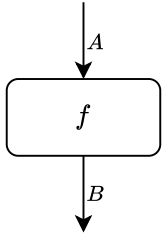
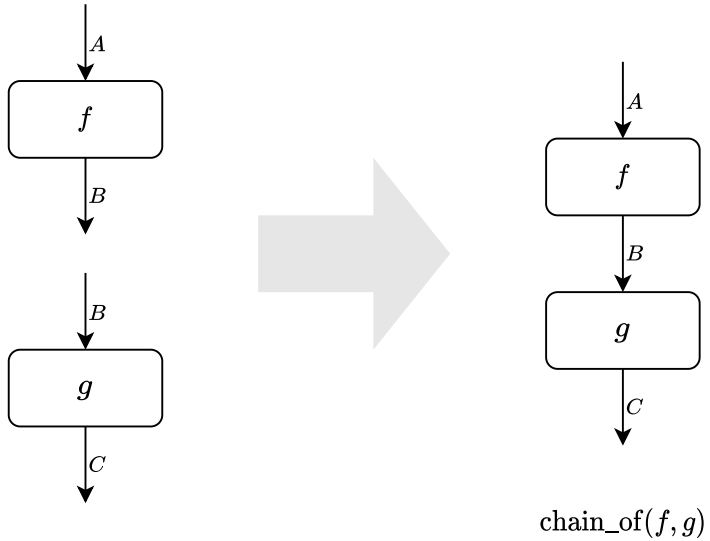


Transformation



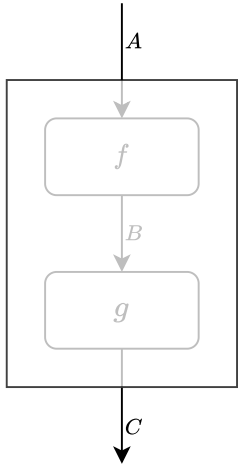
A transformation f
maps any input of type A
to the output of type B .

Composition



Transformations with compatible input and output
can be composed.

Composition is a Transformation



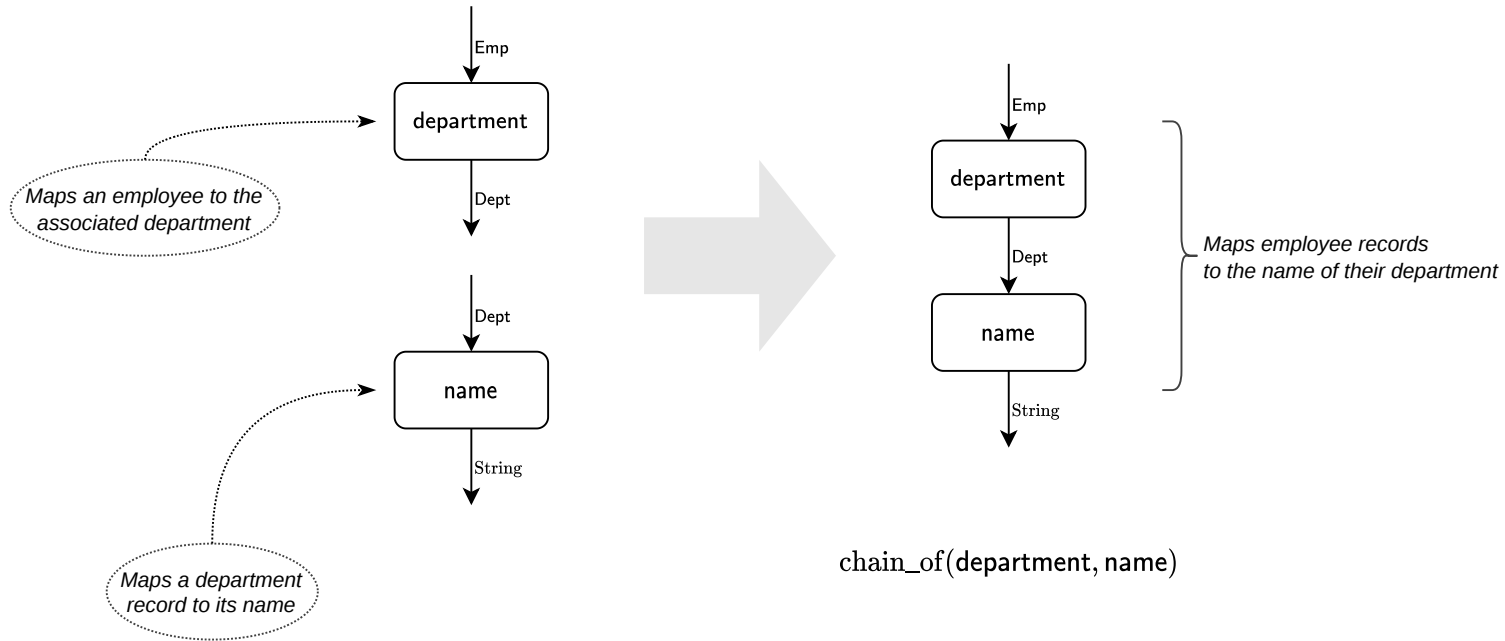
Crucially, composition of transformations is again a transformation.

