

7.12.2021

Seminar 10 – LR(0) parsing

Ex.: Given the grammar $G = (\{S, A\}, \{a, b, c\}, \{S \rightarrow aA, A \rightarrow bA \mid c\}, S)$, parse the sequence $w = abbc$ using an LR(0) parser.

$S' \rightarrow S$

(1) $S \rightarrow aA$

(2) $A \rightarrow bA$

(3) $A \rightarrow c$

LR(0) item $[A \rightarrow \alpha. \beta]$

$[A \rightarrow \alpha. B\beta], [B \rightarrow. \gamma]$

I. Compute canonical collection of states #VA: David T.

$s_0 = \text{closure}(\{[S' \rightarrow. S]\}) = \{[S' \rightarrow. S], [S \rightarrow. aA]\}$

$s_1 = \text{goto}(s_0, S) = \text{closure}(\{[S' \rightarrow S.]\}) = \{[S' \rightarrow S.]\}$

$\text{goto}(s_0, A) = \emptyset = \text{goto}(s_0, b) = \text{goto}(s_0, c)$

$s_2 = \text{goto}(s_0, a) = \text{closure}(\{[S \rightarrow a.A]\}) = \{[S \rightarrow a.A], [A \rightarrow. bA], [A \rightarrow. c]\}$

$s_3 = \text{goto}(s_2, A) = \text{closure}(\{[S \rightarrow aA.]\}) = \{[S \rightarrow aA.]\}$

$s_4 = \text{goto}(s_2, b) = \text{closure}(\{[A \rightarrow b.A]\}) = \{[A \rightarrow b.A], [A \rightarrow. bA], [A \rightarrow. c]\}$

$s_5 = \text{goto}(s_2, c) = \text{closure}(\{[A \rightarrow c.]\}) = \{[A \rightarrow c.]\}$

$s_6 = \text{goto}(s_4, A) = \text{closure}(\{[A \rightarrow bA.]\}) = \{[A \rightarrow bA.]\}$

$\text{goto}(s_4, b) = \text{closure}(\{[A \rightarrow b.A]\}) = s_4$

$\text{goto}(s_4, c) = \text{closure}(\{[A \rightarrow c.]\}) = s_5$

$C = \{s_0, s_1, s_2, s_3, s_4, s_5, s_6\}$

II. Build LR(0) parsing table #VA: Andrada T.

GOTO						
	ACTION	S	A	a	b	c
0	shift	1		2		
1	accept					
2	shift		3		4	5
3	reduce1					
4	shift		6		4	5
5	reduce3					
6	reduce2					

III. Parse the sequence #VA: Andrada T.

Work stack	Input stack	Output band
\$0	abbc\$	€
\$0a2	bbc\$	€
\$0a2b4	bc\$	€
\$0a2b4b4	c\$	€
\$0a2b4b4c5	\$	€
\$0a2b4b4A6	\$	3
\$0a2b4A6	\$	23
\$0a2A3	\$	223
\$0S1	\$	1223
acc	\$	1223

$S \Rightarrow aA \Rightarrow abA \Rightarrow abbA \Rightarrow abbc$ (! Rightmost derivation)