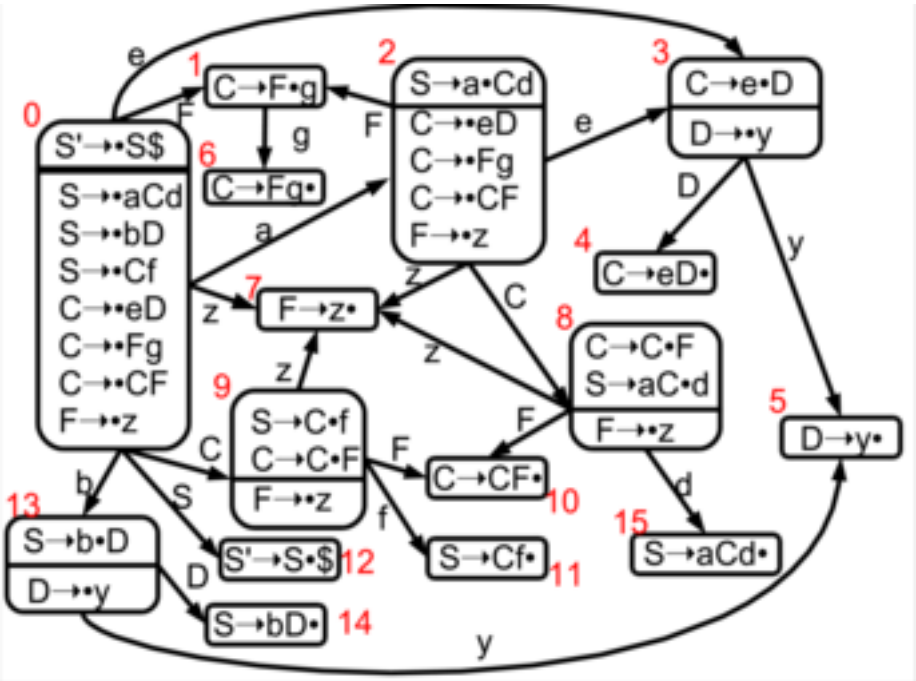
Introduction to Language Theory and Compilation
Solutions

Session 9: LR(0) and LR(k) parsing

Solutions

Ex. 1.



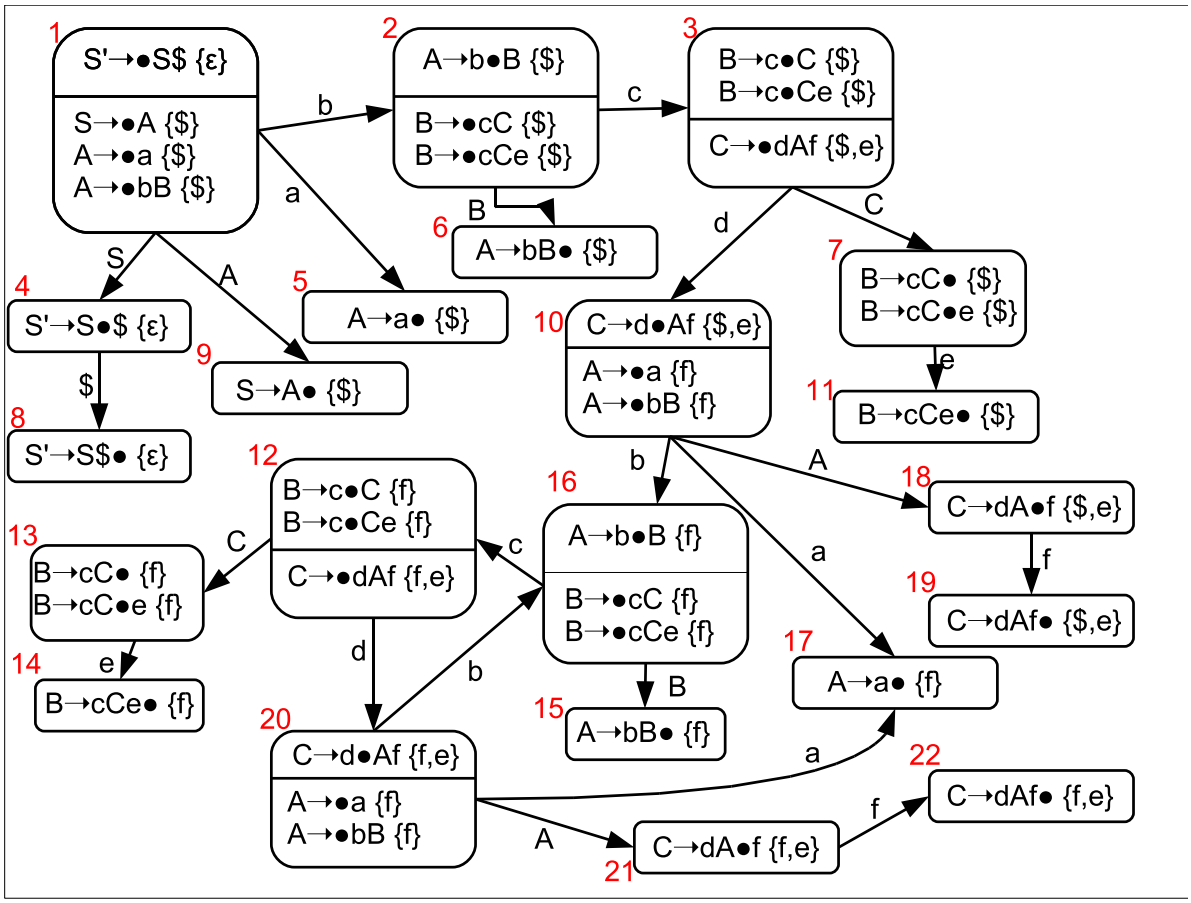
State	Action	State	Action
0	Shift	8	Shift
1	Shift	9	Shift
2	Shift	10	Reduce
3	Shift	11	Reduce
4	Reduce	12	**Accept**
5	Reduce	13	Shift
6	Reduce	14	Reduce
7	Reduce	15	Reduce

Table 1: Action table

Ex. 2.

