

TNT 4105 Compiler Construction

Assignment II, Theory part Due: 17.02.19

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1. LL(1) parsing table construction

Original grammar:

$$S \rightarrow c L E$$
$$L \rightarrow L E \mid \epsilon$$
$$E \rightarrow E s \mid U$$
$$U \rightarrow b \mid c \mid n \mid \epsilon$$

Modified grammar (without left recursion):

$$S \rightarrow c L E$$
$$L \rightarrow \epsilon L' \mid \epsilon$$
$$L' \rightarrow E L' \mid \epsilon$$
$$E \rightarrow U E'$$
$$E' \rightarrow S E' \mid \epsilon$$
$$U \rightarrow b \mid c \mid n \mid \epsilon$$
$$\alpha = E, \beta = \epsilon E$$
$$\alpha = S, \beta = U$$

Table of First(α), Follow(α) and Nullable(α)

	First	Follow	Nullable
S	c	\$	No
L	l	{b, c, n, s}	No
L'	{b, c, n, s}	\$	Yes
E	{b, c, n, s}	{b, c, n, s}	Yes
E'	s	\$	Yes
U	{b, c, n}	\$	Yes

This creates ambiguity in the parsing, as seen below!

	c	l	b	n	s
S	$S \rightarrow cLE$				
L		$L \rightarrow lEL'$			
L'	$L' \rightarrow EL'$		$L' \rightarrow EL'$	$L' \rightarrow EL'$	$L' \rightarrow EL'$
* E	$E \rightarrow UE'$		$E \rightarrow UE'$	$E \rightarrow UE'$	$E \rightarrow UE'$
E'	$E \rightarrow \epsilon$		$E \rightarrow \epsilon$	$E \rightarrow \epsilon$	$E' \rightarrow sE'$
U	$U \rightarrow c$		$U \rightarrow b$	$U \rightarrow n$	

* Conflicts on all entries of E \Rightarrow Not suitable for LL(1) parsing