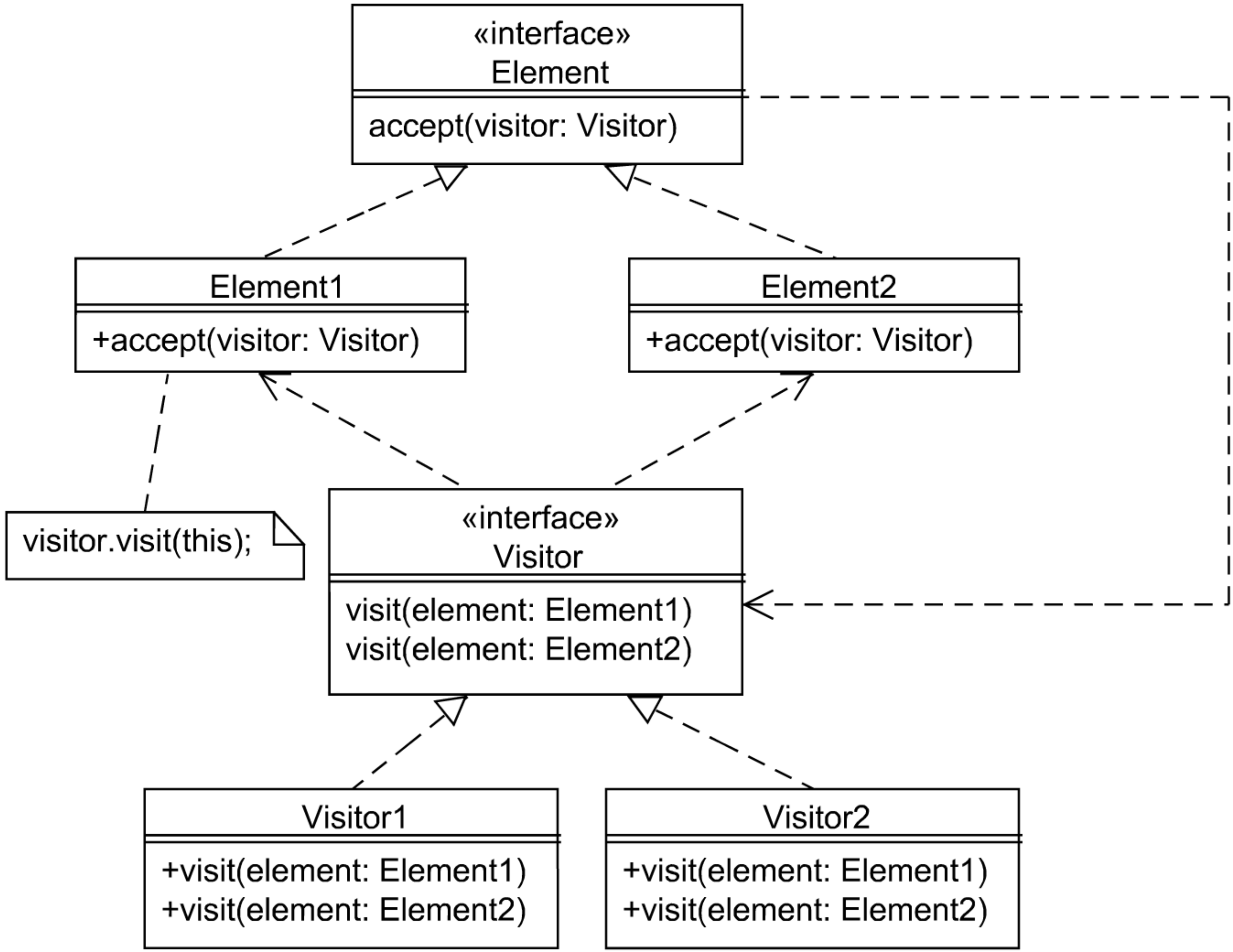
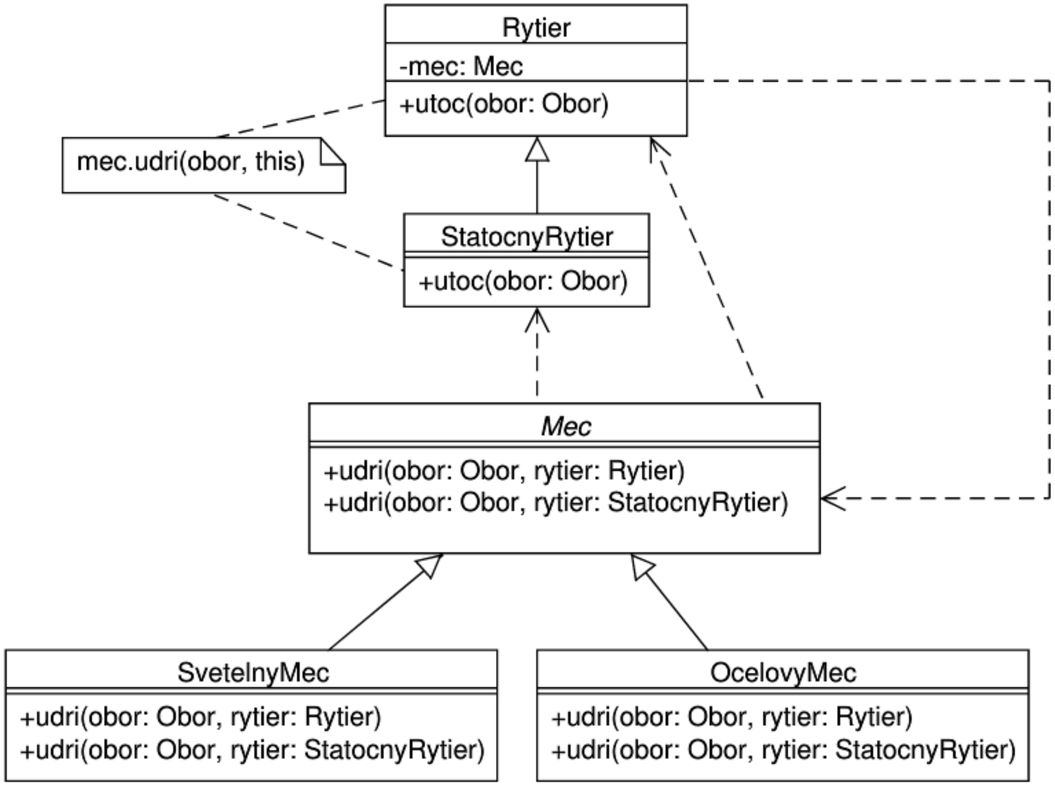
+udri(obor: Obor, rytier: Rytier)
+udri(obor: Obor, rytier: StatocnyRytier)


