CS445 4/2/19

Bottom-Up SLR(1) Parsing (Next: LR(1)), LALR(1)

Conflicts: Shift/Reduce, Reduce/Reduce

0. S → E
1. E → E+T
2. E → T
3. T → T*F
4. T → F
5. F → (E)
6. F → ID

	FIRST	FOLLOW
S	(, ID	$
E	(, ID	$, +,)
T	(, ID	$, +,), *
F	(, ID	$, +,), *

I_0 = cl([S → .E])
S → .E
E → .E+T
E → .T
T → .T*F
T → .F
F → .(E)
F → .ID

I_1 = goto(I_0, E)
S → E.
E → E.+T

I_2 = goto(I_0, T)
E → T.
T → T.*F

I_3 = goto(I_0, F)
T → F.

I_4 = goto(I_0, ()
F → (.E)
E → .E+T
E → .T
T → .T*F
T → .F
F → .(E)
F → .ID

I_5 = goto(I_0, ID)
F → ID.

I_6 = goto(I_1, +)
E → E+.T
T → .T*F
T → .F
F → .(E)
F → .ID

I_7 = goto(I_2, *)
T → T*.F
F → .(E)
F → .ID

I_8 = goto(I_4, E)
F → (E.)
E → E.+T

I_9 = goto(I_6, T)
E → E+T.
T → T.*F

I_{10} = goto(I_7, F)
T → T*F.

I_{11} = goto(I_8,))
F → (E).

SLR(1) table

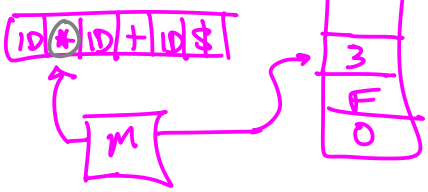
	ACTION						GOTO		
	ID	+	*	(	)	$	E	T	F
0	S5			S4			1	2	3
1		S6				Acc			
2	R2	R2	S7		R2	R2			
3	R4	R4	R4		R4	R4			
4	S5			S4			8	2	3
5	R6	R6			R6	R6			
6	S5			S4				9	3
7	S5			S4					10
8		S6			S11				
9	R1	S7			R1	R1			
10	R3	R3			R3	R3			
11	R5	R5			R5	R5			

[A → α.β, a]
[B → β.aγ]

Trace on pp 220: Fig. 4.32

Stack	Input	Action
0	ID+ID*ID$	shift
0 ID 5	+ID*ID$	reduce F→ID
0 F 3	+ID*ID$	reduce T→F
0 T 2	+ID*ID$	shift
0 T 2 * 7	ID+ID$	shift
0 T 2 * 7 ID 5	+ID$	reduce F→ID
0 T 2 * 7 F 10	+ID$	reduce T→T*F
0 T 2	+ID$	reduce E→T
0 E 1	+ID$	shift
0 E 1 + 6	ID$	shift
0 E 1 + 6 ID 5	$	reduce F→ID
0 E 1 + 6 F 3	$	reduce T→F
0 E 1 + 6 T 9	$	reduce E→E+T
0 E 1	$	

