



Compilers

Abstract Syntax Trees

- A parser traces the derivation of a sequence of tokens
- But the rest of the compiler needs a structural representation of the program
- Abstract syntax trees
 - Like parse trees but ignore some details
 - Abbreviated as AST

- Consider the grammar

$$E \rightarrow \text{int} \mid (E) \mid E + E$$

- And the string

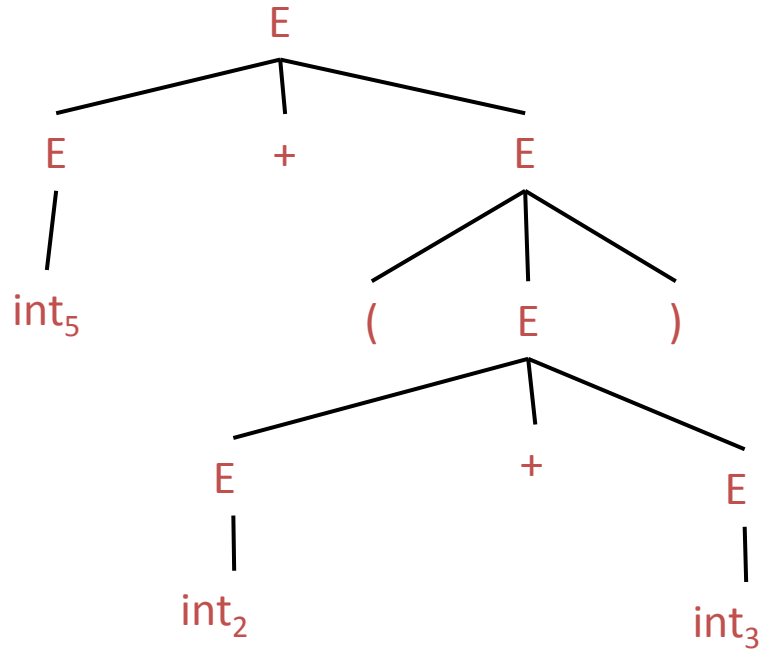
$$5 + (2 + 3)$$

- After lexical analysis (a list of tokens)

$$\text{int}_5 \text{ ' + ' } (\text{ ' int}_2 \text{ ' + ' int}_3 \text{ ') '}$$

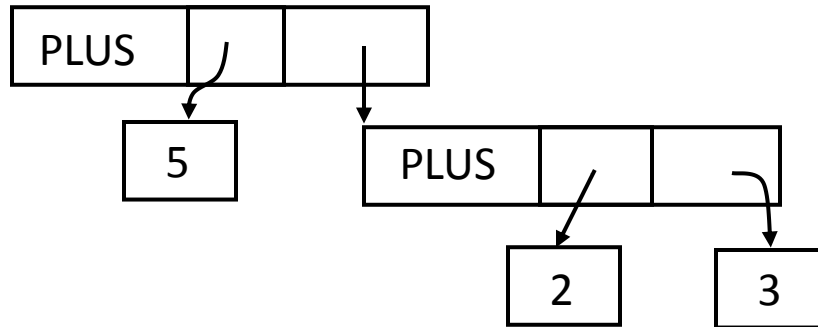
- During parsing we build a parse tree ...

Abstract Syntax Trees



- A parse tree:
- Traces the operation of the parser
- Captures nesting structure
- But too much information
 - Parentheses
 - Single-successor nodes

Abstract Syntax Trees



- Also captures the nesting structure
- But abstracts from the concrete syntax
=> more compact and easier to use
- An important data structure in a compiler