



COMPILER CONSTRUCTION:

CC 5-1: ANTLR TREE VISITORS

22 MAY 2019

MODULE 8: PROGRAMMING PARADIGMS



ANTLR TREE LISTENERS (REMINDER)

- Tree walker visits all nodes of parse tree in fixed order
 - *Pre-order* traversal through `enter`-methods
 - *Post-order* traversal through `exit`-methods
 - Parse tree node passed as `Context`-parameter
- Attribute passing using `ParseTreeProperty` fields
 - *Inherited* attributes: compute values *for* children in `enter`-methods
 - *Synthesized* attributes: compute values *from* children in `exit`-methods
- Generated code
 - `GrammarListener`: interface
 - `GrammarBaseListener`: default implementation, methods all empty

POWER TO THE PEOPLE: ANTLR TREE VISITORS

- Order of visit entirely up to programmer
 - One `visit`-method per non-terminal (or tag)
 - Explicitly calls `visit`-methods of children in parse tree
 - Parse tree node passed as `Context`-parameter (as before)
 - User-determined (generic) return type
- Attribute passing using `ParseTreeProperty` fields *or return value*
 - *Inherited* attributes: compute values *for* children before calling their `visit`
 - *Synthesized* attributes: compute values *from* children after calling their `visit`
 - Optionally use return value for synthesized attributes
- Generated code
 - `GrammarVisitor<T>`: interface
 - `GrammarBaseVisitor<T>`: default implementation
 - All methods call `visitChildren`
 - Return value of node = return value of last child
 - `T`: generic return type of `visit`-methods

DEMO: CALCULATOR

- Listener-based (known)
 - `ListenerCalc`
- Visitor-based (new)
 - `VisitorCalc`

LISTENERS VERSUS VISITORS

- Characteristics of listeners
 - Easier to use (you do not have to program traversal order)
 - Require auxiliary `TreeWalker`
 - Require `ParseTreeProperty` for every attribute
- Characteristics of visitors
 - More flexible (you can determine own traversal order)
 - More room for error (you can more easily forget to visit children, order not fixed)
 - Return values for passing (synthesized) values upwards