## **Profile Demonstration**

```
options
   start_node_filter = "u";
end
grammar ProfileDemo
   nonterminal S(0), A(2), B(2);
               a(1), b(2), c(1);
   terminal
   start
               S;
           ::= a(u) A(u,v)
                                       [ init ]
   S()
   A(u,v)
          ::= A(u,v) b(u,x) B(x,v)
                                       [ a1
                                              ٦
            | /* eps */
                                       [ a2
                                              ]
   B(u,v)
           ::= b(u,x) B(x,v)
                                       [ b1
                                              ]
            | b(u,v)
                                       [ b2
                                             ]
            | c(u)
                                       [ЪЗ
                                             ]
end
```

Note that the reduce step for rule a2 in state  $q_1(a)$  produces a nonterminal A-edge whose second attached node has not yet been determined. This fact is also represented by the condition  $n_1 =?$  in the first transition from state  $q_1(a)$  to  $q_2(n_0)$ . If, however, the second attached node of the A-edge has been determined (in  $q_7(a, b, c)$ ) or  $q_{13}(a, b, c)$ , condition  $n_1$  is satisfied, the other transition from state  $q_1(a)$  to state  $q_{10}(n_0, n_1)$  is taken. In this case,  $n_1 \uparrow$  means that  $n_1$  had not yet been consumed when state  $q_1(a)$  was entered first (i.e., before returning to it from  $q_7(a, b, c)$  or  $q_{13}(a, b, c)$ , respectively), but is now identified and consumed.

[a1]

[init]

[a1]

