Tutoriaal 5

Rekenaarwetenskap 324
Teoretiese Rekenaarwetenskap

Doel van Tutoriaal

Die volgende onderwerp word in hierdie tutoriaal aangespreek:

- LL(1) grammars

LL(1) grammars

Vraag 1

Is the grammar $A \rightarrow a\ A\ a \mid \varepsilon$ LL(1)? Why or why not?

Vraag 2

Given the follow grammar:

$stmt\text{-}sequence \rightarrow stmt\ stmt\text{-}seq'$
$stmt\text{-}seq' \rightarrow ;\ stmt\text{-}sequence \mid \varepsilon$
$stmt \rightarrow \mathbf{s}$

(a) Calculate the First Sets of the nonterminals.
(b) Calculate the Follow Sets of the nonterminals.
(c) Calculate the LL(1) parsing table.

Vraag 3

Given the follow grammar:

$exp \rightarrow term\ exp'$
$exp' \rightarrow addop\ term\ exp' \mid \varepsilon$
$addop \rightarrow + \mid -$
$term \rightarrow factor\ term'$
$term' \rightarrow mulop\ factor\ term' \mid \varepsilon$
$mulop \rightarrow *$
$factor \rightarrow (\ exp\ ) \mid \mathbf{number}$

(a) Given that:
First(exp)=$\{(, \mathbf{number}\}$
First(exp')=$\{\varepsilon, +, -\}$
First($addop$)=$\{+, -\}$
First($term$)=$\{(, \mathbf{number}\}$
First($term'$)=$\{*, \varepsilon\}$
First($mulop$)=$\{*\}$
First($factor$)=$\{(, \mathbf{number}\}$

and
Follow(exp)=$\{\$,)\}$
Follow(exp')=$\{\$,)\}$
Follow($addop$)=$\{(, \mathbf{number}\}$
Follow($term$)=$\{\$, +, -,)\}$
Follow($term'$)=$\{\$, +, -,)\}$
Follow($mulop$)=$\{(, \mathbf{number}\}$
Follow($factor$)=$\{\$, *, +, -,)\}$

(a) Calculate the LL(1) parsing table.
(b) Show the actions of the parser to recognize the arithmetic expression
$\mathbf{number} + \ \mathbf{number} * \ \mathbf{number} - \ \mathbf{number}$

Vraag 4

(a) Can an LL(1) grammar be ambiguous? Why or why not?
(b) Can an ambiguous grammar be LL(1)? Why or why not?
(c) Must an unambiguous grammar be LL(1)? Why or why not?