«interface»
Element
accept(visitor: Visitor)
Element1
+accept(visitor: Visitor)
Element2
+accept(visitor: Visitor)
visitor.visit(this);
«interface»
Visitor
visit(element: Element1)
visit(element: Element2)
Visitor1
+visit(element: Element1)
+visit(element: Element2)
Visitor2
+visit(element: Element1)
+visit(element: Element2)


Rytier
-mec: Mec
+utoc(obor: Obor)
mec.udri(obor, this)
StatocnyRytier
+utoc(obor: Obor)
Mec
+udri(obor: Obor, rytier: Rytier)
+udri(obor: Obor, rytier: StatocnyRytier)
SvetelnyMec
+udri(obor: Obor, rytier: Rytier)
+udri(obor: Obor, rytier: StatocnyRytier)
OcelovyMec
+udri(obor: Obor, rytier: Rytier)
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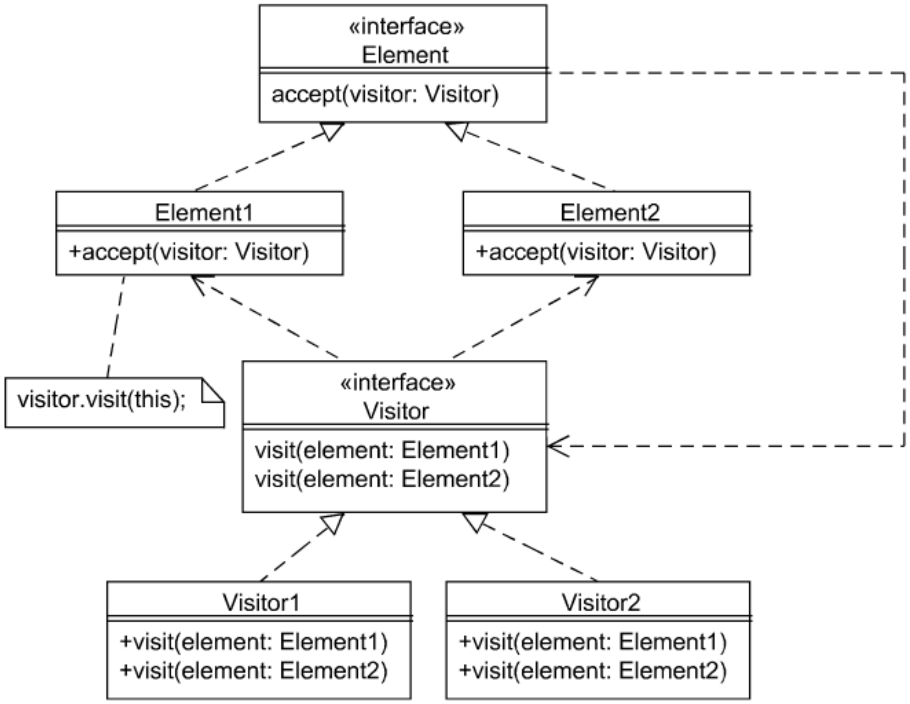
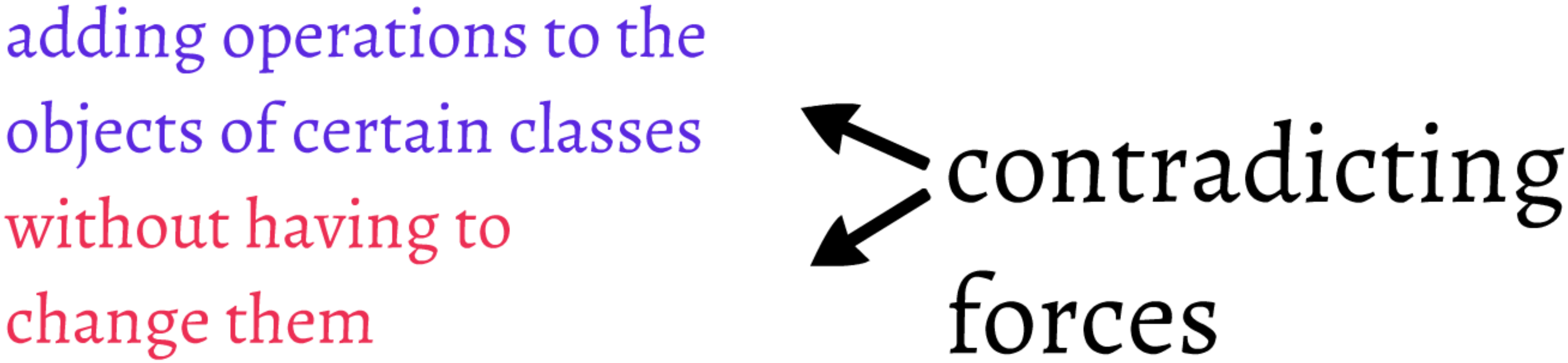

«interface»
Element
accept(visitor: Visitor)
Element1
+accept(visitor: Visitor)
Element2
+accept(visitor: Visitor)
visitor.visit(this);
«interface»
Visitor
visit(element: Element1)
visit(element: Element2)
Visitor1
+visit(element: Element1)
+visit(element: Element2)
Visitor2
+visit(element: Element1)
+visit(element: Element2)

Visitor

adding operations to the objects of certain classes without having to change them