Composition Combinator

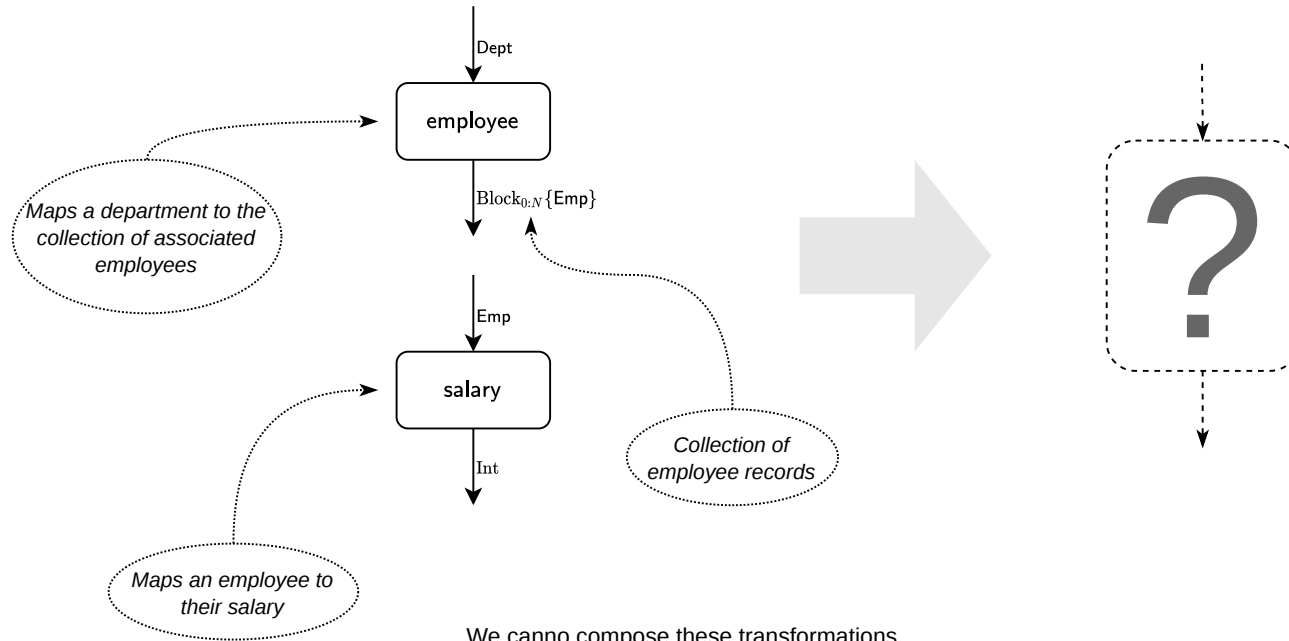


Composition `chain_of([], [])`
is a transformation combinator
with two arguments.

