Compilers Assignment 7

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(1)

Production	**Semantic Rule**
$\text{dnum} \rightarrow \text{num} \,.\, \text{snum}$	$\text{dnum} \,.\, val = \text{num} \,.\, val + \text{snum} \,.\, val \div \text{snum} \,.\, mult$
$\text{num} \rightarrow \text{num}_1 \text{digit}$	$\text{num} \,.\, val = \text{num}_1 \,.\, val \times 10 + \text{digit} \,.\, val$
$\text{num} \rightarrow \text{digit}$	$\text{num} \,.\, val = \text{digit} \,.\, val$
$\text{snum} \rightarrow \text{digit}\ \text{snum}_1$	$\text{snum} \,.\, val \rightarrow \text{digit} \,.\, val \times \text{snum} \,.\, mul + \text{snum}_1$
	$\text{snum} \,.\, mult = \text{snum}_1 \,.\, mult \times 10$
$\text{snum} \rightarrow \text{digit}$	$\text{snum} \,.\, val = \text{digit} \,.\, val$
	$\text{snum} \,.\, mult = 1$
$\text{digit} \rightarrow 0$	$\text{digit} \,.\, val \rightarrow 0$
$\vdots$	$\vdots$
$\text{digit} \rightarrow 9$	$\text{digit} \,.\, val = 9$

(2) SSD

Production	**Semantic Rule**
$S \to L_1 . L_2$	$S . val = L_1 . val + L_2 . val \times 2^{-L_2 . mult}$
$S \to L$	$S . val = L . val$
$L \to LB$	$L . val = L . val \times 2 + B . val$
	$L . mult = L . mult + 1$
$L \to B$	$L . val = B . val$
	$L . mult = 1$
$B \to 0$	$B . val = 0$
$B \to 1$	$B . val = 1$

(2) Production Process:

Input Stack	State	Value	Production Rule
1101.011	–	0	
101.011	1	1	
101.011	B	1	$B\,.\,val = 1$
101.011	L	1	$L\,.\,val = B\,.\,val,\ L\,.\,mult = 1$
01.011	$L1$	1,1	
01.011	LB	1,1	$B\,.\,val = 1$
01.011	L	3	$L\,.\,val = L\,.\,val \times 2 + B\,.\,val,\ L\,.\,mult = 2$
1.011	$L0$	3,0	
1.011	LB	3,0	$B\,.\,val = 0$
1.011	L	6	$L\,.\,val = L\,.\,val \times 2 + B\,.\,val,\ L\,.\,mult = 3$
.011	$L1$	6,1	
.011	LB	6,1	$B\,.\,val = 1$
.011	L	13	$L\,.\,val = L\,.\,val \times 2 + B\,.\,val,\ L\,.\,mult = 4$
011	$L.$	13.	
11	$L.0$	13.,0	
11	$L\,.\,B$	13.,0	$B\,.\,val = 0$
11	$L\,.\,L$	13.0	$L\,.\,val = B\,.\,val,\ L\,.\,mult = 1$

(2) Production Process:

Input Stack	State	Value	Production Rule
1	$L\,.\,L1$	13.0,1	
1	$L\,.\,LB$	13.0,1	$B\,.\,val = 1$
1	$L\,.\,L$	13.1	$L\,.\,val = L\,.\,val \times 2 + B\,.\,val,\ L\,.\,mult = 2$
$\varnothing$	$L\,.\,L1$	13.1,1	
$\varnothing$	$L\,.\,LB$	13.1,1	$B\,.\,val = 1$
$\varnothing$	$L\,.\,L$	13.3	$L\,.\,val = L\,.\,val \times 2 + B\,.\,val,\ L\,.\,mult = 3$
$\varnothing$	S	13.375	$S\,.\,val = L_1\,.\,val + L_2\,.\,val \times 2^{-L_2.mult}$, where $L_2\,.\,mult = 3$