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* Compiler Design Lab

Assignment-8:

Q1

1.1 CFG for arithmetic expressions involving +, -, *, / is

$E \longrightarrow E+T \mid E-T \mid T$.

$T \longrightarrow T*F \mid T/F \mid F$.

$F \longrightarrow$ Number.

→ Number denotes set of all real numbers.

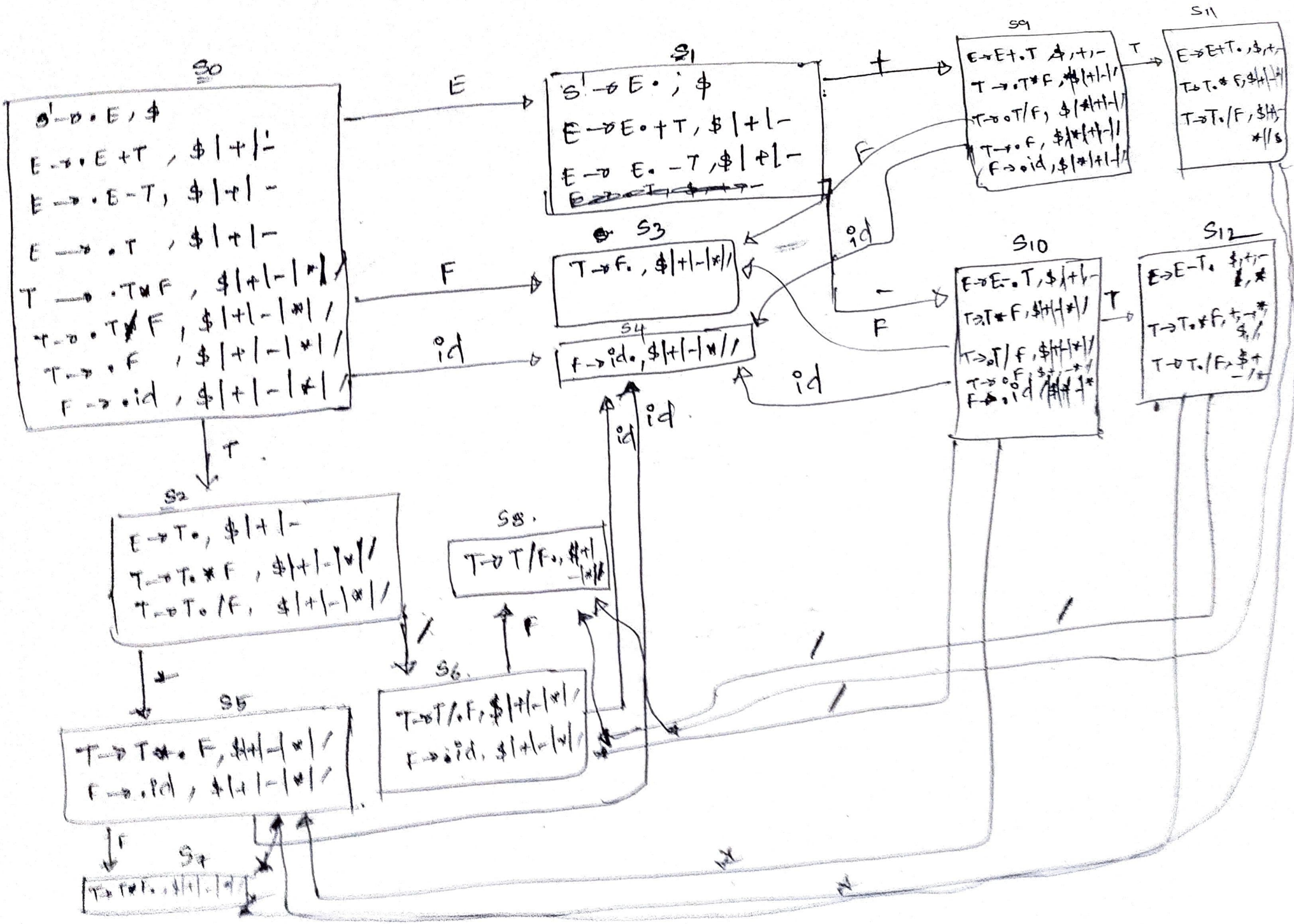
Precedence order.

$\{+,-\} < \{*,/\}$.

Start symbol : E.

To prove that Grammar is LR: we should not have any S-R, R-R conflicts.

