

Script generated by TTT

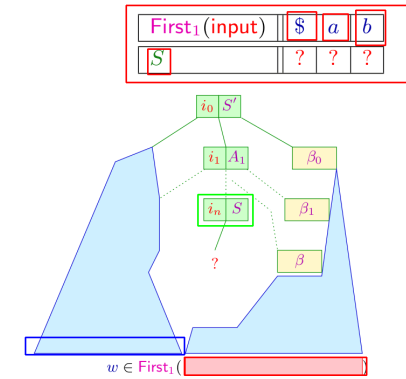
Title: Petter: Compiler Construction (14.05.2020)
- 15: Follow(1) and LL(1) Parser

Date: Mon May 04 17:20:27 CEST 2020

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Pages: 10

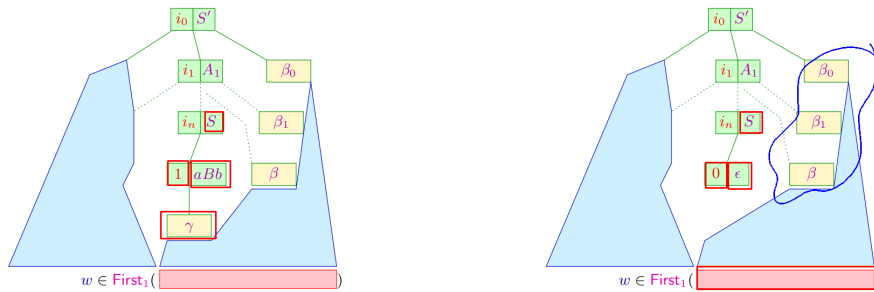
context is relevant too: $S' \rightarrow S \$ \quad S \rightarrow \epsilon^0 \mid a S b^1$



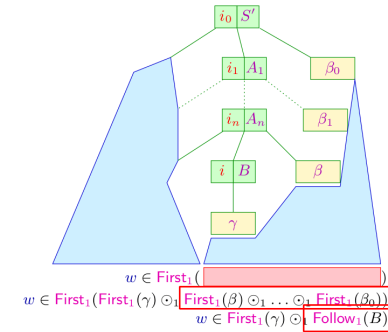
Item Pushdown Automaton as LL(1)-Parser

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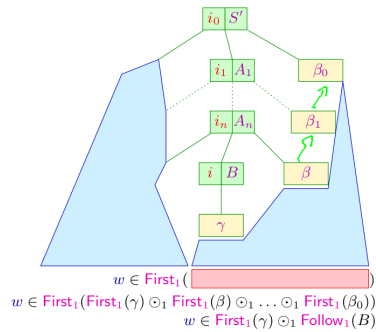
First ₁ (input)	\$	a	b
S	?	?	?



Item Pushdown Automaton as LL(1)-Parser



Item Pushdown Automaton as LL(1)-Parser



Inequality system for $\text{Follow}_1(B) = \text{First}_1(\beta) \odot_1 \dots \odot_1 \text{First}_1(\beta_0)$

$$\begin{aligned}
 \text{Follow}_1(S) &\supseteq \{\$ \} \\
 \text{Follow}_1(B) &\supseteq F_\epsilon(X_j) && \text{if } A \rightarrow \alpha B X_1 \dots X_m \in P, \text{empty}(X_1) \wedge \dots \wedge \text{empty}(X_{j-1}) \\
 \text{Follow}_1(B) &\supseteq \text{Follow}_1(A) && \text{if } A \rightarrow \alpha B X_1 \dots X_m \in P, \text{empty}(X_1) \wedge \dots \wedge \text{empty}(X_m)
 \end{aligned}$$

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Item Pushdown Automaton as LL(1)-Parser

Is G an $LL(1)$ -grammar, we can index a lookahead-table with items and nonterminals:

LL(1)-Lookahead Table

We set $M[B, w] = i$ with $B \rightarrow \gamma^i$ if $w \in \text{First}_1(\gamma) \odot_1 \text{Follow}_1(B)$

... for example: $S' \rightarrow S \$ \quad S \rightarrow \epsilon^0 \mid a S b^1$

$$\text{First}_1(S) = \{\epsilon, a\}$$

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... for example: $S' \rightarrow [S] \$ \quad S \rightarrow \epsilon^0 \mid a [S] b^1$

$$\text{First}_1(S) = \{\epsilon, a\} \quad \text{Follow}_1(S) = \{b, \$\}$$

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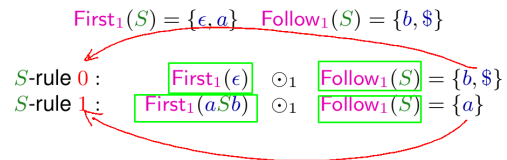
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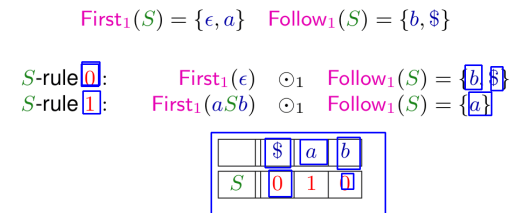
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Item Pushdown Automaton as LL(1)-Parser

For example: $S' \rightarrow S \$ \quad S \rightarrow \epsilon^0 \mid a S b^1$

The transitions of the according Item Pushdown Automaton:

0	$[S' \rightarrow \bullet S \$]$	ϵ	$[S' \rightarrow \bullet S \$] [S \rightarrow \bullet]$
1	$[S' \rightarrow \bullet S \$]$	ϵ	$[S' \rightarrow \bullet S \$] [S \rightarrow \bullet a S b]$
2	$[S \rightarrow \bullet a S b]$	a	$[S \rightarrow a \bullet S b]$
3	$[S \rightarrow a \bullet S b]$	ϵ	$[S \rightarrow a \bullet S b] [S \rightarrow \bullet]$
4	$[S \rightarrow a \bullet S b]$	ϵ	$[S \rightarrow a \bullet S b] [S \rightarrow \bullet a S b]$
5	$[S \rightarrow a \bullet S b] [S \rightarrow \bullet]$	ϵ	$[S \rightarrow a S \bullet b]$
6	$[S \rightarrow a \bullet S b] [S \rightarrow a S b \bullet]$	ϵ	$[S \rightarrow a S \bullet b]$
7	$[S \rightarrow a S \bullet b]$	b	$[S \rightarrow a S b \bullet]$
8	$[S' \rightarrow \bullet S \$] [S \rightarrow \bullet]$	ϵ	$[S' \rightarrow S \bullet \$]$
9	$[S' \rightarrow \bullet S \$] [S \rightarrow a S b \bullet]$	ϵ	$[S' \rightarrow S \bullet \$]$

Lookahead table:

	\$	a	b
S	0	1	0

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