Visitor



adding operations to the objects of certain classes

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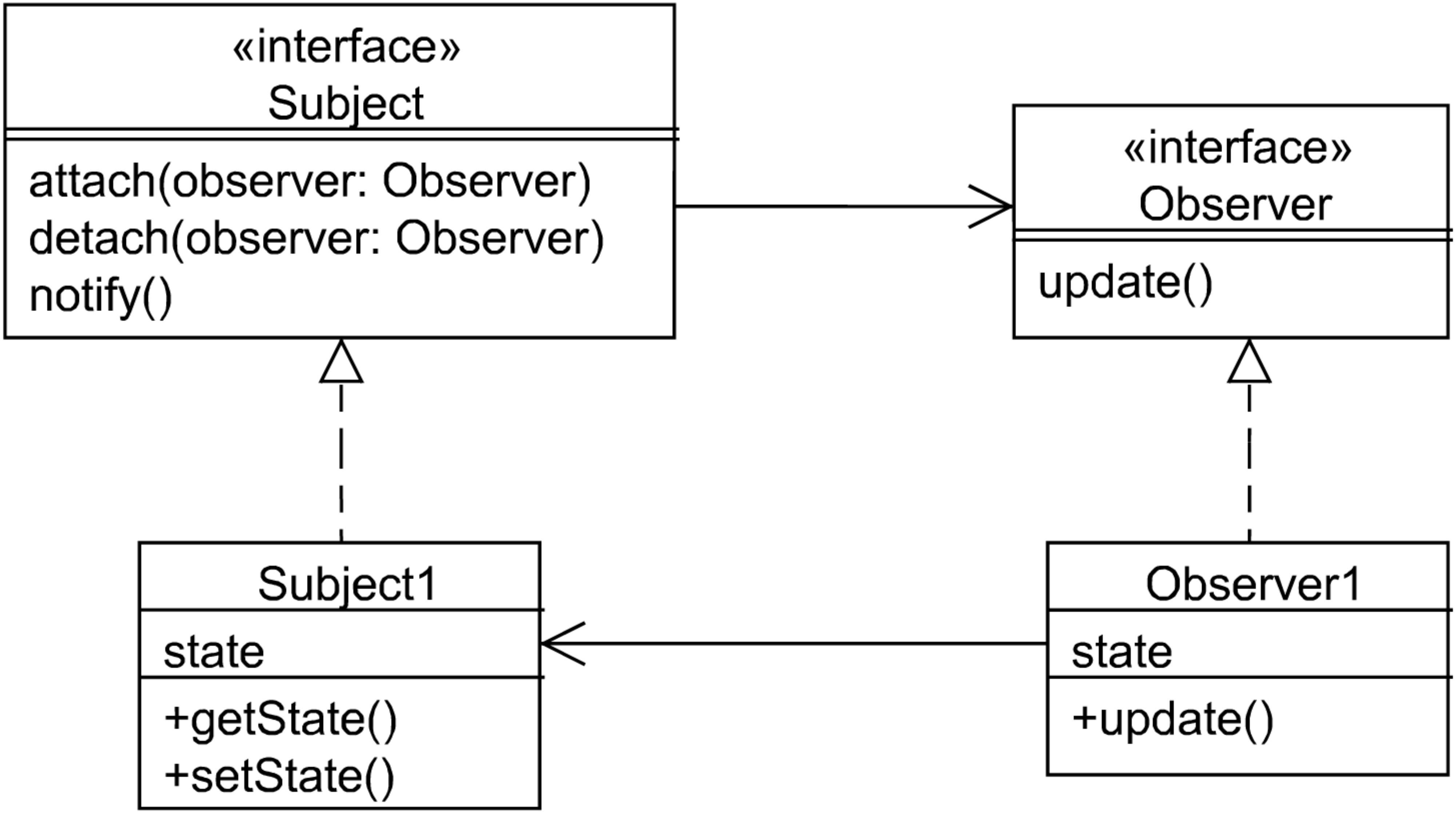
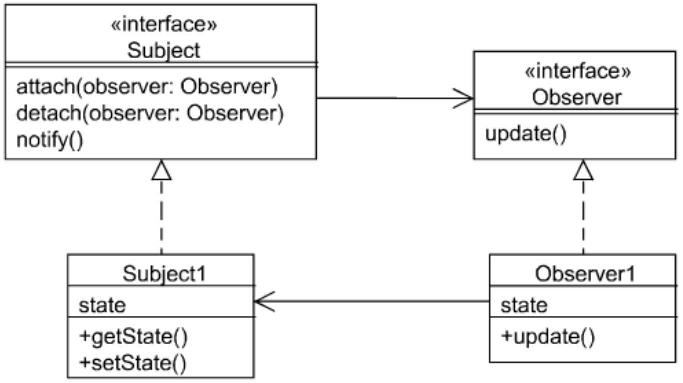
contradicting forces


«interface»
Subject
attach(observer: Observer)
detach(observer: Observer)
notify()
«interface»
Observer
update()
Subject1
state
+getState()
+setState()
Observer1
state
+update()