Example: Composition

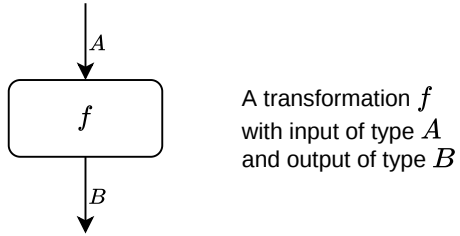


Counter-example: Plural Component

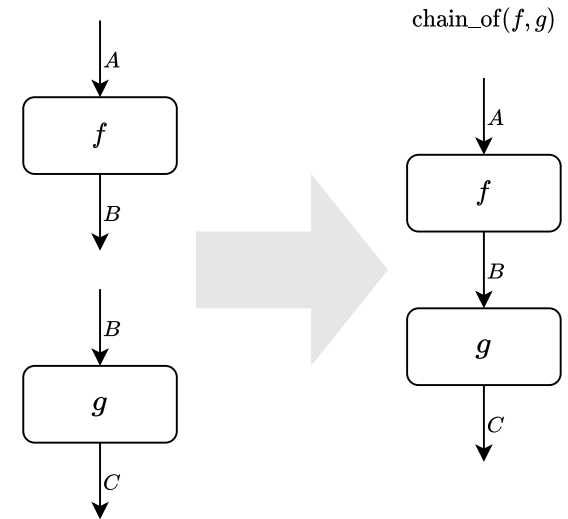


We cannot compose these transformations because their input and output do not quite match.

1. Transformation



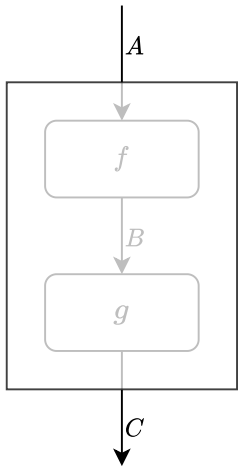
2. Composition



Transformations with compatible input and output can be composed

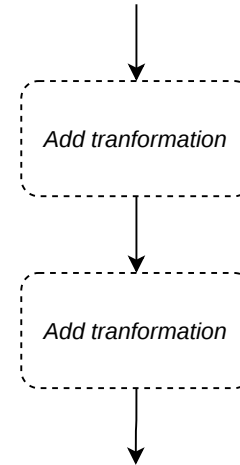
3. Composition is a Transformation

4. Composition Combinator



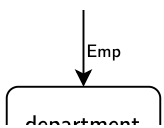
Trivially (but crucially),
a composition of transformations
is again a transformation

chain_of(,)



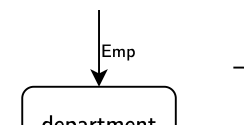
Composition is a transformation combinator
with two placeholders

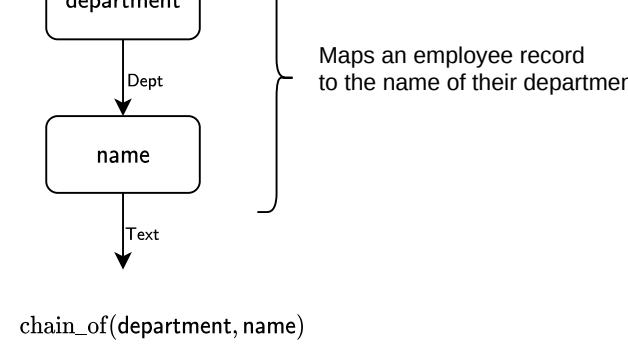
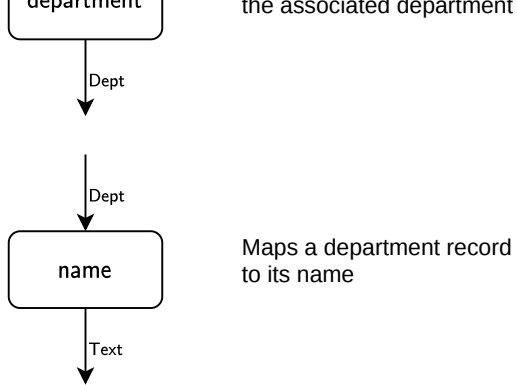
5. Example: Components of a Composition



