

CFG:

$G = \langle N, T, P, S \rangle$

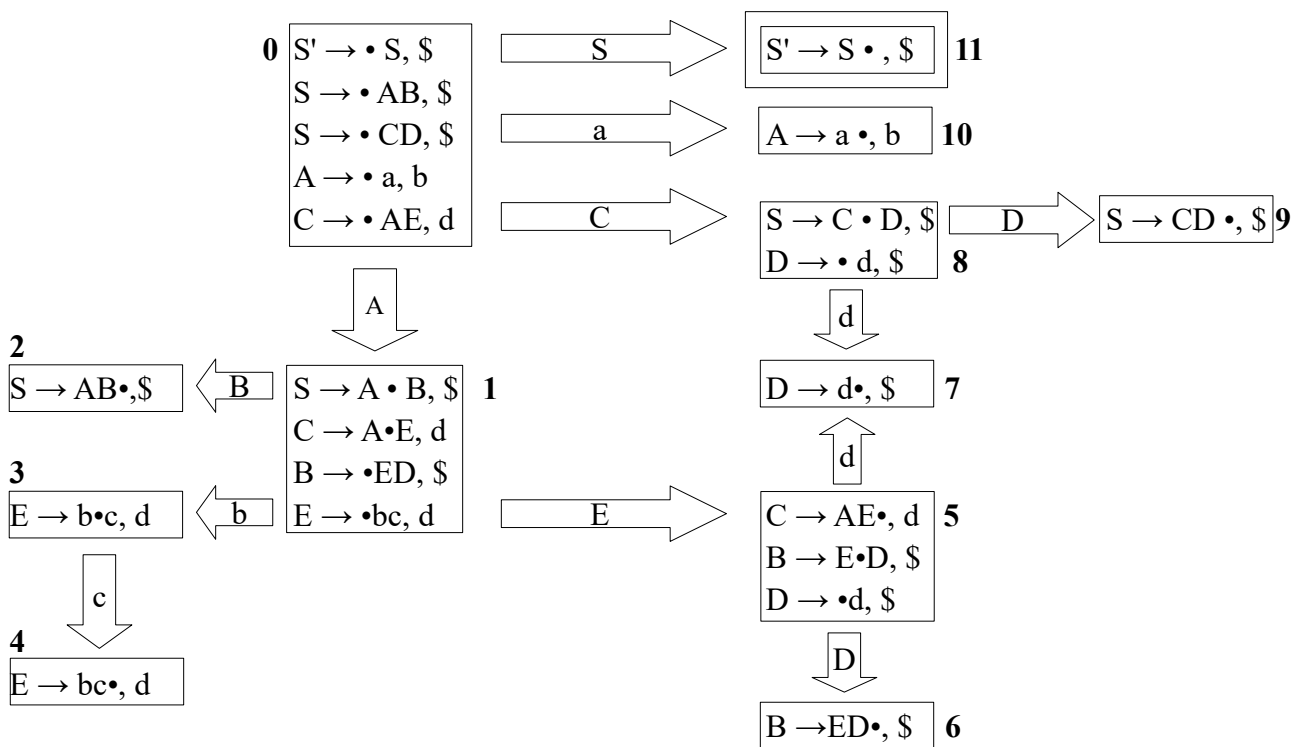
$N = \{ S, A, B, C, D, E \}$

$T = \{ a, b, c, d \}$

$P = \{ S \rightarrow AB \mid CD, A \rightarrow a, B \rightarrow ED, C \rightarrow AE, D \rightarrow d, E \rightarrow bc \}$

1. Give the LR(1) automaton and parse table (the grammar is not LR(1)).

Automat:



Regeln:

1. $S \rightarrow AB$
2. $S \rightarrow CD$
3. $A \rightarrow a$
4. $B \rightarrow ED$
5. $C \rightarrow AE$
6. $D \rightarrow d$
7. $E \rightarrow bc$

parse table:

#	action					goTo					
	a	b	c	d	\$	A	B	C	D	E	S
0	s10					1		8			11
1		s3					2			5	
2					r1						
3			s4								
4				r7							
5				s7, r5					6		
6					r4						
7					r6						
8				s7					9		
9					r2						
10		r3									
11					acc						

2. Give the trace of running Tomita's parser using this parse table, for the input word $w = abcd$.

More concretely: show step by step how the graph-structured stack develops and how the parse forest is constructed in parallel.

DAG

s10: $q_0 \leftarrow a \leftarrow q_{10}$
 r3: $q_0 \leftarrow A \leftarrow q_1$
 s3: $q_0 \leftarrow A \leftarrow q_1 \leftarrow b \leftarrow q_3$
 s4: $q_0 \leftarrow A \leftarrow q_1 \leftarrow b \leftarrow q_3 \leftarrow c \leftarrow q_4$
 r7: $q_0 \leftarrow A \leftarrow q_1 \leftarrow E \leftarrow q_5$
 r5: $q_0 \leftarrow C \leftarrow q_8$
 r7, r5: $q_0 \leftarrow A \leftarrow q_1 \leftarrow E \leftarrow q_5$
 $\blacktriangleright C \leftarrow q_8$
 s7: $q_0 \leftarrow A \leftarrow q_1 \leftarrow E \leftarrow q_5 \leftarrow d \leftarrow q_7$
 $\blacktriangleright C \leftarrow q_8$ \swarrow
 r6: $q_0 \leftarrow A \leftarrow q_1 \leftarrow E \leftarrow q_5 \leftarrow D \leftarrow q_6$
 $\blacktriangleright C \leftarrow q_8 \leftarrow D \leftarrow q_9$
 r4: $q_0 \leftarrow A \leftarrow q_1 \leftarrow B \leftarrow q_2$
 $\blacktriangleright C \leftarrow q_8 \leftarrow D \leftarrow q_9$
 r1: $q_0 \leftarrow S \leftarrow q_{11}$
 $C \leftarrow q_8 \leftarrow D \leftarrow q_9$
 r2: $q_0 \leftarrow S \leftarrow q_{11}$
 $\blacktriangleright S \leftarrow q_{11}$
 r1, r2: $q_0 \leftarrow S \leftarrow q_{11}$

parse forest

stack	analysis
0 s10	
0 - 1 - 10 r3	1 : a
0 - 2 - 1 s3	2 : A (1)
0 - 2 - 1 - 3 - 3 s4	3 : b
0 - 2 - 1 - 3 - 3 - 4 - 4 r7,r5	4 : c
0 - 2 - 1 - 5 - 5 s7	5 : E (3 , 4)
\	
6 - 8	6 : C (2 , 5)
0 - 2 - 1 - 5 - 5 - 7 - 7 r6	7 : d
\	
6 - 8	
0 - 2 - 1 - 5 - 5 - 8 - 6 r4	8 : D (7)
\	
6 - 8 - 8 - 9	
0 - 2 - 1 - 9 - 2 r1,r2	9 : B (5 , 8)
\	
6 - 8 - 8 - 9	
0 - 10 - 11	10 : S (2 , 9)
\	
11	11 : S (6 , 8)
0 - 12 - 11	12 : (10 , 11)

