

Compiler Design

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1403-1404

SLR(1) Grammar

- The SLR method begins with LR(0) items and LR(0) automata
- *Constructing an SLR-parsing table*

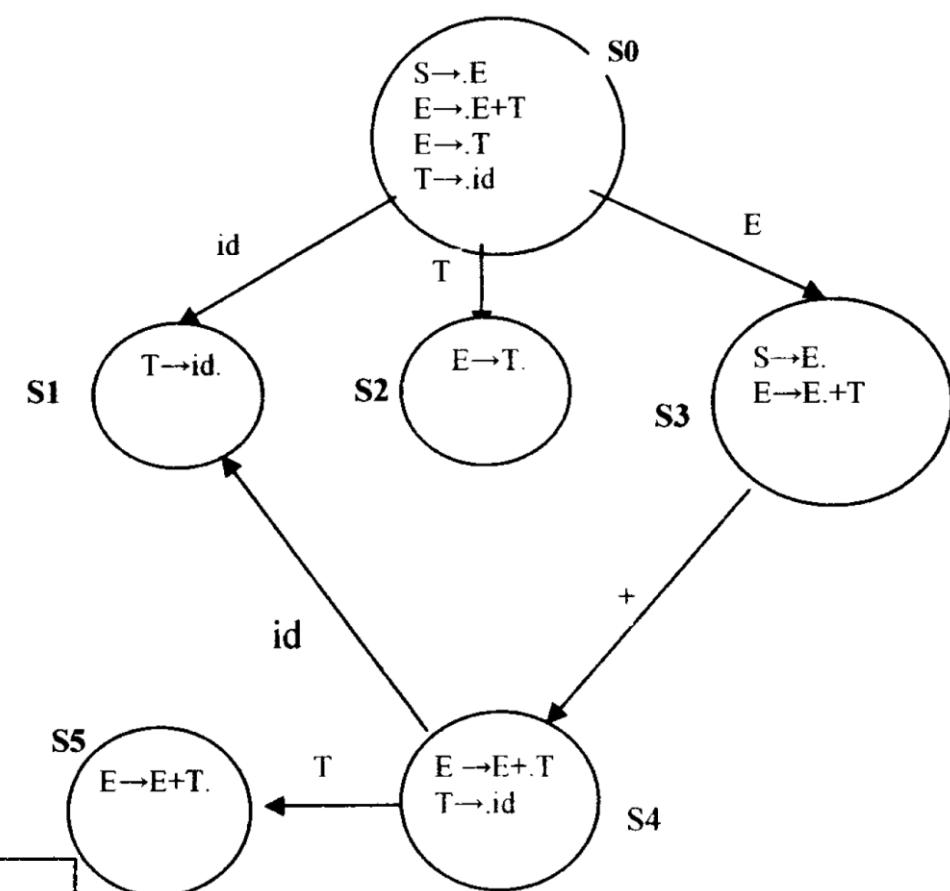
State i is constructed from I_i . The parsing actions for state i are determined as follows:

- If $[A \rightarrow \alpha \cdot a\beta]$ is in I_i and $\text{GOTO}(I_i, a) = I_j$, then set $\text{ACTION}[i, a]$ to “shift j .” Here a must be a terminal.
- If $[A \rightarrow \alpha \cdot]$ is in I_i , then set $\text{ACTION}[i, a]$ to “reduce $A \rightarrow \alpha$ ” for all a in $\text{FOLLOW}(A)$; here A may not be S' .
- If $[S' \rightarrow S \cdot]$ is in I_i , then set $\text{ACTION}[i, \$]$ to “accept.”

SLR(1) Grammar

- Example

- 1- $S \rightarrow E$
- 2- $E \rightarrow E + T$
- 3- $E \rightarrow T$
- 4- $T \rightarrow id$



الحالة	action			goto	
	id	+	\$	T	E
0	s1	error	error	2	3
1	error	r4	r4		
2	error	r3	r3		
3	error	s4	accept		
4	s1	error	error	5	
5	error	r2	r2		

