Some discussions on Visitor

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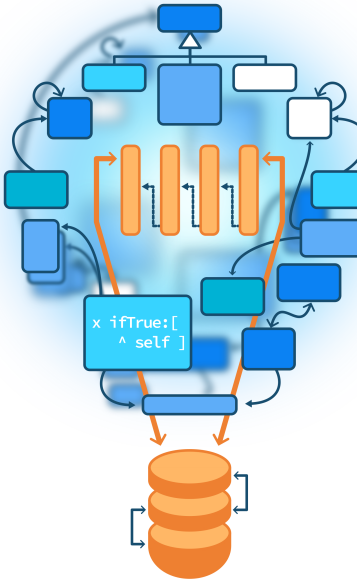


Goals

More on Visitor:

- Variations on navigation control
- Visitor detractors
- Visit methods granularity
- About double dispatch shortcutting
- ...

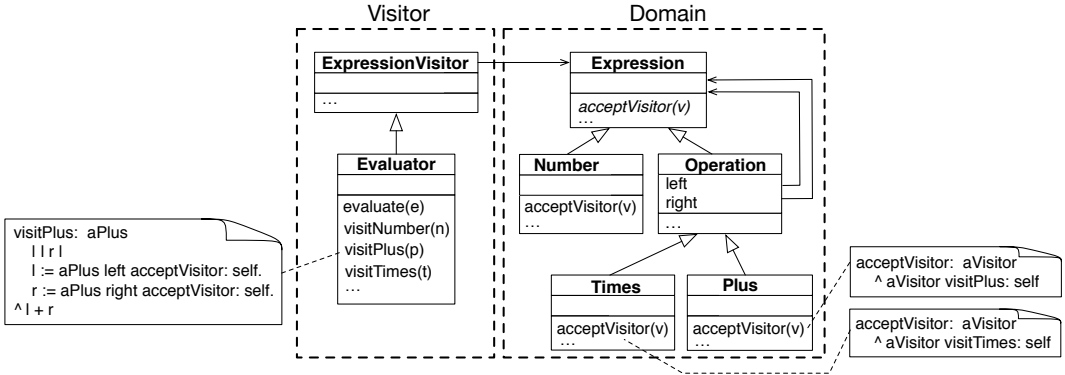
Controlling the traversal

A visitor embeds a structure traversal that can be implemented:

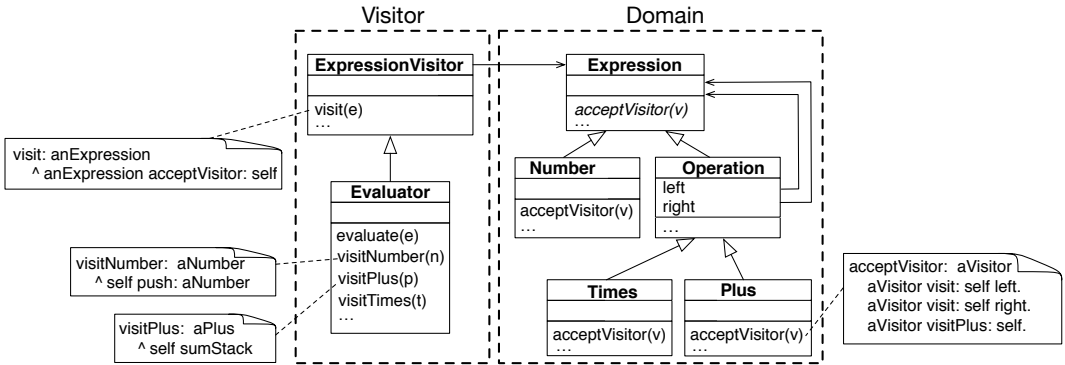
- in the visitors
- in the domain elements themselves

Usually the visitor controls the traversal but maybe the domain elements are more important

Visitor in control



Items in control



Visitor detractors

Visitor is not object-oriented because it externalizes behavior out of objects.

- Yes, operations applied to objects are defined outside themselves
- Are you ready to lose:
  - **clear separation** between operations related state and domain object state?
  - the possibility to **package multiple** behaviors **separately**?
  - the **incremental definition** of new operations?

Visitor vs. class extension

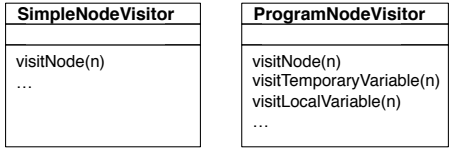
- Pharo supports class extension
  - i.e. defining methods on a class in another package than the class package

Should we use class extension instead of a Visitor?

- No, using a Visitor is better because:
  - Each Visitor **encapsulates a complex operation**
  - Each Visitor has its **own** state

Visit methods granularity

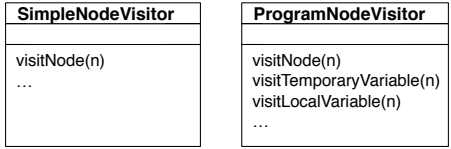
Compare these two Visitors:



- SimpleNodeVisitor only provides visitNode which is very high-level
  - retrieving temporary variables would require testing and filtering nodes
- ProgramNodeVisitor has richer API
  - visitTemporaryVariable is only invoked on temporaries

Visit methods encode a context

- The granularity of visit methods has an impact
- Each **visit*** method provides a contextualized hook
- A too high-level API requires a lot of tests
- A too specialized API spreads information over multiple visit methods which is not good too
  - retrieving all variables involve a lot of hooks: visitTemporaryVariable, visitLocalVariable, ...



About shortcutting the double dispatch

```
RBProgramNodeVisitor >> visitSequenceNode: aSequenceNode
  aSequenceNode statements do: [ :each | self visitVariable: each ]
```

Direct use of visitVariable:

- shortcuts the double dispatch
- does not let the domain decide
- prevents the use of a more specialized API: visitLocalVariable, visitTemporaryVariable, visitInstanceVariable

```
RBProgramNodeVisitor >> visitSequenceNode: aSequenceNode
  aSequenceNode statements do: [ :each |
    each acceptVisitor: self ]
```

Should we promote collections as domain nodes?

- When we iterate on a collection of nodes, the collection is not part of the composite domain
- Should we turn such a collection into a domain element?
- Not necessarily, it depends
  - can you change the domain?
  - think in terms of the benefit e.g., having the possibility to define visitArrayOf...

Building generic Visitors is difficult

There is no definitive solution. Usually, it is better to:

- have an abstract visitor
- redefine most of the logic per families of tasks

Visit methods and static types

Two alternatives to implement visit methods in statically-typed languages:

- Using overloading
  - e.g., visit(Number), visit(Plus), visit(Times)
- Using different methods
  - e.g., visitNumber(Number), visitPlus(Plus), visitTimes(Times)

Avoid using overloading because:

- you will have to explicitly cast your objects everywhere
- you might have the wrong method executed (overload vs override)

Conclusion

- Visitor can be tricky to master
  - using accept/visit vocabulary helps readability
- Visitor is powerful for complex structure operations
  - it provides a **pluggable recursive treatment** of a composite structure

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