

14.12.2021

Seminar 11 – SLR parser

Ex.: Given the grammar $G = (\{E, T\}, \{+, (,), id, const\}, P, E)$

$$S \rightarrow E$$

P: (1) $E \rightarrow T$

$$(2) E \rightarrow E + T$$

$$(3) T \rightarrow (E)$$

$$(4) T \rightarrow id$$

$$(5) T \rightarrow const,$$

parse the sequence $w = id + const$ using an SLR parser.

I. Compute canonical collection of states @B David T.

$$s_0 = \text{closure}(\{[S \rightarrow .E]\}) = s_0 = \text{closure}(\{[S \rightarrow .E]\}) = \{[S \rightarrow .E], [E \rightarrow .T], [E \rightarrow .E + T], [T \rightarrow .(E)], [T \rightarrow .id], [T \rightarrow .const]\}$$

$$s_1 = \text{Goto}(s_0, E) = \text{closure}(\{[S \rightarrow E.], [E \rightarrow E. + T]\}) = \{[S \rightarrow E.], [E \rightarrow E. + T]\}$$

$$s_2 = \text{Goto}(s_0, T) = \text{closure}(\{[E \rightarrow T.]\}) = \{[E \rightarrow T.]\}$$

$$s_3 = \text{Goto}(s_0, id) = \text{closure}(\{[T \rightarrow id.]\}) = \{[T \rightarrow id.]\}$$

$$s_4 = \text{Goto}(s_0, const) = \text{closure}(\{[T \rightarrow const.]\}) = \{[T \rightarrow const.]\}$$

$$s_5 = \text{Goto}(s_0, () = \text{closure}(\{[T \rightarrow (.E)]\}) = \{[T \rightarrow (.E)], [E \rightarrow .T], [E \rightarrow .E + T], [T \rightarrow .(E)], [T \rightarrow .id], [T \rightarrow .const]\}$$

$$s_6 = \text{Goto}(s_1, +) = \text{closure}(\{[E \rightarrow E+.T]\}) = \{[E \rightarrow E+.T], [T \rightarrow .(E)], [T \rightarrow .id], [T \rightarrow .const]\}$$

$$s_7 = \text{Goto}(s_5, E) = \text{closure}(\{[T \rightarrow (E.)], [E \rightarrow E. + T]\}) = \{[T \rightarrow (E.)], [E \rightarrow E. + T]\}$$

$$\text{Goto}(s_5, T) = \text{closure}(\{[E \rightarrow T.]\}) = s_2$$

$$\text{Goto}(s_5, id) = \text{closure}(\{[T \rightarrow id.]\}) = s_3$$

$$\text{Goto}(s_5, const) = \text{closure}(\{[T \rightarrow const.]\}) = s_4$$

$Goto(s_5, () = \text{closure}(\{[T \rightarrow (.E)]\}) = s_5$

$s_8 = Goto(s_6, T) = \text{closure}(\{[E \rightarrow E + T.]\}) = \{[E \rightarrow E + T.]\}$

$Goto(s_6, id) = \text{closure}(\{[T \rightarrow id.]\}) = s_3$

$Goto(s_6, const) = \text{closure}(\{[T \rightarrow const.]\}) = s_4$

$Goto(s_6, () = \text{closure}(\{[T \rightarrow (.E)]\}) = s_5$

$s_9 = Goto(s_7,) = \text{closure}(\{[T \rightarrow (E).]\}) = \{[T \rightarrow (E).]\}$

$Goto(s_7, +) = \text{closure}(\{[E \rightarrow E + T]\}) = s_6$

II. Fill in SLR parse table

$\text{FOLLOW}(E) = \text{FOLLOW}(T) = \{\epsilon, +,)\}$

ACTION						GOTO		
	+	()	id	const	\$	E	T
0		Shift 5		Shift 3	Shift 4		1	2
1	Shift 6					accept		
2	Reduce 1		Reduce 1			Reduce 1		
3	Reduce 4		Reduce 4			Reduce 4		
4	Reduce 5		Reduce 5			Reduce 5		
5		Shift 5		Shift 3	Shift 4		7	2
6		Shift 5		Shift 3	Shift 4			8
7	Shift 6		Shift 9					
8	Reduce 2		Reduce 2			Reduce 2		
9	Reduce 3		Reduce 3			Reduce 3		

III. Parse the sequence @B Alin T.

Work stack	Input stack	Output
\$ 0	id + const \$	eps
\$ 0 id 3	+ const \$	eps
\$ 0 T 2	+ const \$	4
\$ 0 E 1	+ const \$	14

\$ 0 E 1 + 6	const \$	14
\$ 0 E 1 + 6 const 4	\$	14
\$ 0 E 1 + 6 T 8	\$	514
\$ 0 E 1	\$	2514
\$ accept	\$	2514