State $q_0(a)$	State $q_4(a, b)$
$S()  ightarrow \mathtt{a}(oldsymbol{a}, n_1)$	$B({m a},n_1)  o b({m a},{m b})$ . $B({m b},n_1)$
	$B({m a},{m b})  o b({m a},{m b})$ . $[b2]$
$\frac{a(n_0)}{n_0 = \mathbf{a}} q_1(n_0)$	$B(\boldsymbol{b},n_2)  ightarrow L(\boldsymbol{b},n_2)$
$\xrightarrow{n_0 = a} q_1(n_0)$	$B(\boldsymbol{b},n_3)  ightarrow L(\boldsymbol{b},n_4) B(n_4,n_3)$
	$B(oldsymbol{b},n_5)  ightarrow \mathtt{L}(oldsymbol{b})$
State $q_1(a)$	
$ \begin{array}{c} S() & \to a(\boldsymbol{a}) \cdot A(\boldsymbol{a}, n_1) \\ \hline A(\boldsymbol{a}, n_2) \to \bullet & [a2] \end{array} $	$B(n_0, n_1)$
$A(\boldsymbol{a},n_2)  ightarrow \mathbf{I}$	$\xrightarrow{B(n_0,n_1)}{n_0 = \boldsymbol{b}, n_1 = ?} q_8(\boldsymbol{a}, n_0)$
$A(\boldsymbol{a},n_3) \rightarrow A(\boldsymbol{a},n_3) b(\boldsymbol{a},n_4) B(n_4,n_3)$	$\xrightarrow{B(n_0, n_1)}{n_0 = \boldsymbol{b}, n_1 \uparrow} q_9(\boldsymbol{a}, n_1, n_0)$
$A(n_0, n_1)$	$ \begin{array}{c} -\frac{b(n_0, n_1)}{n_0 = \mathbf{b}, n_1 \uparrow} \rightarrow q_4(n_0, n_1) \end{array} $
$\frac{A(n_0, n_1)}{n_0 = \boldsymbol{a}, n_1 =?} \neq q_2(n_0)$	$n_0 = \boldsymbol{b}, n_1 \uparrow \qquad q_4(n_0, n_1)$
$\frac{A(n_0, n_1)}{n_0 = \boldsymbol{a}, n_1 \uparrow}  q_{10}(n_0, n_1)$	$\frac{c(n_0)}{n_0 = \mathbf{b}} \to q_5(n_0)$
	$n_0 = \boldsymbol{b} \qquad \qquad \forall \ q_5(n_0)$
State $q_2(a)$	State $q_5(a)$
$\boxed{A(\boldsymbol{a}, n_1) \to A(\boldsymbol{a}, n_1) \cdot b(\boldsymbol{a}, n_2) B(n_2, n_1)}$	$B(\boldsymbol{a},n_1) \to c(\boldsymbol{a})$ . $[b\beta]$
$S() \to a(\boldsymbol{a}) A(\boldsymbol{a}, n_3)$ . [init]	
	State $q_6(a, b)$
$\frac{b(n_0, n_1)}{n_0 = \boldsymbol{a}, n_1 \uparrow} q_3(n_0, n_1)$	$A(\boldsymbol{a},n_1)  ightarrow A(\boldsymbol{a},n_1)  b(\boldsymbol{a},\boldsymbol{b})  B(\boldsymbol{b},n_1)$ .
	State $q_7(a, b, c)$
State $q_3(a, b)$	$A(\boldsymbol{a},\boldsymbol{b})  o A(\boldsymbol{a},\boldsymbol{b}) b(\boldsymbol{a},\boldsymbol{c}) B(\boldsymbol{c},\boldsymbol{b})$ . [a
$A(\boldsymbol{a},n_1)  ightarrow A(\boldsymbol{a},n_1)  b(\boldsymbol{a},\boldsymbol{b})$ . $B(\boldsymbol{b},n_1)$	
$B(m{b},n_2)  ightarrow \mathbf{b}(m{b},n_2)$	State $q_8(a, b)$
$B(\boldsymbol{b},n_3)  ightarrow L(\boldsymbol{b},n_4) B(n_4,n_3)$	$B(\boldsymbol{a},n_1)  ightarrow b(\boldsymbol{a},\boldsymbol{b}) B(\boldsymbol{b},n_1)$ . [b1]
$B(oldsymbol{b},n_5)  o { t { t c}}(oldsymbol{b})$	
	State $q_9(a, b, c)$
$\frac{B(n_0, n_1)}{n_0 = \boldsymbol{b}, n_1 =?} \to q_6(\boldsymbol{a}, n_0)$	$B(\boldsymbol{a},\boldsymbol{b})  o b(\boldsymbol{a},\boldsymbol{c}) B(\boldsymbol{c},\boldsymbol{b})$ . [b1]
$n_0 = \boldsymbol{b}, n_1 = ? \rightarrow q_6(\boldsymbol{a}, n_0)$	
$ \begin{array}{c} \underline{B}(n_0, n_1) \\ \hline n_0 = \boldsymbol{b}, n_1 \uparrow \end{array} \rightarrow q_7(\boldsymbol{a}, n_1, n_0) \end{array} $	State $q_{10}(a, b)$
0 / 11	$A(\boldsymbol{a},\boldsymbol{b})  o A(\boldsymbol{a},\boldsymbol{b})$ . $b(\boldsymbol{a},n_1)  B(n_1,\boldsymbol{b})$
$ \begin{array}{c} \underline{-\mathbf{b}(n_0, n_1)} \\ \hline n_0 = \mathbf{b}, n_1 \uparrow \end{array} \rightarrow q_4(n_0, n_1) \end{array} $	$S() \longrightarrow a(oldsymbol{a}) A(oldsymbol{a},oldsymbol{b})$ .
$\frac{-\mathbf{c}(n_0)}{n_0 = \mathbf{b}} q_5(n_0)$	$\frac{\mathbf{b}(n_0, n_1)}{n_0 = \mathbf{a}, n_1 \uparrow} q_{11}(n_0, \mathbf{b}, n_1)$
$n_0 = \boldsymbol{b} \qquad \qquad (43)(70)$	$n_0 = \boldsymbol{a}, n_1 \uparrow \uparrow$

