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

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

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

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

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

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

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

II. Fill in SLR parse table

FOLLOW(E) = 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