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Homework

Saturday, February 12, 2022 3:18 PM

Precedence of operators

$9+5*2$

$(9+5)*2$ or $9+(5*2)$?

Homework:
a) Build a grammar for arithmetic expressions $(+, -, *, \div)$

Solution

$+, -$
$*, /$ ↓ precedence

Since we have $n=2$ levels of precedence, we need $n+1$ Nonterminals for the grammar:

1. piece
2. term
3. expression

} from lowest to highest level of precedence

To define the grammar, we will use the productions:

1. expression → expression + term | expression − term | term
2. term → term / piece | term * piece | piece
3. piece → digit
4. digit → 0|1|2|3|...|∞

Note: it is current_nonterminal, operator, higher_precedence_nonterminal) since current_nonterminal $(+, -, /, *)$ are left associative, and thus they are similar to lists that associate to the left: list → list + digit.

b) Build the grammar for the statements (propositions) missing in example 2, prop.
Example 2: Sequence of statements (propositions) separated by ; that are inside blocks of begin and end.
Solution: Consider: (if, if else, while, for, do while, switch)

block → begin props_opt end
props_opt → list_props | ε
list_props → list_props ; prop | prop
prop → if (expr) stmt;
| if (expr) stmt; else stmt;
| while (expr) stmt;
| do stmt; while (expr);
| swith (id) case (digit) stmt; default stmt;
| for (expr) stmt
stmt → id = expr | expr | ε
expr → expr + term | expr − term | term
term → term / piece | term * piece | piece
piece → digit
digit → 0 | 1 | 2 | 3 | ... | ∞