Observer



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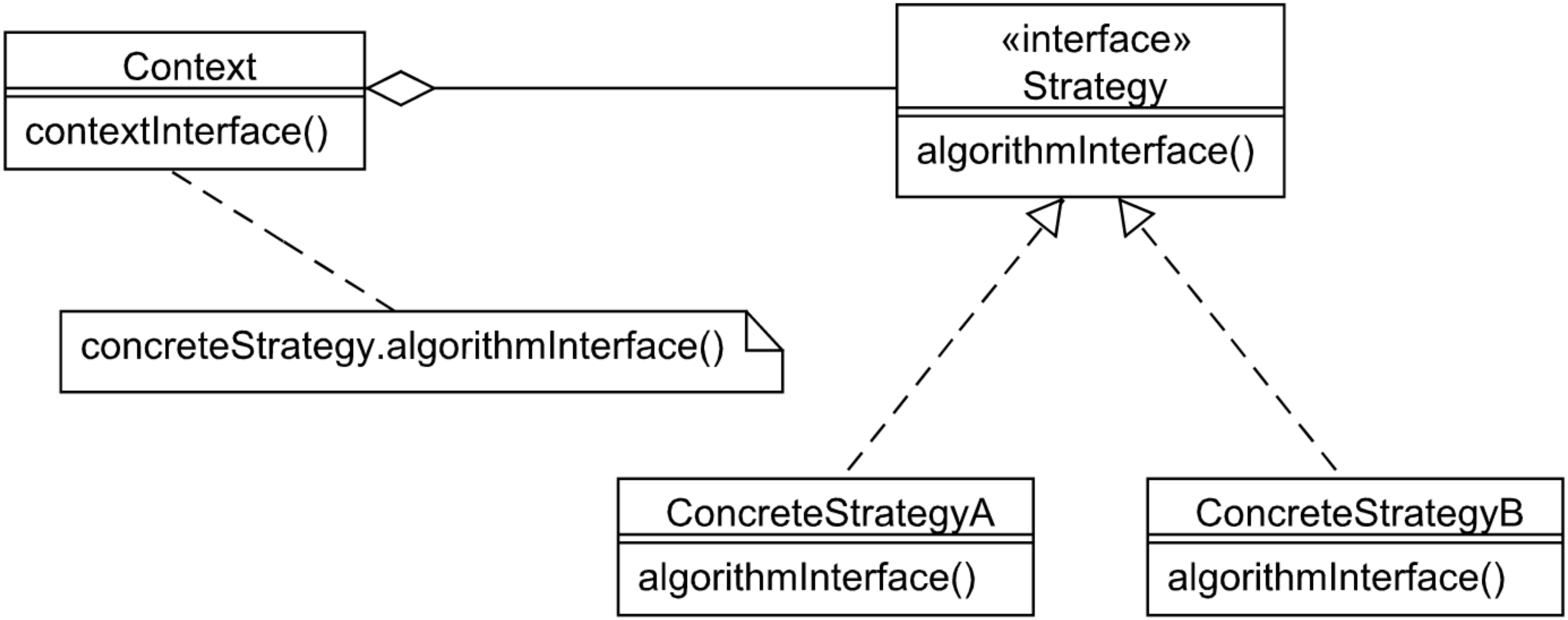
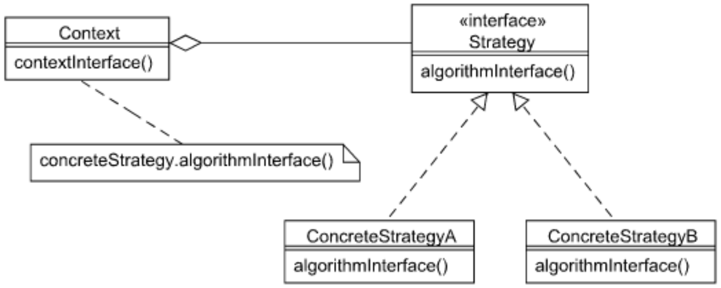

Context
contextInterface()
«interface»
Strategy
algorithmInterface()
concreteStrategy.algorithmInterface()
ConcreteStrategyA
algorithmInterface()
ConcreteStrategyB
algorithmInterface()



