

# Tecniche di Progettazione: Design Patterns

GoF: Interpreter

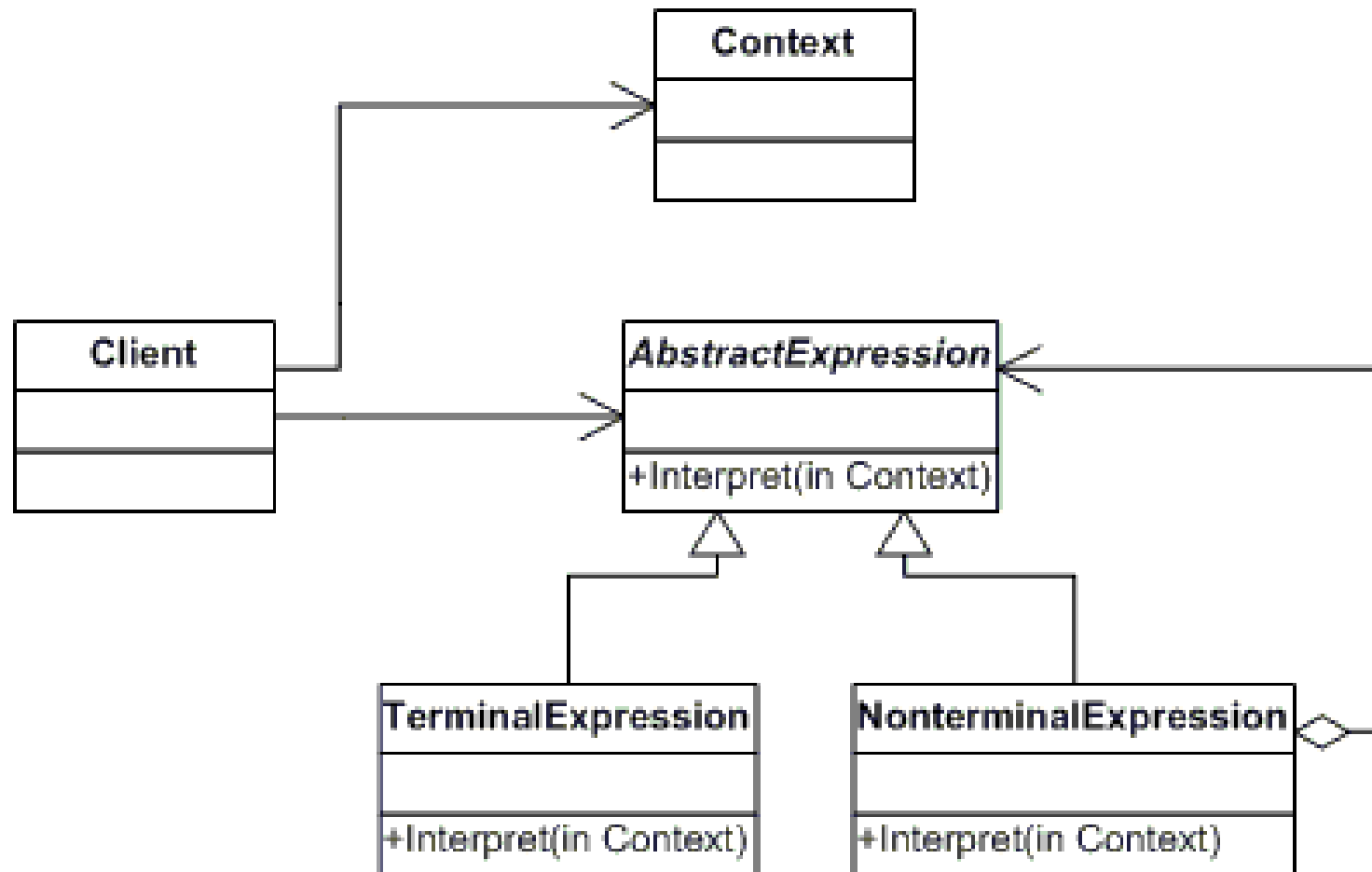
# Intent

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Given a language, define a representation for its grammar along with an interpreter that uses the representation to interpret sentences in the language.

# Structure of Interpreter

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# Flow of Interpreter

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- ▶ Take the Abstract Syntax Tree
- ▶ Interpret the tree (in a given Context)
  - ▶ Each non-terminal node will interpret its children and return a result from that.
  - ▶ Terminal nodes return actual values for non-terminal nodes to use.
  - ▶ The context serves as a global data for interpreting the entire tree

# Consequences

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## Good

- ▶ It's easy to change and extend the grammar
- ▶ Implementing the grammar is easy
- ▶ Easy to evaluate an expression in a new way

