Compiler Design

Assignment – 2: Introduction to LEX Tool

Q-1) What is a LEX tool? Why it is used?

LEX Tool:

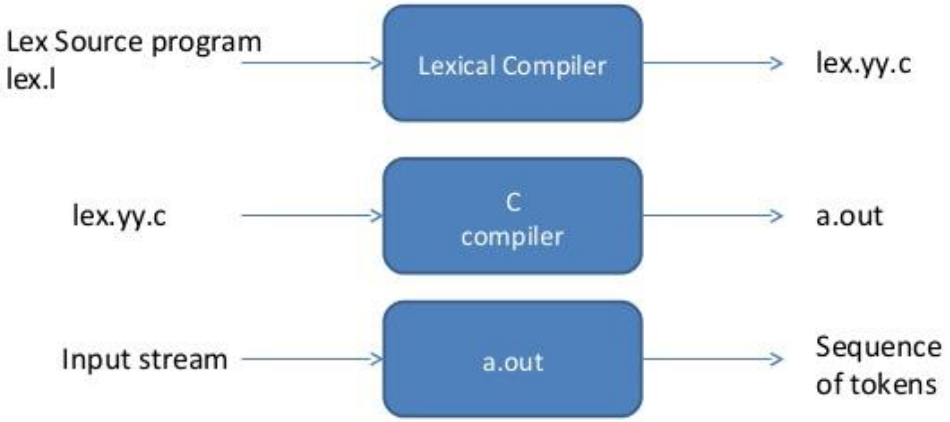
- Lex is a computer program that generates lexical analyzers scanners or lexers.
- Lex is commonly used with the yacc parser generator.
- Lex reads an input stream specifying the lexical analyzer and writes source code which implements the lexical analyzer in the C programming language.
- FLEX (fast lexical analyzer generator) is a very good lex tool which is generating lexical analyzers (scanners or lexers) written by Vern Paxson in C around 1987. It is used together with Berkeley Yacc parser generator or GNU Bison parser generator.
- Moreover, Flex and Bison both are more flexible than Lex and Yacc and produces faster code.

Use of Lex:

- Input file describes the lexical analyzer to be generated named lex.l is written in lex language.
- The lex compiler transforms lex.l to C program, in a file that is always named lex.yy.c.
- The C compiler compile lex.yy.c file into an executable file called a.out.
- The output file a.out take a stream of input characters and produce a stream of tokens.

Q-2) What is the input and output to LEX tool?

Lexical Analyzer Generator - Lex



- **Input:** Lex.l file OR Lex source file
- **Output**: Sequence of tokens

Q-3) Explain the working of a Lexical Analyzer created using a LEX tool through a diagram.

- The Working of a Lexical Analyzer Created Using a Lex Tool:
  - An input file describes the lexical analyzer to be generated named lex.l is written in lex language. The lex compiler transforms lex.l to C program, in a file that is always named lex.yy.c.
  - The output file a.out take a stream of input characters and produce a stream of tokens.
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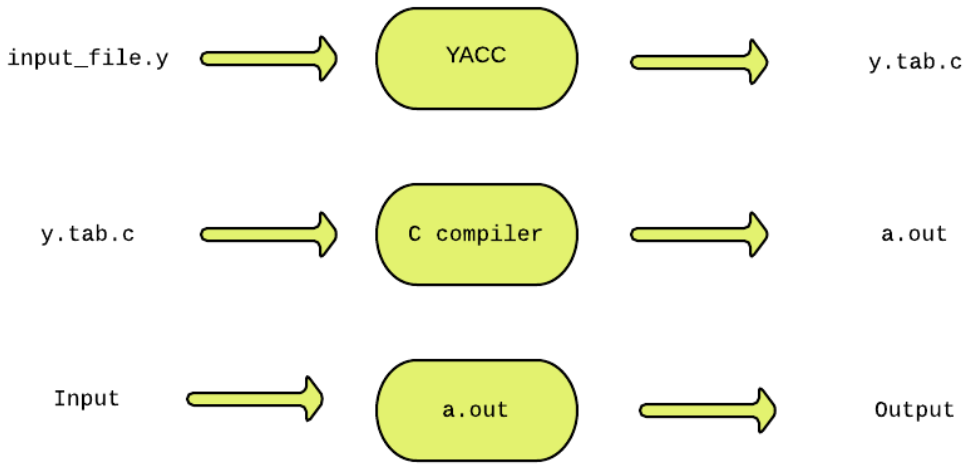

Q-4) Briefly explain the structure of a LEX program.

- There are three sections in the structure of Lex Program:

1) **Definition Section:**
   - The definition section contains the declaration of variables, regular definitions, manifest constants.
   - In the definition section, text is enclosed in **"%{%}"** brackets.
   - Anything written in these brackets is copied directly to the file lex.yy.c

Syntax

```
%{
// Definitions
%}
```

2) **Rules Section:**

   - The rules section contains a series of rules in the form: pattern action and pattern must be unintended and action begin on the same line in {} brackets. The rule section is enclosed in **"%% %%".**

Syntax:

```
%%
        pattern action
%%.
```

3) User Code Section:

- This section contains C statements and additional functions. We can also compile these functions separately and load with the lexical analyzer.

Syntax:

```
%{
 // Definitions
%}%%
Rules
%%
User code section
```

Q-5) What is the reason of writing yylex() function in LEX program?

- The reason of writing yylex() function in Lex Program is as depicted below:
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    - The function yylex() is automatically generated by the flex when it is provided with a .l file and this yylex() function is expected by parser to call to retrieve tokens from current/this token stream.

    - The function yylex() is the main flex function which runs the Rule Section and extension (.l) is the extension used to save the programs.

Q-6) Write a LEX program to print Your Name and your enrolment number on the screen. (Source code + Output)

- **CODE:**

```
%option noyywrap
%{
#include<stdio.h>
%}
%%
%%
int main()
{
printf("Name : Arjun Vankani \n
Enrollment Number : 180210107060 \n
Sem : 7th \n
Subject: Compiler Design");
yylex();
return 0;
}
```

- **Output:**

C:\Flex Windows\EditPlusPortable\ASSIGNMENT\Program1.exe

```
Name : Arjun Vankani
 Enrollment Number : 180210107060
 Sem : 7th
 Subject: Compiler Design
```