SLR(1) Grammar

- Example: Parse string id+id

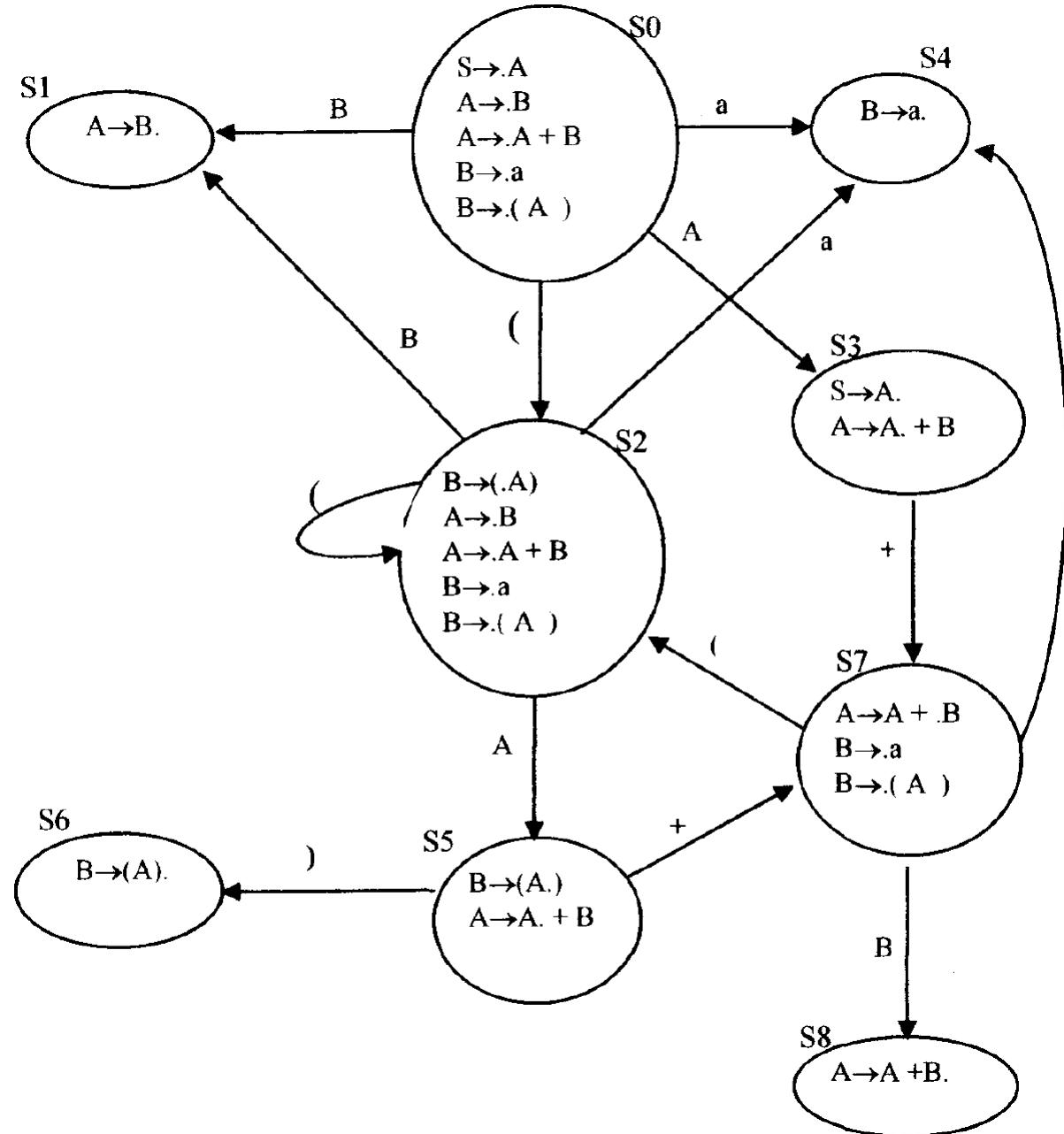
پشتہ	رشته ورودی	عملیات
0	id+id\$	s1
0id1	+id\$	r4: T → id
0T	+id\$	goto[0,T]=2
0T2	+id\$	r3: E → T
0E	+id\$	goto[0,E]=3
0E3	+id\$	s4
0E3+4	id\$	s1
0E3+4id1	\$	r4: T → id
0E3+4T	\$	goto[4,T]=5
0E3+4T5	\$	r2: E → E+T
0E	\$	goto[0,E]=3
0E3	\$	accept

SLR(1) Grammar

- Example

$A \rightarrow B$
 $A \rightarrow A + B$
 $B \rightarrow a$
 $B \rightarrow (A)$

- 1- $S \rightarrow A$
- 2- $A \rightarrow B$
- 3- $A \rightarrow A + B$
- 4- $B \rightarrow a$
- 5- $B \rightarrow (A)$



