Lecture 13

Semantics Analysis

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Take aways from the last class

- LR(1) parse table

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- LALR Parse Table

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- Parser Generator

Semantic Analysis

- Check semantics

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  - An identifier may be usable in one part of the program but not another

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- Methods in a class are not multiply defined

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  - Use code for attribute value computation

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- It may store information in symbol table

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- The synthesized attribute of Node `N` can be defined using inherited attributes of Node `N`
- Inherited attribute of Node `N` can not be defined using attribute of child of Node `N`
- Terminal can have only synthesized attributes (calculated from lexical phase). No SDD rules for computing attributes of terminal

Example

- Consider a grammar for signed binary numbers
  $Number \rightarrow sign \quad list$
  $sign \rightarrow +|-$
  $list \rightarrow list \quad bit|bit$
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Symbol	Attribute
number	value
sign	negative
list	position, value
bit	position, value

Attribute Rules

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number $\rightarrow$ sign list	$list.position \leftarrow 0$
	`if sign.negative`
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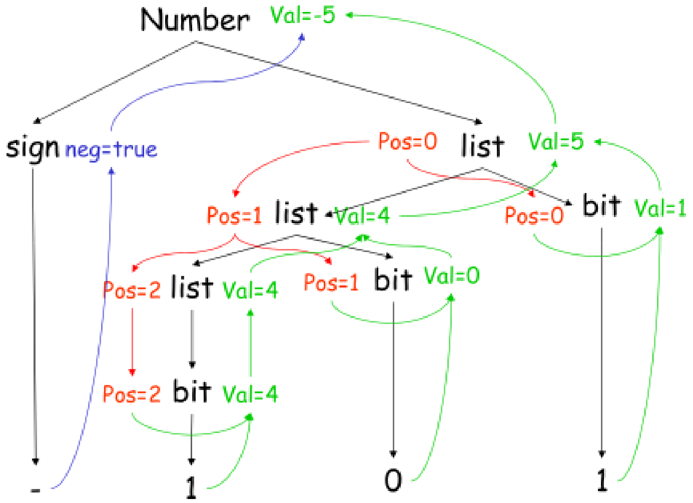
bit $\rightarrow$ 0	bit.value $\leftarrow$ 0
bit $\rightarrow$ 1	bit.value $\leftarrow 2^{bit.position}$

Parse tree and the dependence graph


Number
Val=-5
sign
neg=true
Pos=0
list
Val=5
Pos=1
list
Val=4
Pos=0
bit
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list
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1
0
1