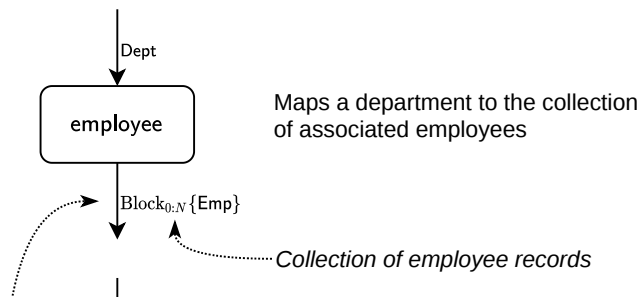
Maps an employee to

6. Example: Composition

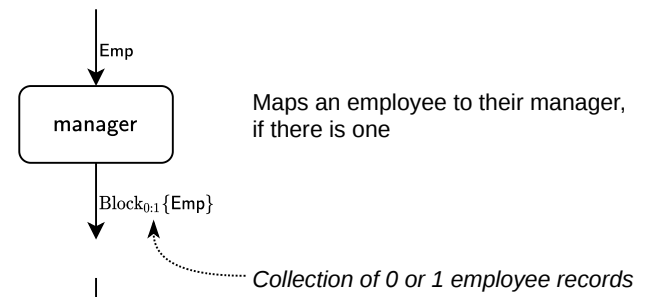




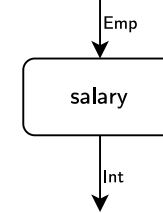
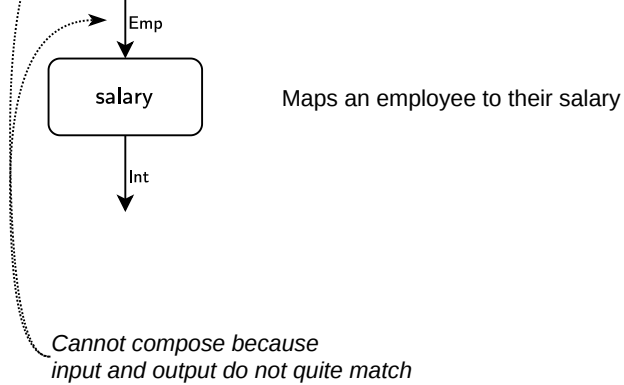
7. Counter-example: Plural Component