## Bad

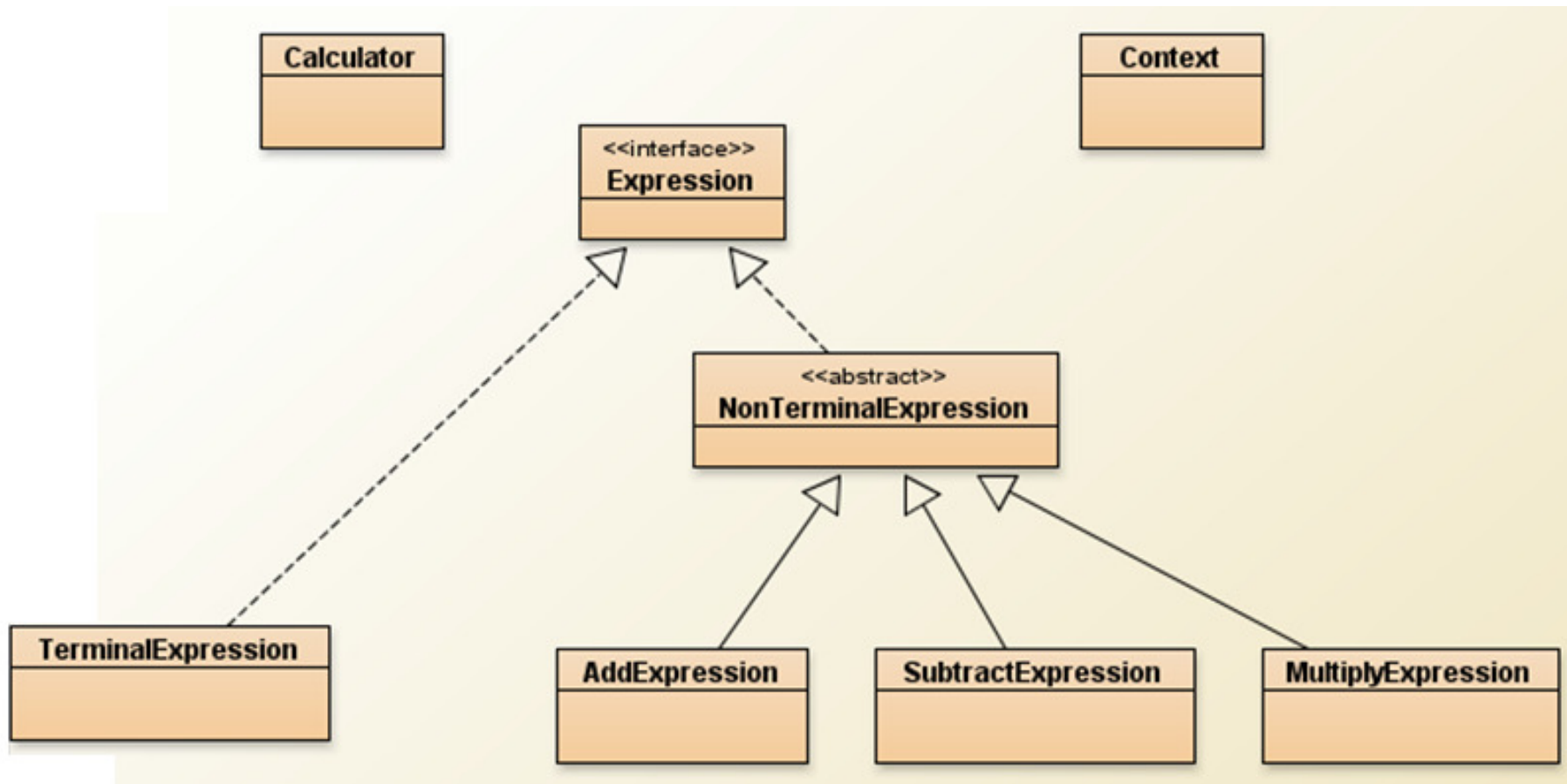
- ▶ Complex grammars are hard to maintain
  - ▶ One class for each rule

# Example: Calculator

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- ▶ <http://www.java2s.com/Code/Java/Design-Pattern/InterpreterPatternCalculator.htm>
  - ▶ ill-defined because it also performs parsing and syntactic tree construction.
  - ▶ The interpreter starts from the tree.
  - ▶ Redefined in NewCalculator (InterpreterCalculator)
  
- ▶ Another example in:  
[http://www.dofactory.com/Patterns/PatternInterpreter.aspx#\\_self2](http://www.dofactory.com/Patterns/PatternInterpreter.aspx#_self2)

# Interpreter: Calculator



# Related Patterns

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- ▶ **Composite**

- ▶ Abstract syntax tree is an instance of Composite Pattern

- ▶ **Flyweight**

- ▶ Shows how to share terminal symbols within the abstract syntax tree

- ▶ **Iterator**

- ▶ The interpreter can use an iterator to traverse the structure

- ▶ **Visitor**

- ▶ Can be used to implement the method interpret: the interpreter is in a separate Visitor object.



# Homework: Boolean

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- ▶ Define an interpreter for boolean expressions.
- ▶ The interpretation must be an integer: "1" for true a "0" for false.
- ▶  $E ::= \text{true} \mid \text{false} \mid E \text{ and } E \mid E \text{ or } E \mid \text{not } E \mid (E)$