

编译原理第七次理论作业

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Exercise 7.1

Consider the grammar

$$S \rightarrow (SR \mid a$$

$$R \rightarrow , SR \mid)$$

Try to construct an SLR(1) parsing table for the grammar, and see if there are conflicts in the parsing table.

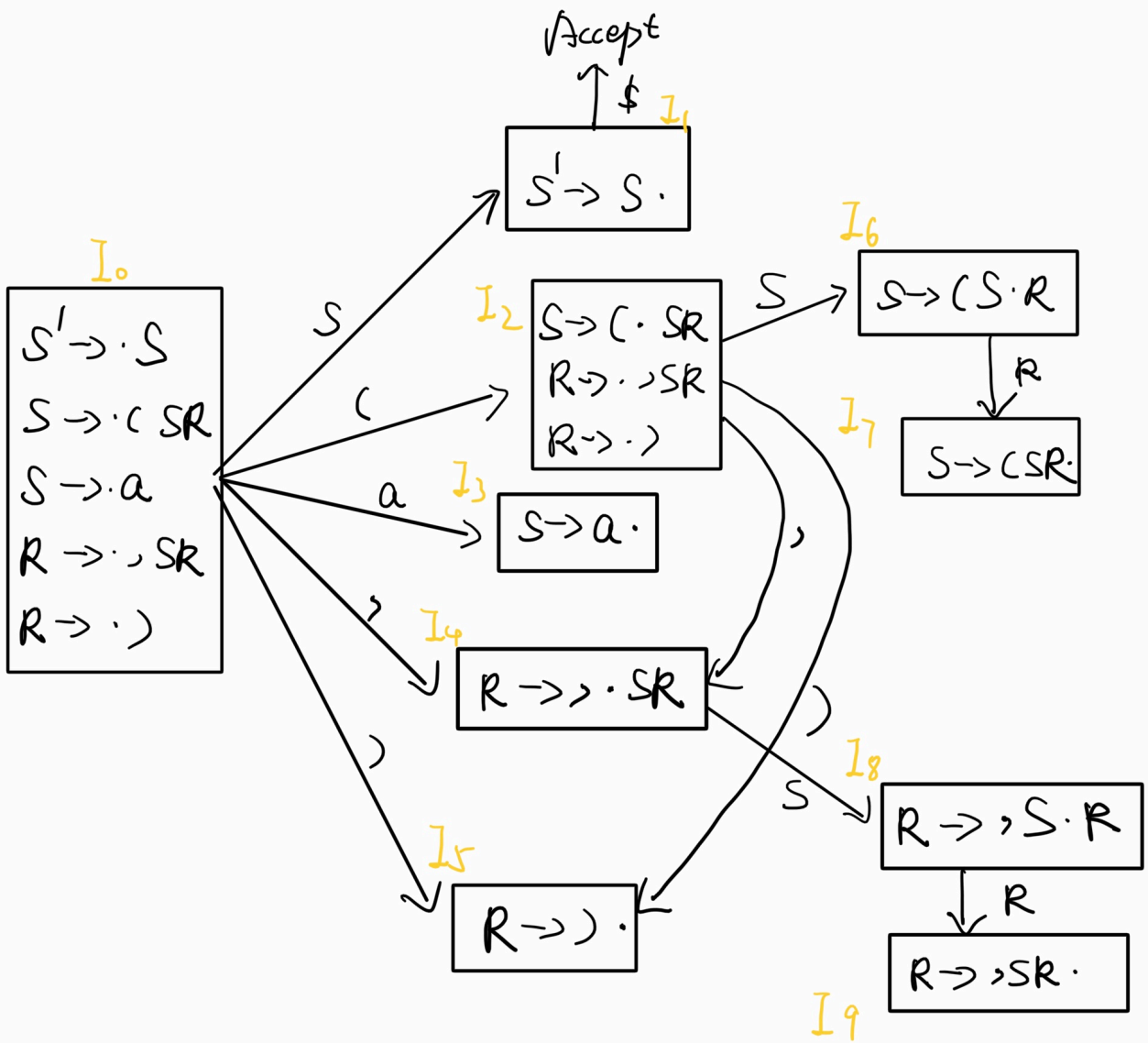
扩充文法:

$$S' \rightarrow \cdot S$$
$$S \rightarrow \cdot (SR$$
$$S \rightarrow \cdot a$$
$$R \rightarrow \cdot , SR$$
$$R \rightarrow \cdot)$$

$$\text{FIRST}(S) = \{ (, a \} \quad \text{FOLLOW}(S) = \{ >,), \$ \}$$

$$\text{FIRST}(R) = \{ >,) \} \quad \text{FOLLOW}(R) = \{ \$ \}$$

可构造自动机:



于是可构造SLR(1)分析表:

STATE	ACTION	GOTO
	() a \$	
0	S ₂ S ₄ S ₅	1
1	ACC	
2	S ₄ S ₅ r ₂	6
3	r ₃ r ₃ r ₃ r ₃ r ₃	
4		8
5	r ₅ r ₅ r ₅ r ₅ r ₅	
6	r ₂ r ₂ r ₂	7
7	r ₂	
8	r ₄ r ₄ r ₄	9
9	r ₄	

没有冲突

Exercise 7.2

Consider the grammar

$$S \rightarrow Sa b \mid a R$$

$$R \rightarrow S \mid a$$

Is the grammar an SLR(1) grammar? and why?