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State $q_{11}(a, b, c)$
$A({m{a}},{m{b}})  o A({m{a}},{m{b}})  b({m{a}},{m{c}})$ . $B({m{c}},{m{b}})$
$B(oldsymbol{c},oldsymbol{b})  o$ , b $(oldsymbol{c},oldsymbol{b})$
$B(oldsymbol{c},oldsymbol{b})  o Lb(oldsymbol{c},n_1)  B(n_1,oldsymbol{b})$
$B(oldsymbol{c},oldsymbol{b})  o \mathtt{LC}(oldsymbol{c})$
$\xrightarrow{B(n_0,n_1)} q_{13}(\boldsymbol{a},\boldsymbol{b},n_0)$
$n_0 = \boldsymbol{c}, n_1 = ? \xrightarrow{q_{13}(\boldsymbol{a}, \boldsymbol{b}, n_0)}$
$\xrightarrow{B(n_0,n_1)} q_7(\boldsymbol{a},n_1,n_0)$
$\overrightarrow{n_0 = c, n_1 = b} q_7(a, n_1, n_0)$
$ \xrightarrow{\mathbf{b}(n_0, n_1)} q_{15}(n_0, n_1) $
$n_0 = \boldsymbol{c}, n_1 = \boldsymbol{b} \xrightarrow{q_{15}(n_0, n_1)}$
$\xrightarrow{\mathbf{b}(n_0,n_1)} q_{14}(n_0,\mathbf{b},n_1)$
$n_0 = c, n_1$
$\xrightarrow{c(n_0)} q_{12}(n_0, \boldsymbol{b})$
$n_0 = \boldsymbol{c} \qquad \qquad \gamma q_{12}(n_0, \boldsymbol{v})$
State $q_{12}(a, b)$

State  $q_{12}(a, b)$  $\exists (a, b) \rightarrow c(a) . [b3]$ 

 $\begin{array}{c} \textbf{State} \ \boldsymbol{q_{13}}(\boldsymbol{a},\boldsymbol{b},\boldsymbol{c}) \\ \hline \textbf{A}(\boldsymbol{a},\boldsymbol{b}) \rightarrow \textbf{A}(\boldsymbol{a},\boldsymbol{b}) \, \textbf{b}(\boldsymbol{a},\boldsymbol{c}) \, \textbf{B}(\boldsymbol{c},\boldsymbol{b}) \, \textbf{.} \quad [a1] \end{array} \right]$ 

State $q_{14}(a, b, c)$
$B({m a},{m b})  o b({m a},{m c})$ . $B({m c},{m b})$
$B(oldsymbol{c},oldsymbol{b})  o { ilde{b}}(oldsymbol{c},oldsymbol{b})$
$B(\boldsymbol{c},\boldsymbol{b})  ightarrow b(\boldsymbol{c},n_1) B(n_1,\boldsymbol{b})$
$B(oldsymbol{c},oldsymbol{b})  o \mathtt{.c}(oldsymbol{c})$

$$\begin{array}{c} \begin{array}{c} & {\sf B}(n_0,n_1) \\ \hline n_0 = {\pmb c}, n_1 =? \end{array} & q_{16}({\pmb a},{\pmb b},n_0) \\ \hline & {\sf B}(n_0,n_1) \\ \hline & n_0 = {\pmb c}, n_1 = {\pmb b} \end{array} & q_9({\pmb a},n_1,n_0) \\ \hline & \begin{array}{c} {\sf b}(n_0,n_1) \\ \hline & n_0 = {\pmb c}, n_1 = {\pmb b} \end{array} & q_{15}(n_0,n_1) \\ \hline & \begin{array}{c} {\sf b}(n_0,n_1) \\ \hline & n_0 = {\pmb c}, n_1 \uparrow \end{array} & q_{14}(n_0,{\pmb b},n_1) \\ \hline & \begin{array}{c} {\sf c}(n_0) \\ \hline & n_0 = {\pmb c} \end{array} & q_{12}(n_0,{\pmb b}) \end{array}$$

 $\begin{array}{c} \textbf{State } \boldsymbol{q_{15}}(\boldsymbol{a},\boldsymbol{b}) \\ \hline \\ \textbf{B}(\boldsymbol{a},\boldsymbol{b}) \rightarrow \textbf{b}(\boldsymbol{a},\boldsymbol{b}) \textbf{.} \quad \begin{bmatrix} \boldsymbol{b}\boldsymbol{\mathcal{Z}} \end{bmatrix} \end{bmatrix} \end{array}$ 

 $\begin{array}{c} \textbf{State } \boldsymbol{q_{16}}(\boldsymbol{a},\boldsymbol{b},\boldsymbol{c}) \\ \hline & & \begin{bmatrix} \textbf{B}(\boldsymbol{a},\boldsymbol{b}) \rightarrow \textbf{b}(\boldsymbol{a},\boldsymbol{c}) \, \textbf{B}(\boldsymbol{c},\boldsymbol{b}) \, \textbf{.} & [b1] \end{bmatrix} \end{array}$