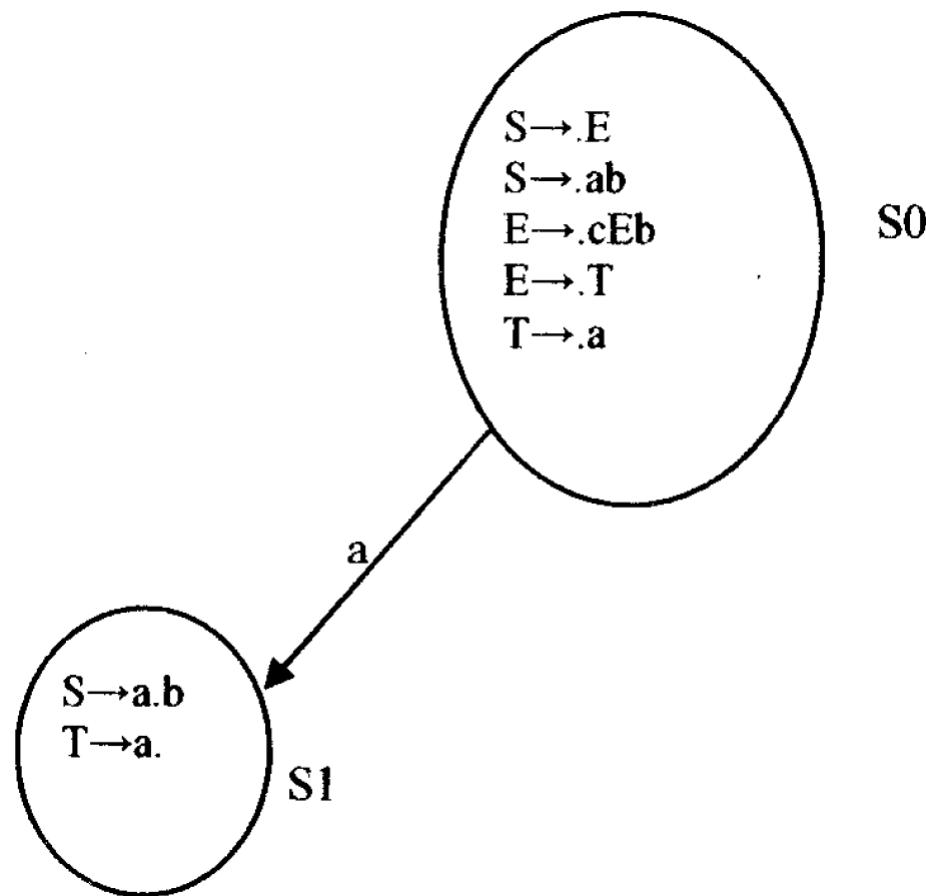
SLR(1)

حالت	action					goto	
	a	+	()	\$	A	B
0	s4		s2			3	1
1		r2		r2	r2		
2	s4		s2			5	1
3		s7			accept		
4		r4		r4	r4		
5		s7		s6			
6		r5		r5	r5		
7	s4		s2				8
8		r3		r3	r3		

پشتہ	رشته ورودی	اعمال انجام شدہ
0	(a+a)\$	s2
0(2	a+a)\$	s4
0(2a4	+a)\$	r4: B→a
0(2B1	+a)\$	r2: A→B
0(2A5	+a)\$	s7
0(2A5+7	a)\$	s4
0(2A5+7a4)\$	r4: B→a
0(2A5+7B8)\$	r3: A→A + B
0(2A5)\$	s6
0(2A5)6	\$	r5: B→(A)
0A3	\$	accept