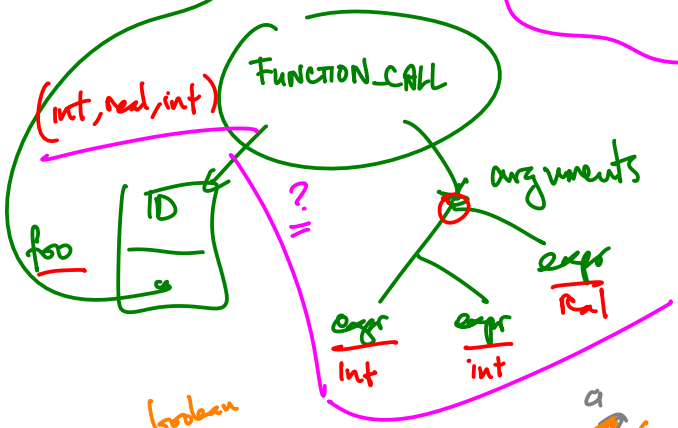
ACCEPT

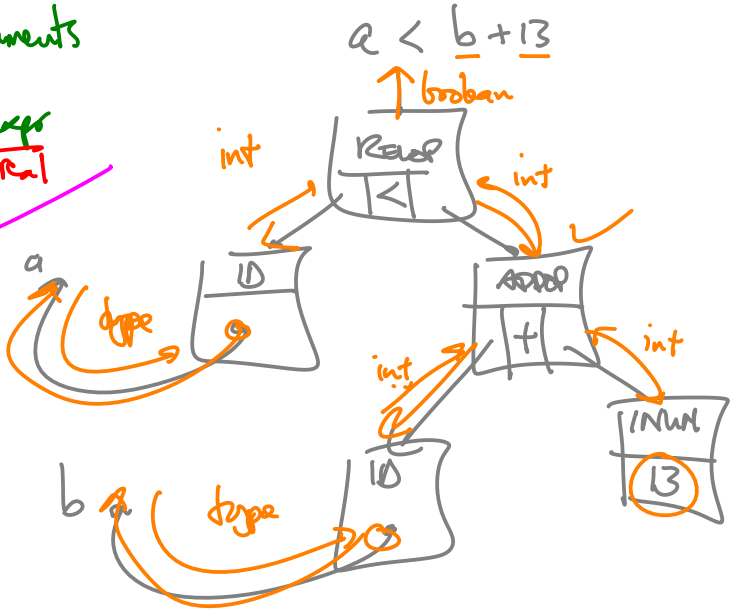


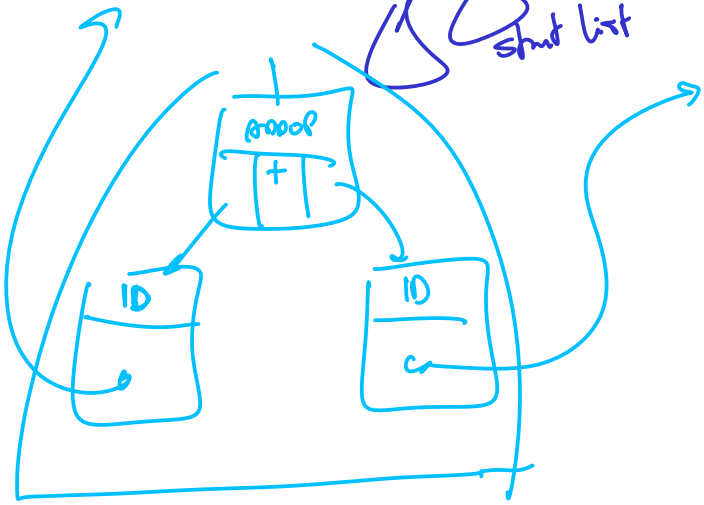
E ⇒ E+T
⇒ E+F
⇒ E+ID
⇒ T+ID
⇒ T*F+ID
⇒ T*ID+ID
⇒ F*ID+ID
⇒ ID*ID+ID

E → E+T
T → F
F → ID
E → T
T → T*F
F → ID
T → F
F → ID

Semantic Checking:



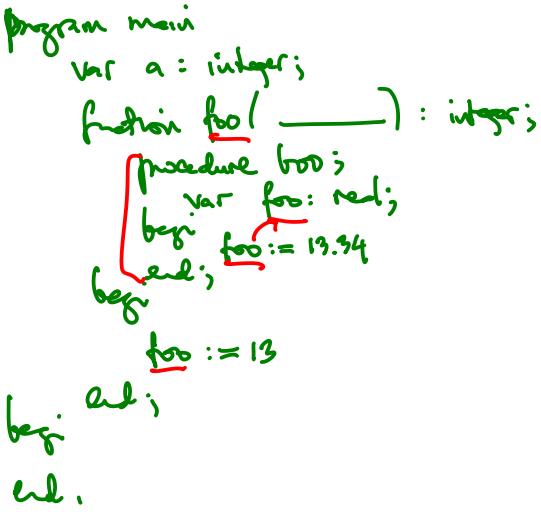




Question:
Functions must return something

foo := _____

Functions cannot change nonlocal vars


program main
var a : integer;
function foo(———) : integer;
procedure foo;
var foo: real;
begin
foo := 13.34
end;
begin
foo := 13
end;
begin
end.