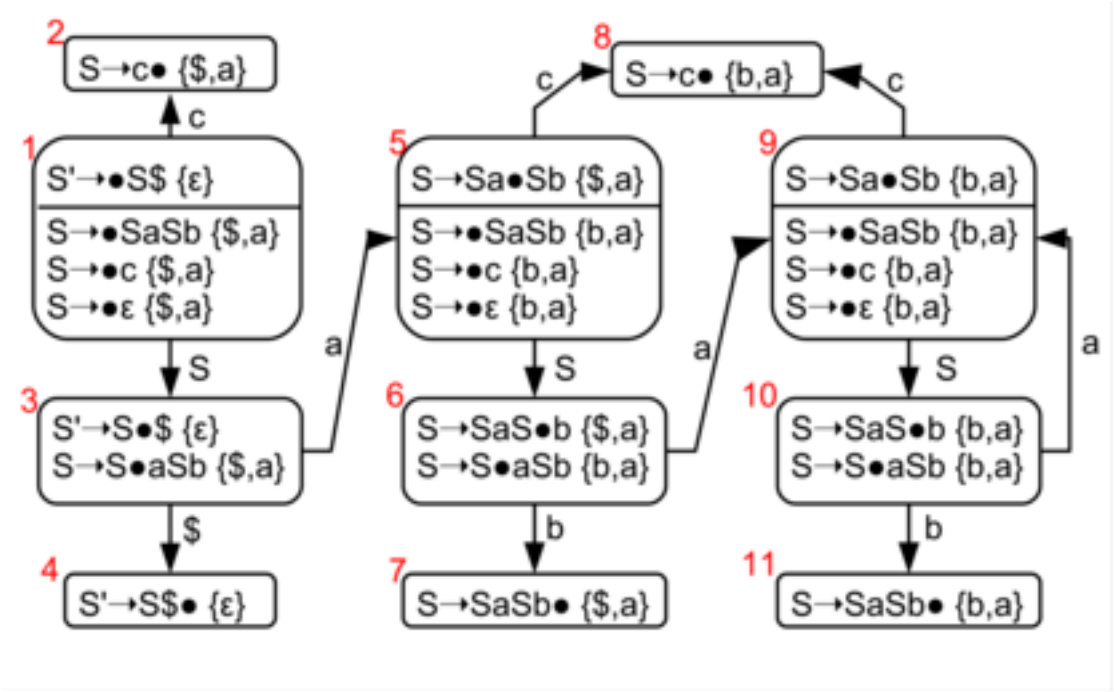
Stack	Input	Action	Output	Stack	Input	Action	Output
0	aeyzzd$	Shift		0a2*C*8*F*10	zd$	Reduce 6	8,4,7
0a2	eyzzd$	Shift		0a2*C*8	zd$	Shift	8,4,7,6
0a2e3	yzzd$	Shift		0a2*C*8z7	d$	Reduce 7	8,4,7,6
0a2e3y5	zzd$	Reduce 8		0a2*C*8*F*10	d$	Reduce 6	8,4,7,6,7
0a2e3*D*4	zzd$	Reduce 4	8	0a2*C*8	d$	Shift	8,4,7,6,7,6
0a2*C*8	zzd$	Shift	8,4	0a2*C*8d15	$	Reduce 1	8,4,7,6,7,6
0a2*C*8z7	zd$	Reduce 7	8,4	0*S*12	$	Accept	8,4,7,6,7,6,1

Ex. 3. It is not $LR(0)$ because without the context, the parser cannot distinguish the action to choose in the case of the state 7.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
a	S									S										S		
b	S									S										S		
c		S														S						
d			S									S										
e							S						S						R7			R7
f													R5	R6	R3		R2	S	R7		S	R7
$				S	R4	R3	R5		R2		R6											

Ex. 4.



	a	b	c	$
1	R4		S	R4
2	R3			R3
3	S			S
4	Accept			
5	R4	R4	S	
6	S	S		
7	R2			R2
8	R3	R3		
9	R4	R4	S	
10	S	S		
11	R2	R2		

1 Action table

Stack	Input	Action	Output
1	abacb$	Reduce 4	
1*S*3	abacb$	Shift	4
1*S*3a5	bacb$	Reduce 4	4
1*S*3a5*S*6	bacb$	Shift	4,4
1*S*3a5*S*6b7	acb$	Reduce 2	4,4
1*S*3	acb$	Shift	4,4,2
1*S*3a5	cb$	Shift	4,4,2
1*S*3a5c8	b$	Reduce 3	4,4,2
1*S*3a5*S*6	b$	Shift	4,4,2,3
1*S*3a5*S*6b7	$	Reduce 2	4,4,2,3
1*S*3	$	Shift	4,4,2,3,2
1*S*3$4		Accept	4,4,2,3,2

2 Simulation on the input `abacb`