8. Counter-example: Optional

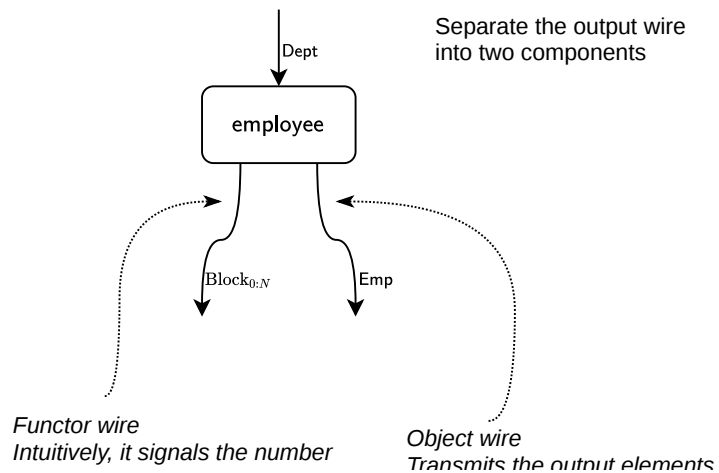


Component

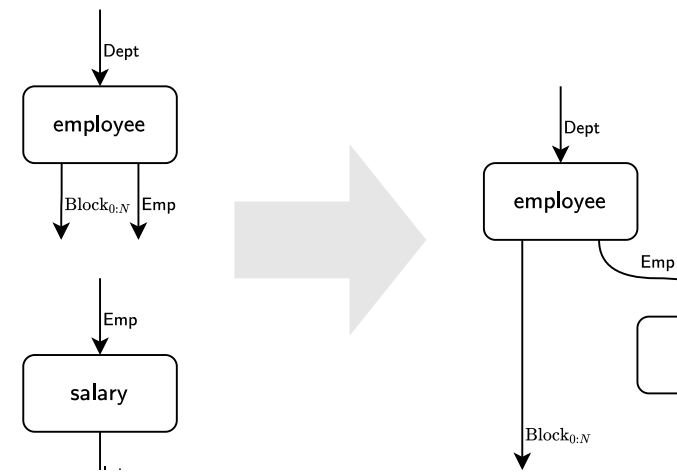


Can we represent composition of these transformations with an intuitive diagrammatic notation?

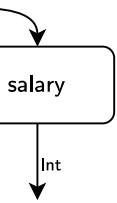
9. Idea: Unbundle the Wire



10. Idea: Compose Using the



Object Wire



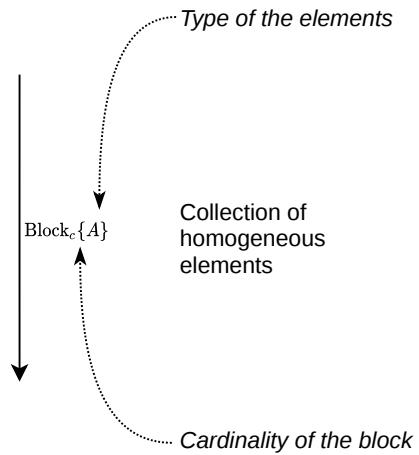
of output elements

transmits the output elements

Int
↓

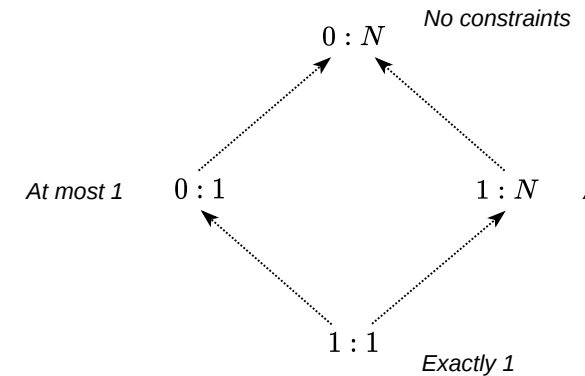
Attaching a transformation to the object wire indicates that the transformation is applied to each element of the collection

11. Block Type



12. Cardinality

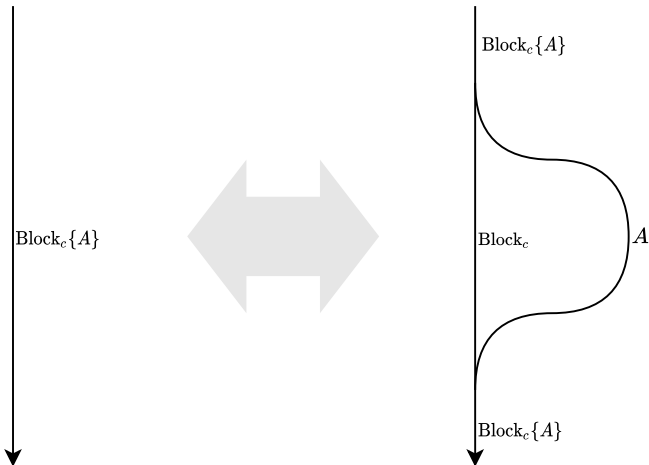
Cardinality is a constraint on the number of elements



