

Script generated by TTT

Title: Petter: Compiler Construction (04.06.2020)
- Precedence and Associativity

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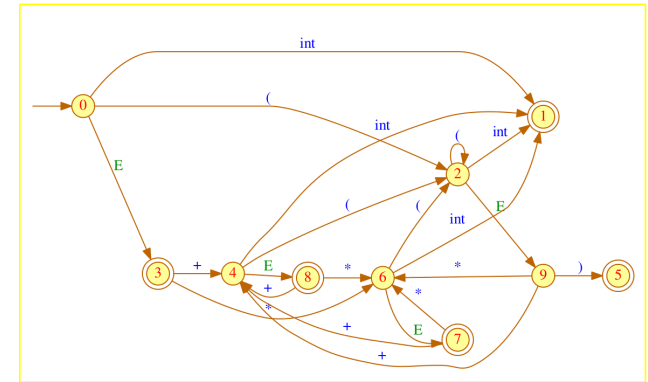
Precedences

Many parser generators give the chance to fix Shift-/Reduce-Conflicts by patching the action table either by hand or with *token precedences*.

... for example:

```

S' → E0
E  → E + E0
    | E * E1
    | ( E )2
    | int3
  
```



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```

Shift-/Reduce Conflict in state 8:

```

[E → E • + E0 ]
[E → E + E •0 , + ]
  
```

< $\gamma E + E, + \omega$ > ⇒ *Associativity*

action	\$	int	()	+	*
q ₀	S',0			s	s
q ₁	E,3		E,3	E,3	E,3
q ₂	s			s	s
q ₃	s			s	s
q ₄	s			s	s
q ₅	E,2		E,2	E,2	E,2
q ₆	s			s	s
q ₇	E,1		E,1	?	?
q ₈	E,0		E,0	?	?
q ₉	s			s	s

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+ *left associative*

action	\$	int	()	+	*
q ₀	S',0			s	s
q ₁	E,3		E,3	E,3	E,3
q ₂	s			s	s
q ₃	s			s	s
q ₄	s			s	s
q ₅	E,2		E,2	E,2	E,2
q ₆	s			s	s
q ₇	E,1		E,1	?	?
q ₈	E,0		E,0	E,0	?
q ₉	s			s	s

Precedences

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... for example:

$$\begin{array}{l}
 S' \rightarrow E^0 \\
 E \rightarrow E + E^0 \\
 \quad | \quad E * E^1 \\
 \quad | \quad (E)^2 \\
 \quad | \quad \text{int}^3
 \end{array}$$

Shift-/Reduce Conflict in state 7:

$$\begin{array}{l}
 [E \rightarrow E \bullet * E^1] \\
 [E \rightarrow E * E \bullet^1, *]
 \end{array}$$

$\langle \gamma E * E, * \omega \rangle \Rightarrow$ *Associativity*

* *right associative*

action	\$	int	()	+	*
q0	S',0			s	s
q1	E,3		E,3	E,3	E,3
q2	s			s	s
q3	s			s	s
q4	s		s	s	s
q5	E,2		E,2	E,2	E,2
q6	s		s	s	s
q7	E,1		E,1	?	s
q8	E,0		E,0	E,0	?
q9	s		s	s	s

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Shift-/Reduce Conflict in states 8, 7:

$$\begin{array}{l}
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$\langle \gamma E * E, + \omega \rangle$

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$\langle \gamma E + E, * \omega \rangle$

action	\$	int	()	+	*
q0	S',0			s	s
q1	E,3		E,3	E,3	E,3
q2	s			s	s
q3	s			s	s
q4	s		s	s	s
q5	E,2		E,2	E,2	E,2
q6	s		s	s	s
q7	E,1		E,1	?	s
q8	E,0		E,0	E,0	?
q9	s		s	s	s

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$\langle \gamma E + E, * \omega \rangle$

* *higher precedence*

+ *lower precedence*

action	\$	int	()	+	*
q0	S',0			s	s
q1	E,3		E,3	E,3	E,3
q2	s			s	s
q3	s			s	s
q4	s		s	s	s
q5	E,2		E,2	E,2	E,2
q6	s		s	s	s
q7	E,1		E,1	E,1	s
q8	E,0		E,0	E,0	s
q9	s		s	s	s

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