

LR(1) Parsing 1

LR(1) Parsing

- 1 $Goal \rightarrow List$
- 2 $List \rightarrow List Pair$
- 3 $\quad \quad | Pair$
- 4 $Pair \rightarrow (Pair)$
- 5 $\quad \quad | ()$

State	Action Table		Goto Table	
	eof	()	
0		s 3		1 2
1	acc	s 3		4
2	r 3	r 3		
3		s 6	s 7	5
4	r 2	r 2		
5			s 8	
6		s 6	s 10	9
7	r 5	r 5		
8	r 4	r 4		
9			s 11	
10			r 5	
11			r 4	

(a) Parentheses Grammar

(b) Action and Goto Tables

■ FIGURE 3.16 The Parentheses Grammar.

LR(1) Parsing Algorithm

```
push $;
push start state,  $s_0$ ;
word  $\leftarrow$  NextWord();
while (true) do;
  state  $\leftarrow$  top of stack;
  if Action[state,word] = "reduce  $A \rightarrow \beta$ " then begin;
    pop  $2 \times |\beta|$  symbols;
    state  $\leftarrow$  top of stack;
    push A;
    . push Goto[state, A];
  end;
  else if Action[state,word] = "shift  $s_i$ " then begin;
    push word;
    push  $s_i$ ;
    word  $\leftarrow$  NextWord();
  end;
  else if Action[state,word] = "accept"
    then break;
  else Fail();
end;
report success; /* executed break on "accept" case */
```

■ FIGURE 3.15 The Skeleton LR(1) Parser.

Parse the String () ()

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- 5 $\quad \quad | \underline{()}$

State	Action Table			Goto Table	
	eof	()	List	Pair
0		s3		1	2
1	acc	s3			4
2	r3	r3			
3		s6	s7		5
4	r2	r2			
5			s8		
6		s6	s10		9
7	r5	r5			
8	r4	r4			
9			s11		
10			r5		
11			r4		

Iteration	State	Word	Stack	Action
Initial	-	(	\$ 0	
1	0	(	\$ 0	s3
2	3	)	\$ 0 (3	s7
3	7	(	\$ 0 (3) 7	r5
4	2	(	\$ 0 Pair 2	r3
5	1	(	\$ 0 List 1	s3
6	3	)	\$ 0 List 1 (3	s7
7	7	(	\$ 0 List 1 (3) 7	r5
8	4	(	\$ 0 List 1 Pair 4	r2
9	1	(	\$ 0 List 1	s3
10	3	)	\$ 0 List 1 (3	s7
11	7	eof	\$ 0 List 1 (3) 7	r5
12	4	eof	\$ 0 List 1 Pair 4	r2
13	1	eof	\$ 0 List `1	acc

(a) Parentheses Grammar

(b) Action and Goto Tables

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6		s6	s10		9
7	r5	r5			
8	r4	r4			
9			s11		
10			r5		
11			r4		

Iteration	State	Word	Stack	Action
Initial	-	(\$ 0	

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6		s6	s10		9
7	r5	r5			
8	r4	r4			
9			s11		
10			r5		
11			r4		

Iteration	State	Word	Stack	Action
Initial	-	(\$ 0	
1	0	(\$ 0	s3

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(b) Action and Goto Tables

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6		s6	s10		9
7	r5	r5			
8	r4	r4			
9			s11		
10			r5		
11			r4		

Iteration	State	Word	Stack	Action
Initial	-	(\$ 0	
1	0	(\$ 0	s3
2	3)	\$ 0 (3	s7

(a) Parentheses Grammar

(b) Action and Goto Tables

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4	r2	r2			
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6		s6	s10		9
7	r5	r5			
8	r4	r4			
9			s11		
10			r5		
11			r4		

Iteration	State	Word	Stack	Action
Initial	-	(\$ 0	
1	0	(\$ 0	s3
2	3)	\$ 0 (3	s7
3	7	(\$ 0 (3) 7	r5

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(b) Action and Goto Tables

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7	r5	r5			
8	r4	r4			
9			s11		
10			r5		
11			r4		

Iteration	State	Word	Stack	Action
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(a) Parentheses Grammar

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5			s8		
6		s6	s10		9
7	r5	r5			
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10			r5		
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Iteration	State	Word	Stack	Action
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1	0	(\$ 0	s3
2	3)	\$ 0 (3	s7
3	7	(\$ 0 (3) 7	r5
4	2	(\$ 0 Pair 2	r3
5	1	(\$ 0 List 1	s3

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9			s11		
10			r5		
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Iteration	State	Word	Stack	Action
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2	3)	\$ 0 (3	s7
3	7	(\$ 0 (3) 7	r5
4	2	(\$ 0 Pair 2	r3
5	1	(\$ 0 List 1	s3
6	3)	\$ 0 List 1 (3	s7

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- 1 $Goal \rightarrow List$
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Iteration	State	Word	Stack	Action
Initial	-	(\$ 0	
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2	3)	\$ 0 (3	s7
3	7	(\$ 0 (3) 7	r5
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5	1	(\$ 0 List 1	s3
6	3)	\$ 0 List 1 (3	s7
7	7	(\$ 0 List 1 (3) 7	r5

(a) Parentheses Grammar

(b) Action and Goto Tables

■ FIGURE 3.16 The Parentheses Grammar.

Parse the String () ()

- 1 *Goal* → *List*
- 2 *List* → *List Pair*
- 3 | *Pair*
- 4 *Pair* → (Pair)
- 5 | ()

State	Action Table			Goto Table	
	eof	()	List	Pair
0		s3		1	2
1	acc	s3			4
2	r3	r3			
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7	7	(\$ 0 List 1 (3) 7	r5
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