

## UE19CS351

### COMPILER DESIGN

#### **PROBLEM STATEMENT :** MINI COMPILER FOR C PROGRAMMING LANGUAGE

NAME : PRIYA MOHATA

SRN : PES2UG19CS301

SECTION : E

#### **PROGRAM :**

#### **LEXER.L:**

```

1  %[
2  #define YYSTYPE char*
3  #include "y.tab.h"
4  #include<stdio.h>
5  extern void yyerror(const char*);
6  %]
7
8  digit [0-9]
9  letter [a-zA-Z]
10 id {letter}{letter}{digit}*
11 digits {digit}+
12 opFraction (\.{digits})?
13 opExponent ([Ee][+-]?{digits})?
14 number {digits}{opFraction}{opExponent}
15 %%
16
17 \\\/(.*) ;
18 [\t\n] ;
19 "int" {return T_INT;}
20 "char" {return T_CHAR;}
21 "double" {return T_DOUBLE;}
22 "float" {return T_FLOAT;}
23 "while" {return T_WHILE;}
24 "if" {return T_IF;}
25 "else" {return T_ELSE;}
26 "do" {return T_DO;}
27 "#include" {return T_INCLUDE;}
28 "main" {return T_MAIN;}
29 \".*\n" {return T_STRLITERAL;}
30 "==" {return T_EQCOMP;}
31 "!=" {return T_NOTEQUAL;}
32 ">=" {return T_GREATEREQ;}
33 "<=" {return T_LESSEREQ;}
34 "(" {return *yytext;}
35 ")" {return *yytext;}
36 "." {return *yytext;}
37 "," {return *yytext;}
38 "{" {return *yytext;}
39 "}" {return *yytext;}

```

```

lexer.l
39  "}" {return *yytext;}
40  "*" {return *yytext;}
41  "+" {return *yytext;}
42  "-" {return *yytext;}
43  ";" {return *yytext;}
44  "/" {return *yytext;}
45  "=" {return *yytext;}
46  "<" {return *yytext;}
47  ">" {return *yytext;}
48  {number} {return T_NUM;}
49  {id}\\.h {return T_HEADER;}
50  {id} {return T_ID;}
51  . {}
52  %%

```

### **PARSER.Y:**

```

parser.y
1  %{
2  #include<stdio.h>
3  #include<stdlib.h>
4  #include<string.h>
5
6  void yyerror(char* s);
7  int yylex();
8  extern int yylineno;
9  %}
10
11 %token T_INT T_DOUBLE T_FLOAT T_CHAR T_WHILE T_DO T_STRLITERAL T_IF T_ELSE T_INCLUDE T_MAIN T_EQCOMP T_NOTEQUAL T_GREATEREQ T_LESSEREQ T_NUM
12
13 %start START
14
15 %%
16 START : PROG {printf("Valid syntax\n");YYACCEPT;}
17 ;
18 PROG : T_INCLUDE'<'T_HEADER'>'PROG
19 | MAIN PROG
20 | DECLR';'PROG
21 | ASSGN';'PROG
22 |
23 ;
24 DECLR : TYPE LISTVAR
25 ;
26 LISTVAR : LISTVAR','T_ID
27 | T_ID
28 ;
29 TYPE : T_INT
30 | T_FLOAT
31 | T_DOUBLE
32 | T_CHAR
33 ;
34 ASSGN : T_ID'='EXPR
35 ;

```

```

36  Expr      :  Expr Rel_Op E
37  |
38  ;
39  Rel_Op    :  T_LESSEREQ
40  |
41  | T_GREATEREQ
42  | T_LT
43  | T_GT
44  | T_EQCOMP
45  | T_NOTEQUAL
46  ;
47  E         :  E '+' T
48  |
49  | E '-' T
50  |
51  | T
52  ;
53  T         :  T '*' F
54  |
55  | T '/' F
56  |
57  | F
58  ;
59  F         :  '(' Expr ')'
60  |
61  | T_ID
62  |
63  | T_NUM
64  ;
65  MAIN : TYPE T_MAIN('EMPTY_LISTVAR') '{ STMT }';
66
67  EMPTY_LISTVAR : LISTVAR
68  |
69  ;
70  STMT : STMT_NO_BLOCK STMT
71  |
72  | BLOCK STMT
73  ;
74
75  %nonassoc T_IFX;
76  %nonassoc T_ELSE;
77
78  STMT_NO_BLOCK : DECLR ';'
79  |
80  | ASSGN ';'
81  |
82  | T_IF COND STMT %prec T_IFX
83  |
84  | T_IF COND STMT T_ELSE STMT
85  |
86  | WHILE
87  ;
88
89  BLOCK : '{ STMT }';
90
91  WHILE : T_WHILE '(' COND ')' WHILE_2;
92
93  COND : EXPR
94  |
95  | ASSGN
96  ;
97
98  WHILE_2 : '{ STMT }'
99  |
100 | ';'
101 ;
102
103 %%
104 void yyerror(char *s)
105 {
106     printf("Error : %s at %d\n",s,yylineno);
107 }
108
109 int main(int argc,char* argv[])
110 {
111     yyparse();
112     return 0;
113 }

```

**MAKEFILE.MK:**

```

M makefile.mk
1  LEX = lex
2  YACC = yacc -d
3
4  CC = gcc
5
6  parser: y.tab.o lex.yy.o
7      $(CC) -o parser y.tab.o lex.yy.o -ll -ly
8
9  lex.yy.o: lex.yy.c y.tab.h
10 lex.yy.o y.tab.o: y.tab.h
11
12 y.tab.c y.tab.h: parser.y
13     $(YACC) -v parser.y
14
15 lex.yy.c: lexer.l
16     $(LEX) lexer.l
17
18 clean:
19     -rm -f *.o lex.yy.c *.tab.* parser *.output
20
21

```

### OUTPUT SCREENSHOTS:

input.c

```

1  #include<stdio.h>
2  main(){
3      int a=10;
4      int b,x,z;
5      int sum=a+b;
6      printf("Sum=%d",sum);
7      printf("hello world");
8      return 0;
9  }
10

```

```
apple@Apples-MacBook-Air Assignment-1 % make -f makefile.mk
yacc -d -v parser.y
conflicts: 32 shift/reduce
gcc -c -o y.tab.o y.tab.c
gcc -c -o lex.yy.o lex.yy.c
gcc -o parser y.tab.o lex.yy.o -ll -ly
ld: warning: object file (/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/lib/libl.a(libyywrap.o)) was built for newer macOS version (12.1) than being linked (12.0)
apple@Apples-MacBook-Air Assignment-1 % ./a.out < input.c

Valid syntax
apple@Apples-MacBook-Air Assignment-1 %
```

```
C input.c > ...
1  #include<stdio.h>
2  main(){
3      int a=10;
4      int b,x,z;
5      int sum=a+b;
6      printf("Sum=%d",sum);
7      printf("hello world");
8      return 0;
9  }
10
```

```
apple@Apples-MacBook-Air Assignment-1 % ./a.out < input.c
```

```
Error : syntax error at 1
```

```
apple@Apples-MacBook-Air Assignment-1 %
```