



Practical - 7

2CS701 – Compiler Construction

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19BCE059

Aim:

To implement grammar rules for control statements, and Loop control.

Code:

practical7.1

```
%{
    #include "y.tab.h";
}%

alpha [A-Za-z]
digit [0-9]

%%

"for" return FOR;
"if" return IF;
"else" return ELSE;
[0-9]+ return NUM;
{alpha}({alpha}|{digit})* return ID;
"<=" return LE;
">=" return GE;
"==" return EQ;
"!=" return NE;
"||" return OR;
"&&" return AND;
. return yytext[0];

%%

int yywrap()
{
    return 1;
}
```

Practical7.y

```
%{
    #include <stdio.h>
    #include <stdlib.h>
    int flag = 0;
}%

%token ID NUM FOR LE GE EQ NE OR AND IF ELSE
%right '='
%left OR AND
%left '<' '>' LE GE EQ NE
%left '+' '-'
%left '*' '/'
%right UMINUS
%left '!'

%%

SS : SS S
   | S {
       printf("\nInput accepted!\n\n");
       exit(0);
   }
   ;

S : E ';' S
  | IFST S
  | FORST S
  | FORST
  | IFST
  | E
  ;

IFST : IF '(' E ')' S
      | IF '(' E ')' S ELSE S
      ;
```

```

FORST : FOR '(' E ';' E2 ';' E ')' DEF
      ;

DEF : '{ ' E ';' '}'
    | '{ ' S '}'
    |
    ;

E : E '=' E
  | E '+' E
  | E '-' E
  | E '*' E
  | E '/' E
  | E '<' E
  | E '>' E
  | E LE E
  | E GE E
  | E EQ E
  | E NE E
  | E OR E
  | E AND E
  | T
  |
  ;

E2 : E '<' E
    | E '>' E
    | E LE E
    | E GE E
    | E EQ E
    | E NE E
    | E OR E
    | E AND E
    |
    ;

T : ID
  | NUM

```

```

;

%%

void main()
{
    printf("Enter code having loop controls and control
statements (if, else, >=, for, etc.) : ");
    yyparse();
}

void yyerror()
{
    printf("\nSyntax Error!\n\n");
    flag = 1;
}

```

Output:

```

1 %{
2     #include "y.tab.h";
3 %}
4
5 alpha [A-Za-z]
6 digit [0-9]
7
8 %%
9
10 "for" return FOR;
11 "if" return IF;
12 "else" return ELSE;
13 "[0-9]+" return NUM;
14 "{alpha}({alpha}|{digit})*" return ID;
15 "<=" return LE;
16 ">=" return GE;
17 "==" return EQ;
18 "!=" return NE;
19 "||" return OR;
20 "&&" return AND;
21 . return yytext[0];
22
23 %%
24
25 int yywrap()
26 {
27     return 1;
28 }

```

The screenshot shows a text editor window titled 'practical7.y' with the following code:

```

1 %{
2     #include <stdio.h>
3     #include <stdlib.h>
4     int flag = 0;
5 %}
6
7 %token ID NUM FOR LE GE EQ NE OR AND IF ELSE
8 %right '='
9 %left OR AND
10 %left '<' '>' LE GE EQ NE
11 %left '+' '-'
12 %left '*' '/'
13 %right UMINUS
14 %left '!'
15
16 %%
17
18 SS : SS S
19   | S {
20       printf("\nInput accepted!\n\n");
21       exit(0);
22   }
23 ;
24
25 S : E ';' S
26   | IFST S
27   | FORST S
28   | FORST
29   | IFST
30   | E
31   |
32 ;

```

The screenshot shows the continuation of the text editor window 'practical7.y' with the following code:

```

58 | E AND E
59 | T
60 |
61 ;
62
63 E2 : E '<' E
64     | E '>' E
65     | E LE E
66     | E GE E
67     | E EQ E
68     | E NE E
69     | E OR E
70     | E AND E
71     |
72 ;
73
74 T : ID
75     | NUM
76 ;
77
78 %%
79
80 void main()
81 {
82     printf("Enter code having loop controls and control statements (if, else, >=, for, etc.) : ");
83     yyparse();
84 }
85
86 void yyerror()
87 {
88     printf("\nSyntax Error!\n\n");
89     flag = 1;
90 }

```

```

Activities Terminal Nov 3 3:52 PM
nirma@nirma-63: ~/Downloads

nirma@nirma-63:~/Downloads$ yacc -d practical7.y
practical7.y: warning: 71 shift/reduce conflicts [-Wconflicts-sr]
practical7.y: warning: 187 reduce/reduce conflicts [-Wconflicts-rr]
nirma@nirma-63:~/Downloads$ lex practical7.l
nirma@nirma-63:~/Downloads$ gcc lex.yy.c y.tab.c -ll
practical7.l:2:23: warning: extra tokens at end of #include directive
 2 | #include "y.tab.h";
   |
y.tab.c: In function 'yyparse':
y.tab.c:1329:16: warning: implicit declaration of function 'yylex' [-Wimplicit-function-declaration]
1329 |     yychar = yylex ();
      |
y.tab.c:1465:7: warning: implicit declaration of function 'yyerror'; did you mean 'yyerrok'? [-Wimplicit-function-declaration]
1465 |     yyerror (YY_("syntax error"));
      |
practical7.y: At top level:
practical7.y:86:6: warning: conflicting types for 'yyerror'
 86 | void yyerror()
      |
y.tab.c:1465:7: note: previous implicit declaration of 'yyerror' was here
1465 |     yyerror (YY_("syntax error"));
      |
nirma@nirma-63:~/Downloads$ ./a.out
Enter code having loop controls and control statements (if, else, >=, for, etc.) : if(x){y=5;}else{y=3;}

Input accepted!

nirma@nirma-63:~/Downloads$

```

```

Activities Terminal Nov 3 3:54 PM
nirma@nirma-63: ~/Downloads

y.tab.c:1465:7: note: previous implicit declaration of 'yyerror' was here
1465 |     yyerror (YY_("syntax error"));
      |
nirma@nirma-63:~/Downloads$ ./a.out
Enter code having loop controls and control statements (if, else, >=, for, etc.) : if(x){y=5;}else{y=3;}

Input accepted!

nirma@nirma-63:~/Downloads$ ./a.out
Enter code having loop controls and control statements (if, else, >=, for, etc.) : if(x{y=34;})z=3;

Syntax Error!

nirma@nirma-63:~/Downloads$ ./a.out
Enter code having loop controls and control statements (if, else, >=, for, etc.) : else{y=43}

Input accepted!

nirma@nirma-63:~/Downloads$ ./a.out
Enter code having loop controls and control statements (if, else, >=, for, etc.) : for(i=0;i<3;i++);

Input accepted!

nirma@nirma-63:~/Downloads$ ./a.out
Enter code having loop controls and control statements (if, else, >=, for, etc.) : for(i=0;i<9)

Syntax Error!

nirma@nirma-63:~/Downloads$ ./a.out
Enter code having loop controls and control statements (if, else, >=, for, etc.) : for(;i<7;);

Input accepted!

nirma@nirma-63:~/Downloads$

```