不是 SLR(1) 文法。

增个文法:

$$\begin{aligned} S' &\rightarrow S \cdot \\ S &\rightarrow \cdot S a b \\ S &\rightarrow \cdot a R \\ R &\rightarrow \cdot S \\ R &\rightarrow \cdot a \end{aligned}$$
$$\text{Follow}(S) = \{a, \$\}$$
$$\text{Follow}(R) = \{a, \$\}$$

对于 I_0 项中 $S \rightarrow \cdot a R$

有 $\text{Action}[0, a]$ 为移进 - 但 $\text{Follow}(R) = \{a, \$\}$

会导致在 a 上规约。

于是有移进 - 规约冲突。

故不是 SLR(1) 的。

Exercise 7.3

Consider the grammar

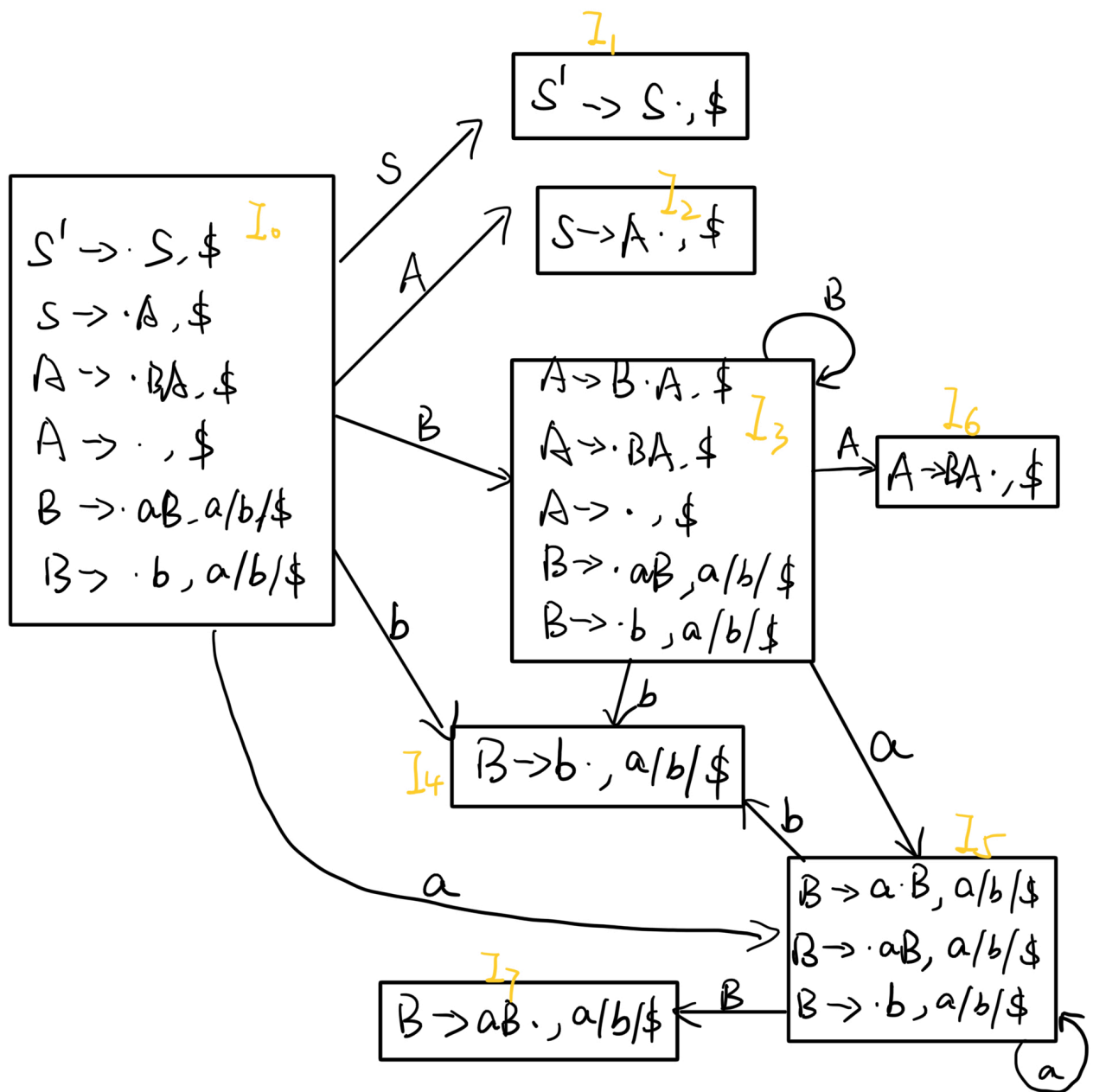
$$S \rightarrow A$$
$$A \rightarrow BA | \epsilon$$
$$B \rightarrow aB | b$$

- Prove that the grammar is an LR(1) grammar.
- Construct an LR(1) parsing table for the grammar.
- Show the detailed parsing procedure for the sentence **abab**, following the style in slides of this lecture.

