$Chapter\ 5 - HW02$

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5.3.1 解:

- 1) SDD 如下:

产生式	语法规则
1)$E \rightarrow E_1 + T$	$E.type = (E_1.type == integer \&\& T.type == integer)?integer : real$
2)$E \rightarrow T$	$E.type = T.type$
3)$T \rightarrow num.num$	$T.type = real$
4)$T \rightarrow num$	$T.type = integer$

- 2) 扩展后的 SDD 如下:

产生式	语法规则
1)$E \rightarrow E_1 T'+$	$if(E_1.type == integer \&\& T.type == integer)\{$ $\quad E.type = integer;$ $\quad E.post = E_1.post \parallel T.post \parallel "int";$ $\}else\{$ $\quad E.type = real;$ $\quad if(E_1.type == integer)\{$ $\quad\quad E_1.type = real;$ $\quad\quad E_1.post = E_1.post \parallel "intToReal";$ $\quad\}if(T.type == integer)\{$ $\quad\quad T.type = real;$ $\quad\quad T.post = T.post \parallel "intToReal";$ $\quad\}$ $\quad E.post = E_1.post \parallel T.post \parallel "float+";$ $\}$
2)$E \rightarrow T$	$E.type = T.type$ $E.post = T.post$
5)$T \rightarrow num.num$	$T.type = real$ $T.post = num.num$
7)$T \rightarrow num$	$T.type = integer$ $T.post = num$

其中, $post$ 属性为后缀符号串, $\parallel$ 符号为连接运算。

5.4.2 解：改写后的文法如下：

$$A \to 0A'$$
$$A' \to \{a\}BA' \mid B\{b\}A' \mid \epsilon$$
$$B \to 1B'$$
$$B' \to \{c\}AB' \mid A\{d\}B' \mid \epsilon$$

5.4.6 解：扩展后的 SDD 如下：

产生式	语法规则
1)$S \to B$	$B.ps = 10;$
2)$B \to B_1 B_2$	$B_1.ps = B.ps;$ $B_2.ps = B.ps;$ $B.le = B_1.le + B_2.le;$ $B.ht = max(B_1.ht, B_2.ht);$ $B.dp = max(B_1.dp, B_2.dp);$
3)$B \to B_1\ sub\ B_2$	$B_1.ps = B.ps;$ $B_2.ps = 0.7 * B.ps;$ $B.le = B_1.le + 0.7 * B_2.le;$ $B.ht = max(B_1.ht, B_2.ht - 0.25 * B.ps);$ $B.dp = max(B_1.dp, B_2.dp + 0.25 * B.ps);$
4)$B \to (B_1)$	$B_1.ps = B.ps;$ $B.le = B_1.le;$ $B.ht = B_1.ht;$ $B.dp = B_1.dp;$
5)$B \to text$	$B.le = getLe(B.ps, text.lexval);$ $B.ht = getHt(B.ps, text.lexval);$ $B.dp = getDp(B.ps, text.lexval);$

SDT 如下：

产生式	语义动作
1)$S \rightarrow$	$\{B.ps = 10; \}$
$\quad B$	
2)$B \rightarrow$	$\{B_1.ps = B.ps; \}$
$\quad B_1$	$\{B_2.ps = B.ps; \}$
$\quad B_2$	$\{B.le = B_1.le + B_2.le;$
	$B.ht = max(B_1.ht, B_2.ht);$
	$B.dp = max(B_1.dp, B_2.dp); \}$
3)$B \rightarrow$	$\{B_1.ps = B.ps; \}$
$\quad B_1 \ sub$	$\{B_2.ps = 0.7 * B.ps; \}$
$\quad B_2$	$\{B.le = B_1.le + 0.7 * B_2.le;$
	$B.ht = max(B_1.ht, B_2.ht - 0.25 * B.ps);$
	$B.dp = max(B_1.dp, B_2.dp + 0.25 * B.ps); \}$
4)$B \rightarrow ($	$\{B_1.ps = B.ps; \}$
$\quad B_1)$	$\{B.le = B_1.le;$
	$B.ht = B_1.ht;$
	$B.dp = B_1.dp; \}$
5)$B \rightarrow text$	$\{B.le = getLe(B.ps, text.lexval);$
	$B.ht = getHt(B.ps, text.lexval);$
	$B.dp = getDp(B.ps, text.lexval); \}$