TDT4205: Problem Set 2

Compiler Construction

Neshat Naderi

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Task 1

Pascal expressions abstrected into grammer as below:
$E \rightarrow S|SrS$
$S \rightarrow T|IT|SaT$
$T \rightarrow F|TmF$
$F \rightarrow i|n$
$I \rightarrow p|m$

FIRST and FOLLOW sets

Using algorithms for finding FIRST and FOLLOW sets, table 1 is created.

	a	i	m	n	p	r	$
E		$E \rightarrow S$ $E \rightarrow SrS$	$E \rightarrow S$ $E \rightarrow SrS$	$E \rightarrow S$ $E \rightarrow SrS$	$E \rightarrow S$ $E \rightarrow SrS$		
S		$S \rightarrow T$ $S \rightarrow SaT$	$S \rightarrow IT$ $S \rightarrow SaT$	$S \rightarrow T$ $S \rightarrow SaT$	$S \rightarrow IT$ $S \rightarrow SaT$		
T		$T \rightarrow F$ $T \rightarrow TmF$		$T \rightarrow F$ $T \rightarrow TmF$			
F		$F \rightarrow i$		$F \rightarrow n$			
I			$I \rightarrow m$		$I \rightarrow p$		

Table 1: Table of SET and FOLLOW sets of all Pascal expressions' nonterminals

$First(E) = First(S)$
$First(S) = First(T), First(I), First(S)$
$First(T) = First(F), First(T)$

$First(F) = \{i, n\}$
$First(I) = \{p, m\}$
$First(F) = First(T) = \{i, n\}$
$First(E) = First(S) = \{i, n, p, m\}$

$Follow(E) \subset Follow(S)$
$First(T) \subset Follow(I)$

$Follow(S) = \{\$, r, a\}$
$Follow(T) = \{\$, m\}$
$Follow(F) = \{\$\}$
$Follow(I) = \{i, n\}$
$Follow(E) = \{\$\}$

LL(1) parsing

As shown in Table 1 there is ambiguity in the grammer. Therefore it is not suitable for $LL(1)$ type parsing. There is also possible to conver the grammer to solve the ambiguties. In that case the grammer could be used for $LL(1)$ parsing.