ents in a block

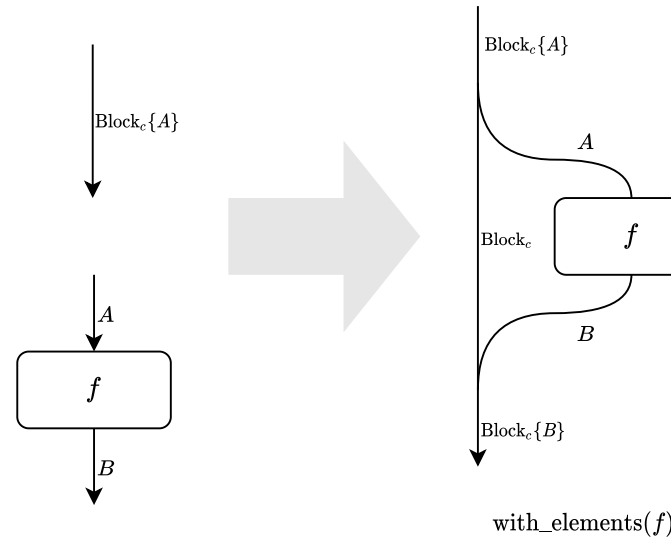
At least 1

13. Unbundling



We can unbundle a wire of a block type into a functor and object components

14. Object Transformation



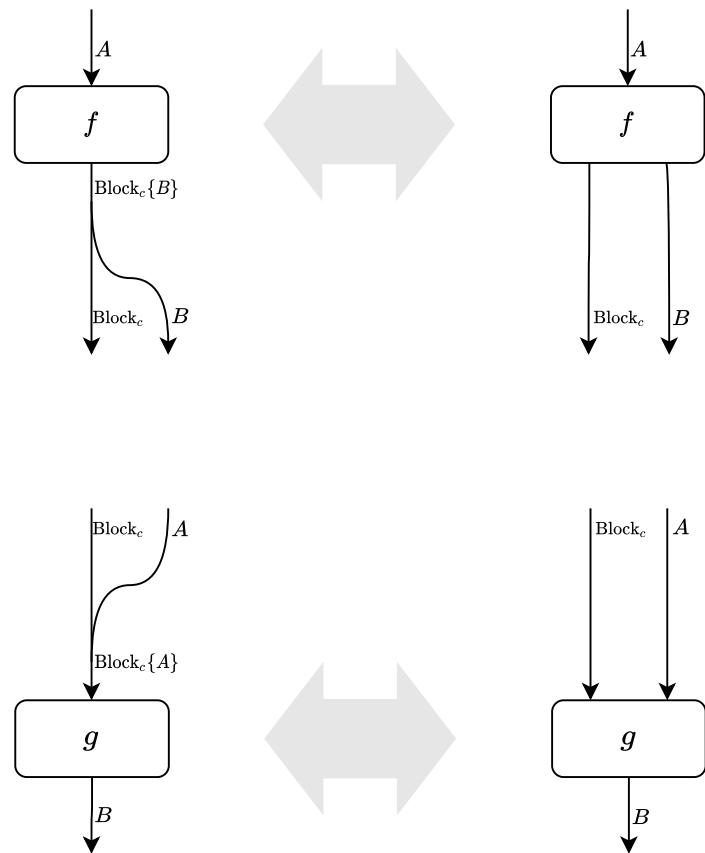
Then any compatible transformation can be applied to the object f , which indicates that the transformation is applied to every element of the block



