



SNS COLLEGE OF TECHNOLOGY

COIMBATORE -35

(An Autonomous Institution)



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Boolean expressions

Boolean expressions have two primary purposes. They are used for computing the logical values. They are also used as conditional expression using if-then-else or while-do.

Consider the grammar

1. $E \rightarrow E \text{ OR } E$
2. $E \rightarrow E \text{ AND } E$
3. $E \rightarrow \text{NOT } E$
4. $E \rightarrow (E)$
5. $E \rightarrow \text{id relop id}$
6. $E \rightarrow \text{TRUE}$
7. $E \rightarrow \text{FALSE}$

The relop is denoted by $<$, $>$, $<=$, $>=$.

The AND and OR are left associated. NOT has the higher precedence then AND and lastly OR.

Production rule	Semantic actions
$E \rightarrow E1 \text{ OR } E2$	<pre>{E.place = newtemp(); Emit (E.place := E1.place 'OR' E2.place) }</pre>
$E \rightarrow E1 + E2$	<pre>{E.place = newtemp(); Emit (E.place := E1.place 'AND' E2.place) }</pre>
$E \rightarrow \text{NOT } E1$	<pre>{E.place = newtemp(); Emit (E.place := 'NOT' E1.place) }</pre>

E → (E1)	{E.place = E1.place}
E → id relop id2	{E.place = newtemp(); Emit ('if' id1.place relop.op id2.place 'goto' nextstar + 3); EMIT (E.place ':=' '0') EMIT ('goto' nextstat + 2) EMIT (E.place ':=' '1') }
E → TRUE	{E.place := newtemp(); Emit (E.place ':=' '1') }
E → FALSE	{E.place := newtemp(); Emit (E.place ':=' '0') }

The EMIT function is used to generate the three address code and the newtemp() function is used to generate the temporary variables.

The E → id relop id2 contains the next_state and it gives the index of next three address statements in the output sequence.

Here is the example which generates the three address code using the above translation scheme:

1. p>q AND r<s OR u>r
2. 100: **if** p>q **goto** 103
3. 101: t1:=0
4. 102: **goto** 104
5. 103: t1:=1
6. 104: **if** r>s **goto** 107
7. 105: t2:=0
8. 106: **goto** 108
9. 107: t2:=1
10. 108: **if** u>v **goto** 111
11. 109: t3:=0
12. 110: **goto** 112
13. 111: t3:= 1
14. 112: t4:= t1 AND t2
15. 113: t5:= t4 OR t3