UCS 1602 - Compiler Design

Exercise 2 - Implementation of Lexical Analyzer using LEX tool

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Semester: VI

Date: February 9, 2021

Aim:

To create lexical analyser using LEX tool.

Program

```
%{
#include <stdio.h>
#include <string.h>
pre_process ^#(.)*
line_comment
                 multi_comment
keyword
→ auto|break|case|char|const|continue|default|do|double|else|enum|extern|float|for|goto|if|int|lon
             [a-zA-Z_{-}]([a-zA-Z0-9_{-}])*
id
function
             \{id\}\setminus((.)*\setminus)
realConst (\ + \ -)?[1-9][0-9]*\ .[0-9]+
intConst (\+|\-)?[1-9][0-9]*
charConst
           \'[a-zA-Z]\'
               \\"[a-z \A-Z]*\"
stringConst
assignOp =
bitwiseOp "^"|"&"|"|"|"<<"|">>"
arithAssignOp "+="|"-="|"*="|"\="|"%="
relOp <|<=|>|>=|=|!=
arithOp "+"|"-"|"*"|"/"|"%"
logicOp &&|\\|\||!
separators ";"|","|"."|"["|"]"|"("|")"|"{"|"}"|"["|"]"
/*printf(" | %25s | %-25s |\n", yytext, "Function call");*/
%%
                 {printf(" | %25s | %-25s | \n", yytext, "Keyword");}
{keyword}
{function}
                            | %25s | %-25s |\n", yytext, "Function call");}
                 {printf("
                            | %25s | %-25s |\n", yytext, "Identifier");}
{id}
                 {printf("
                            | %25s | %-25s |\n", yytext, "Real const");}
| %25s | %-25s |\n", yytext, "Integer Constant");}
{realConst}
                 {printf("
{intConst}
                 {printf("
                            | %25s | %-25s |\n", yytext, "Bitwise Operator");}
{bitwiseOp}
                 {printf("
                 {printf(" | %25s | %-25s |\n", yytext, "Assignment Operator");}
{assignOp}
```

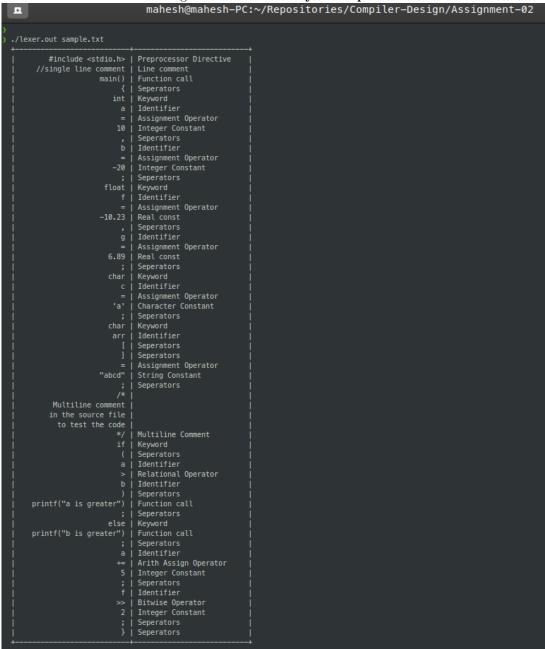
{arithAssignOp} {printf(" | %25s | %-25s |\n", yytext, "Arith Assign Operator");}

```
{arithOp}
                 {printf(" | %25s | %-25s |\n", yytext, "Arithmetic Operator");}
                 {printf(" | %25s | %-25s | \n", yytext, "Logical Operator");}
{logicOp}
                 {printf(" | %25s | %-25s |\n", yytext, "Relational Operator");}
{relOp}
                 {printf(" | %25s | %-25s | \n", yytext, "Character Constant");}
{charConst}
{\text{stringConst}} \{\text{printf(" | \%25s | \%-25s |\n", yytext, "String Constant");}} \{\text{separators}\} \{\text{printf(" | \%25s | \%-25s |\n", yytext, "Separators");}} \{\text{pre_process}\} \{\text{printf(" | \%25s | \%-25s |\n", yytext, "Preprocessor Directive");}} \}
{line_comment} {printf(" | %25s | %-25s | \n", yytext, "Line comment");}
{multi_comment} {
    char *lines = strtok(yytext, "\n");
    while(lines){
        printf(" | %25s | ", lines);
        lines = strtok(NULL, "\n");
        printf("%-25s |\n",(lines!=NULL)?" ": "Multiline Comment");}
.|\n {}
%%
int main(int argc, char **argv)
    if(argc != 2){
        fprintf(stderr, "Please Enter file as second argument!\n");
        return 1;
    yyin = fopen(argv[1], "rt");
    if(yyin == NULL){
        fprintf(stderr, "File not found!\n");
        return 1;
    printf(" +-----+\n");
    yylex();
    printf(" +-----+\n");
}
```

Figure 1: Sample Program file

```
lexer.l
           sample.txt X
Assignment-02 > ≧ sample.txt
     #include <stdio.h>
      //single line comment
   3
      main() {
           int a = 10, b = -20;
   4
   5
           float f = -10.23, g = 6.89;
           char c = 'a';
   6
           char arr[] = "abcd";
   7
      /*
   8
      Multiline comment
   9
      in the source file
  10
      to test the code
  11
  12
      */
           if (a > b)
  13
               printf("a is greater");
  14
  15
           else
               printf("b is greater");
  16
           a += 5;
  17
  18
           f >> 2;
  19
```

Figure 2: Lexical analysis output



Learning Outcomes

- 1. We learn to write regular expressions to identify tokens
- 2. We learn to combine regular expressions to identify complex tokens like functions
- 3. We learn to work with LEX tool to match regular expressions
- 4. We learn to design lexical analyser using LEX tool