	$	+	-	*	/	id	E	T	F
0									
1	Accept.	S_9	S_{10}			S_4	S_1	S_2	S_3
2	E→T	E→T	E→T	S_5	S_6				
3	T→F	T→F	T→F	T→F	T→F				
4	F→id	F→id	F→id	F→id	F→id				
5									
6						S_4			
7	T→T*F	T→T*F	T→T*F	T→T*F	T→T*F	S_4			S_7
8	T→T/F	T→T/F	T→T/F	T→T/F	T→T/F				S_8
9									
10						S_4		S_{11}	S_3
11						S_4		S_{12}	S_3
12				S_5	S_6				


I0
S' → . E , $
E → . E + T , $ | + | -
E → . E - T , $ | + | -
E → . T , $ | + | -
T → . T * F , $ | + | - | * | /
T → . T / F , $ | + | - | * | /
T → . F , $ | + | - | * | /
F → . id , $ | + | - | * | /
E
I1
S' → E . , $
E → E . + T , $ | + | -
E → E . - T , $ | + | -
+
S6
E → E + . T , $ | + | -
T → . T * F , $ | + | - | * | /
T → . T / F , $ | + | - | * | /
T → . F , $ | * | + | - | /
F → . id , $ | * | + | - | /
T
S9
E → E + T . , $ | + | -
T → T . * F , $ | * | + | - | /
T → T . / F , $ | * | + | - | /
S11
E → E + T . , $ | + | -
T → T . * F , $ | * | + | - | /
T → T . / F , $ | * | + | - | /
F
S3
T → F . , $ | + | - | * | /
id
S4
F → id . , $ | + | - | * | /
-
S10
E → E - . T , $ | + | -
T → . T * F , $ | + | - | * | /
T → . T / F , $ | + | - | * | /
T → . F , $ | * | + | - | /
F → . id , $ | * | + | - | /
T
S12
E → E - T . , $ | + | -
T → T . * F , $ | * | + | - | /
T → T . / F , $ | * | + | - | /
F
S2
E → T . , $ | + | -
T → T . * F , $ | * | + | - | /
T → T . / F , $ | * | + | - | /
*
S5
T → T * . F , $ | * | + | - | /
F → . id , $ | * | + | - | /
S8
T → T / F . , $ | * | + | - | /
/
S6
T → T / . F , $ | * | + | - | /
F → . id , $ | * | + | - | /
F
S7
T → T * F . , $ | * | + | - | /
id
id
id
*
*
/
/

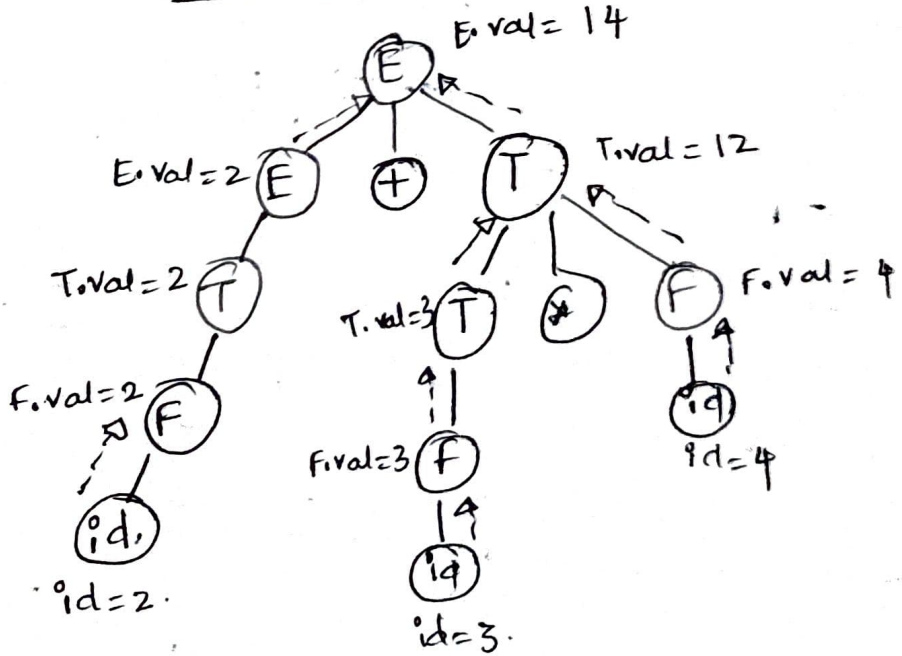
Hence we dont we any S-R, R-R conflicts therefore Grammar is suitable for LR parsing

1.2 Attribute Grammar is as follows.

$E \to E_1 + T$	$E.val := E_1.val + T.val$
$\mid E_1 - T$	$E.val := E_1.val - T.val$
$\mid T$	$E.val := T.val$
$T \to T_1 * F$	$T.val := T_1.val * F.val$
$\mid T_1 / F$	$T.val := T_1.val / F.val$
$\mid F$	$T.val := F.val$
$F \to id$	$F.val := id.lexval$

Example: 2+3*4

Parse tree



Attribute value Evaluated = 14

2+3*4