(1)

增广文法:

$S' \rightarrow \cdot S$	(0)
$S \rightarrow \cdot A$	(1)
$A \rightarrow \cdot BA$	(2)
$A \rightarrow \epsilon$	(3)
$B \rightarrow \cdot aB$	(4)
$B \rightarrow \cdot b$	(5)



无冲突. 所以是 LR(0) 文法

(2)

STATE	Action			Goto		
	a	b	\$	S	A	B
0	s5	s4	r3	1	2	3
1			Acc			
2			r1			
3	s5	s4	r3		6	3
4	r5	r5	r5			7
5	s5	s4				
6			r2			
7	r4	r4	r4			

(3)

	STACK	INPUT	ACTION
1	0	abab\$	shift
2	0a5	bab\$	shift
3	0a5b4	ab\$	reduce. $B \rightarrow b$.
4	0a5B7	ab\$	reduce. $B \rightarrow aB$.
5	0B3	ab\$	shift
6	0B3a5	b\$	shift
7	0B3a5b4	\$	reduce. $B \rightarrow b$
8	0B3a5B7	\$	reduce. $B \rightarrow aB$
9	0B3B3	\$	reduce $A \rightarrow \epsilon$
10	0B3B3A6	\$	reduce $A \rightarrow BA$
11	0B3A6	\$	reduce $A \rightarrow BA$
12	0A2	\$	reduce $S \rightarrow A$
13	0S1	\$	accept

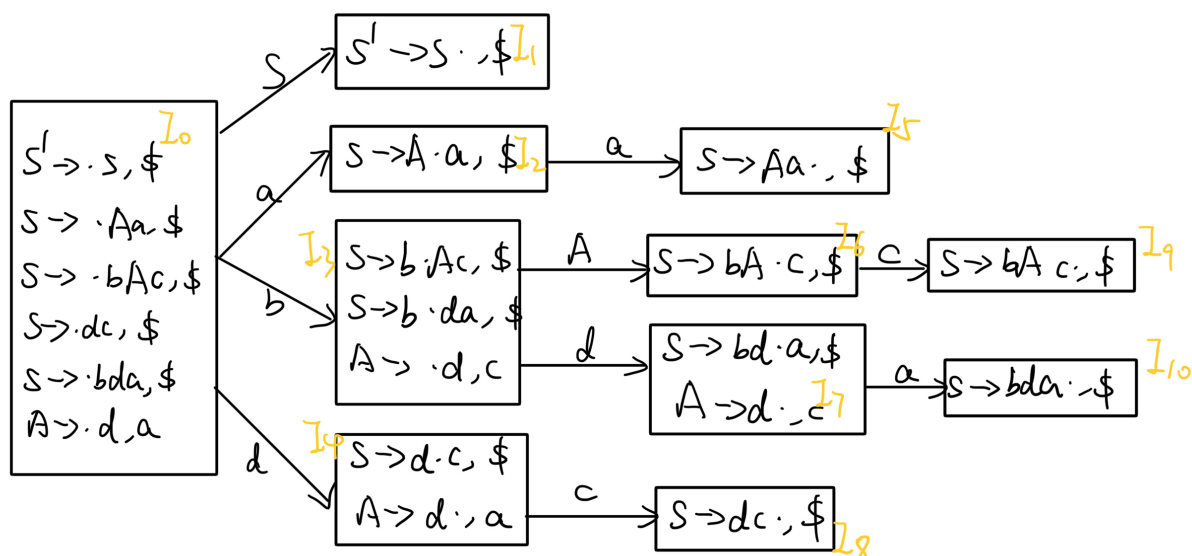
Exercise 7.4

Show that the grammar

$$S \rightarrow Aa \mid bAc \mid dc \mid bda$$

$$A \rightarrow d$$

is LALR(1) but not SLR(1).



STATE	ACTION					GOTO	
	a	b	c	d	\$	S	A
0		S ₃		S ₄		1	2
1					acc		
2	S ₅						
3				S ₇			6
4	r ₅		S ₈				
5							
6				S ₉			
7	S ₁₀			r ₅			
8					r ₃		
9					r ₂		
10					r ₄		

并无冲突，可以看出是LALR(1)的，但是I₇下一个符号是a，但是FOLLOW(A)={a,c}，于是产生移入规约冲突，所以不是SLR(1)。