REPORT ON LECTURE (5th NOVEMBER)

Translation of Control Statements and Semantic Rules

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A **control statement** is a statement that determines whether other statements will be executed.

For example : if(x>100) x=0;

A **Three Address Code** is a language in which statements are of the form :

x:= y op z

Where x , y , z are names , constants or compiler generated temporary variables and "op" stands for any operator .

If we consider the following example :

if(x>100)

| goto L1

end

goto L2

Here we define a few non-terminals for the above Grammar :

P -> Non-Terminal for Program

S -> Non-Terminal for Statements

E -> Non-Terminal for expressions

E -> E1 + E2

We can also assign attributes for the above non-terminals

P :- {code} ⟵ synth

S :- {code} ⟵ synth

{next} ⟵ inherited

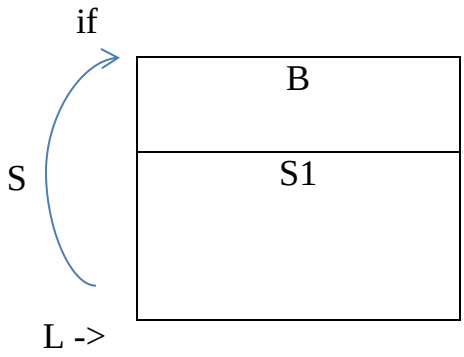
B :- {true}

inherited

{false}

E :- {code} ⟵ synth

Semantic Rules for the example can be depicted in the following manner :



L = newLabel()

S.next = L

B.true = newLabel()

B.false = S.next

S.code = B.code || Label(B.true) || S1.code

P.code = S.code || Label(L)

Id = E.addr

Now we can write the grammar for the above :

B -> B1||B2 | B1&&B2 | !B1

B -> B1 relop B2

Relop -> >= | <= | > | < | ==

Expression thus becomes :

If (E1 relop E2) goto B.true

Goto B.false

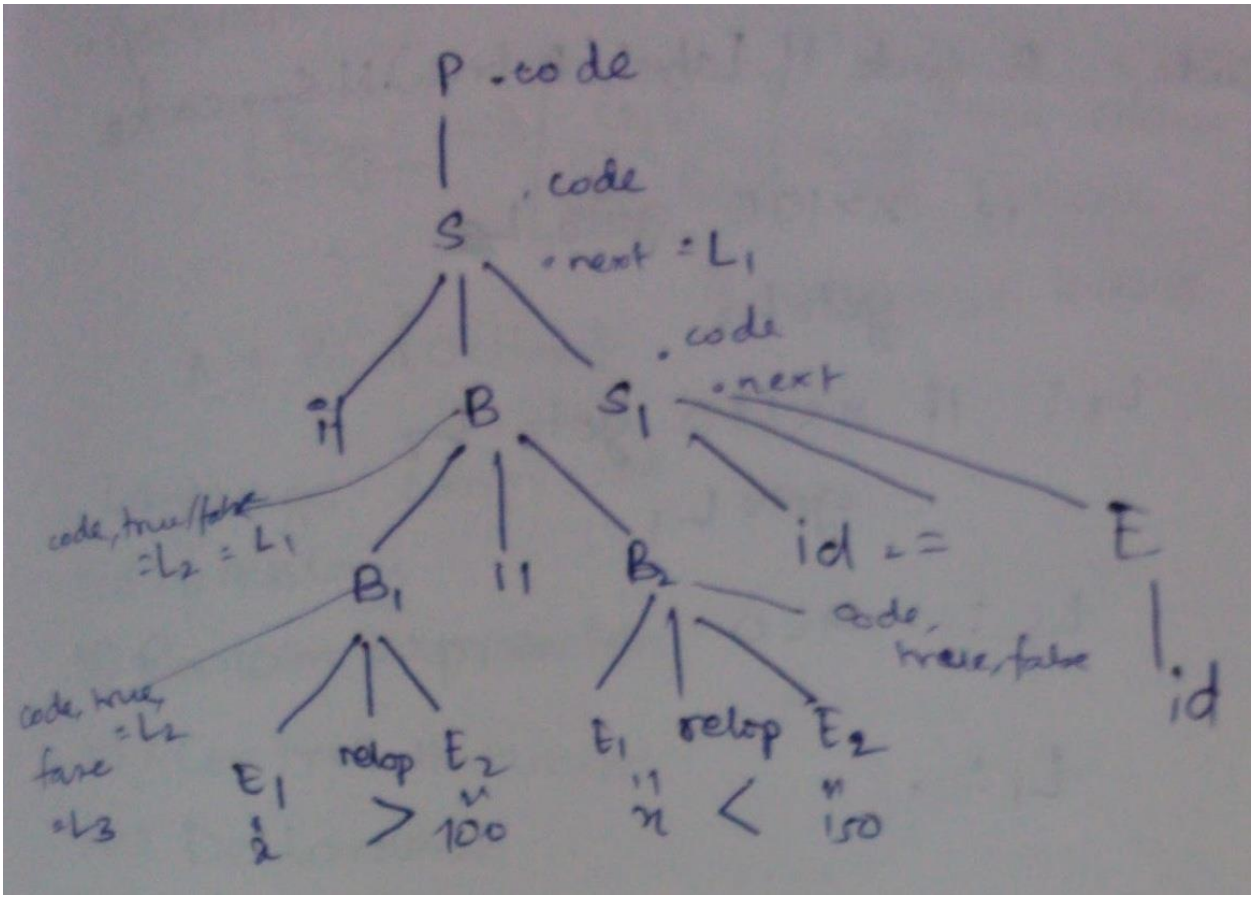
This can be rewritten as -

B.code = B1.code || Label(B1.false) || B2.code

Let us take another example to understand this better :

If (x > 100 || x <150)

X=0;



We can draw the above parse tree to demonstrate the above case

L1 = newLabel()

S.next = L1

L2 = newLabel()

B.true = L2

B.false = S.next

B1.true = L2

L3 = newLabel()

B1.false = L3

B2.true = L3

B2.false = L1

B1.code = if(x>100) goto B1.true

Goto L3

B2.code = if(x<150) goto B1.true

Goto L1

B.code = B1.code || Label(L3) || B2.code

= if(x>100) goto L2

Goto L3

L3 :

If(x<150) goto L2

Goto L1

S1.code := x=0

S.code := B.code || Label(B.true) || S1.code