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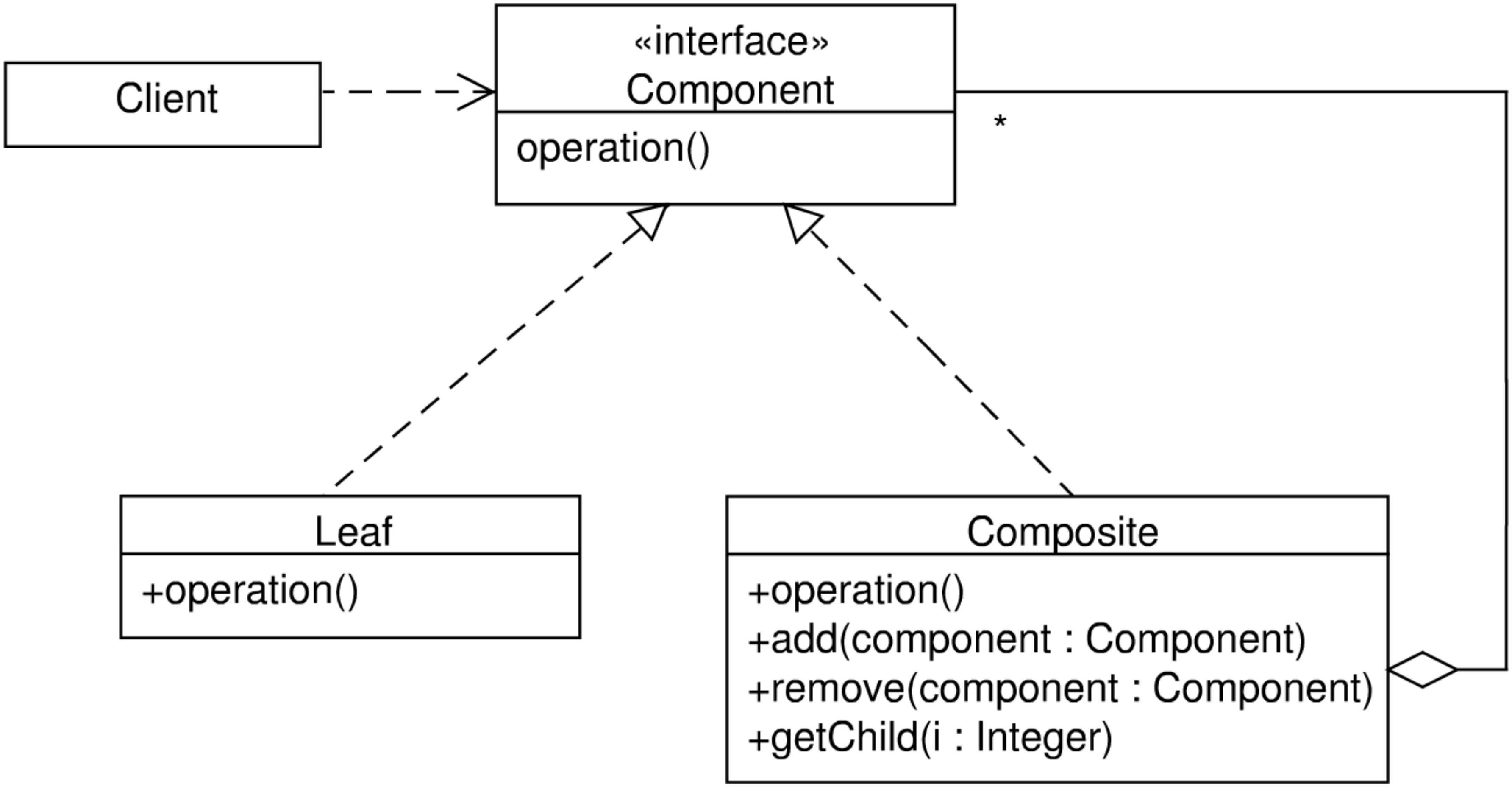
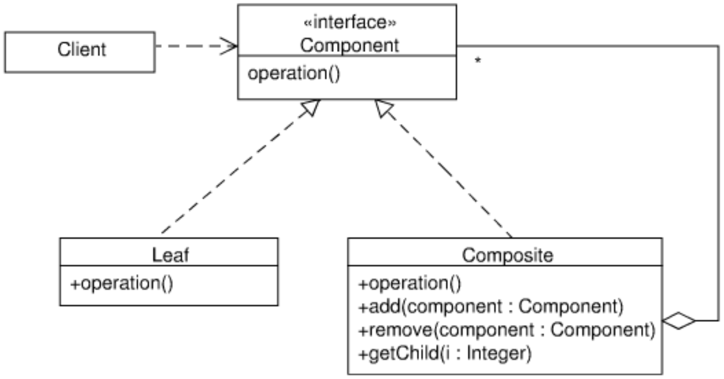

Client
«interface»
Component
operation()
*
Leaf
+operation()
Composite
+operation()
+add(component : Component)
+remove(component : Component)
+getChild(i : Integer)



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