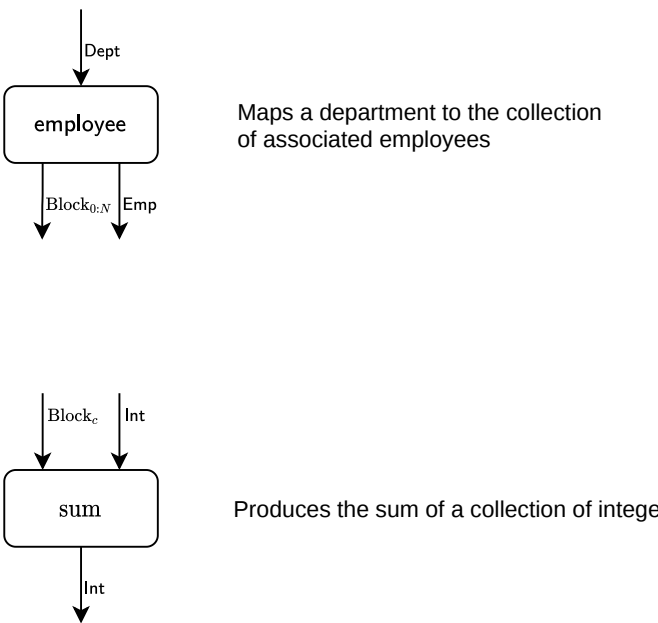
)

t wire,
ent

13. Multiwired transformations



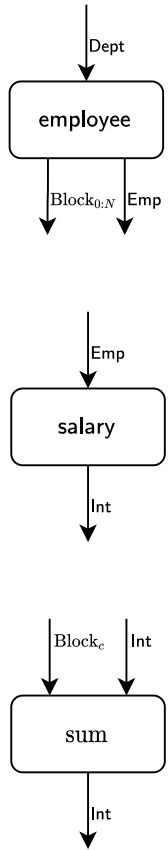
14. Example: Multiwired Trans



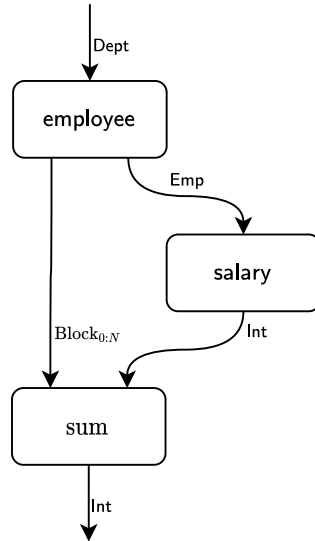
sformations

ers

14. Example: Multiwired Composition

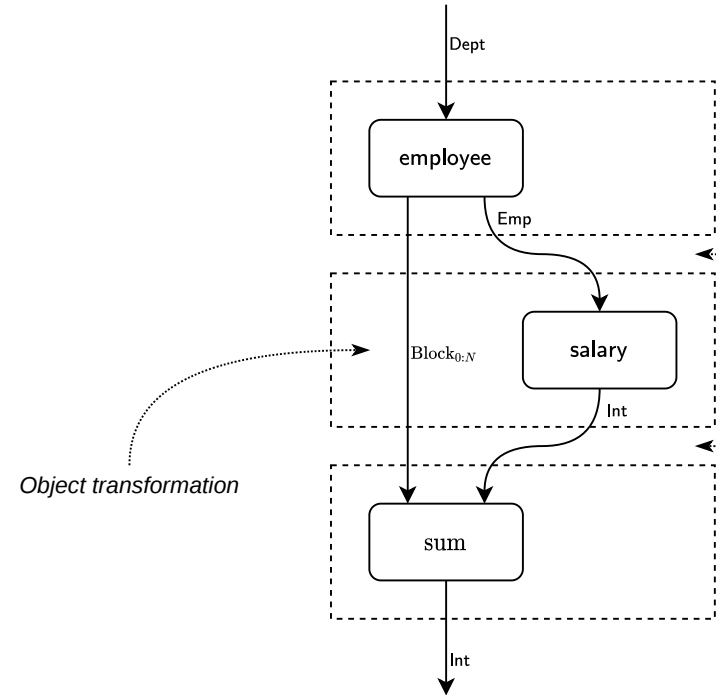


Total sum of salaries in a given department



`chain_of(employee, with_elements(salary), sum)`

15. Example: Details



`chain_of(employee, with_elements(salary), sum)`



Composition

sum)