SLR(1) Grammar

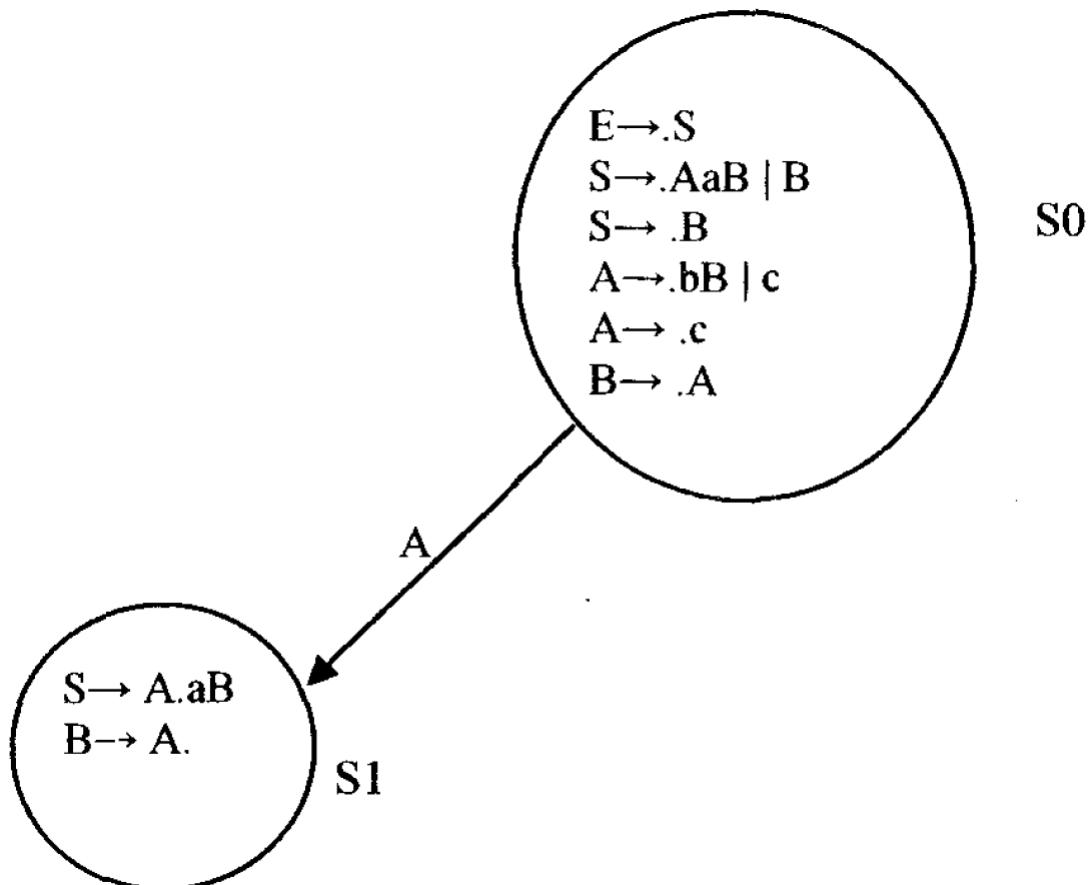
- Example: Shift/Reduce Conflict
 - The grammar is not SLR(1)

$$\begin{array}{l} S \rightarrow E \mid ab \\ E \rightarrow cEb \mid T \\ T \rightarrow a \end{array}$$


SLR(1) Grammar

- Example: Shift/Reduce Conflict
 - The grammar is not SLR(1)

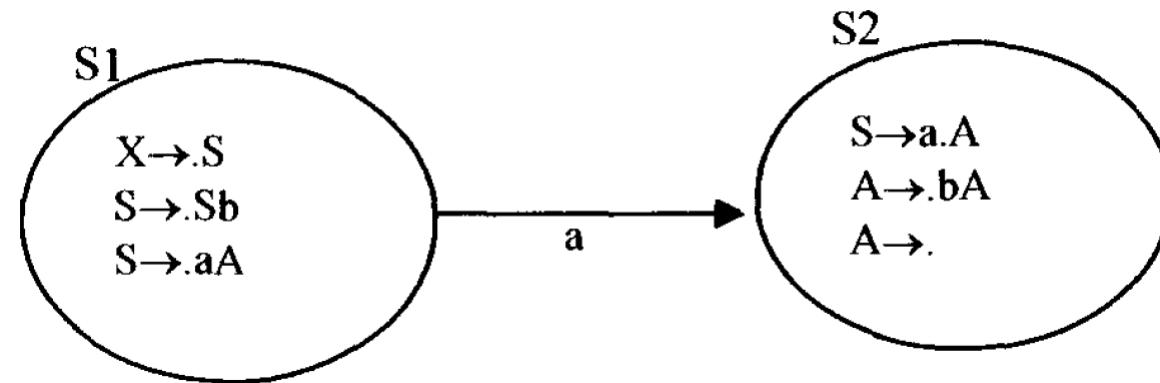
$S \rightarrow AaB \mid B$
 $A \rightarrow bB \mid c$
 $B \rightarrow A$



SLR(1) Grammar

- Example: Shift/Reduce Conflict
 - The grammar is not SLR(1)

$S \rightarrow Sb \mid aA$
 $A \rightarrow bA \mid \epsilon$



SLR(1) Grammar

- Example: Shift/Reduce Conflict
 - The grammar is not SLR(1)

$S \rightarrow aACb$
 $A \rightarrow b \mid \epsilon$
 $C \rightarrow cC \mid \epsilon$

