

College Of Engineering Trivandrum

Compiler Design Lab

CS431



Submitted By:

Neethu S

S6 CSE Roll No:42

TVE18CS043

Department of Computer Science

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Cycle 3 Experiment 1

1 LEX Programs

1.1 Aim

1. Write a LEX program to identify integers, decimals and exponents
2. Write a LEX program to count the number of characters, words and lines
3. Write a LEX program to eliminate comment lines in a given C program
4. Write a LEX program to count the number of vowels and consonants in a given string
5. Write a LEX program to check whether a given number is even or odd

1.2 Theory

- lex.l is an input file written in a language which describes the generation of lexical analyzer. The lex compiler transforms lex.l to a C program known as lex.yy.c.
- lex.yy.c is compiled by the C compiler to a file called a.out.
- The output of C compiler is the working lexical analyzer which takes stream of input characters and produces a stream of tokens.

Structure of a LEX program

Lex program will be in following form

declarations

%%

translation rules

%%

auxiliary functions

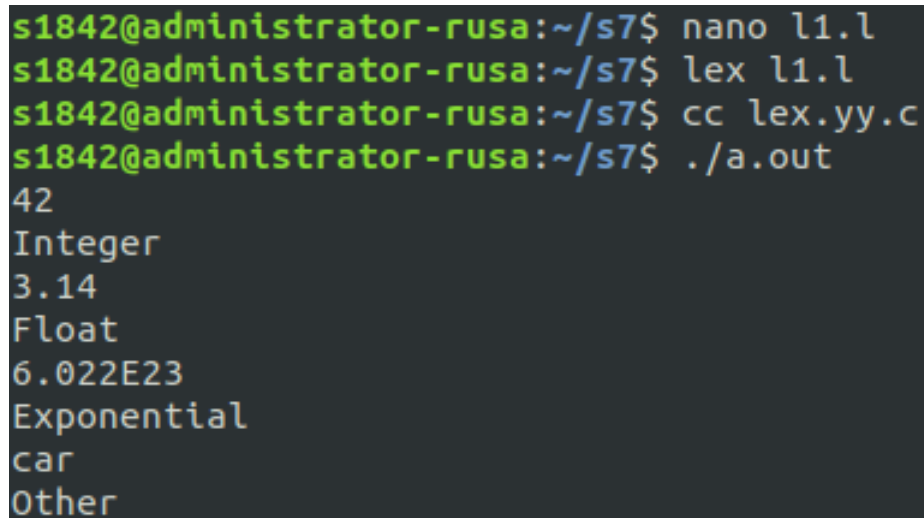
1.3 Code & Output

1 LEX program to identify integers, decimals and exponents

```
%{
#include<stdio.h>
%}
%%
[0-9]+ printf("Integer");
[0-9]+ "." [0-9]+ printf("Float");
[0-9]+ E[? \- 0-9] [0-9]* printf("Exponential");
[? \- 0-9] [0-9]* ? . [0-9]+ E[? \- 0-9] [0-9]* printf("Exponential");
.* printf("Other");
%%

int yywrap(void)
{
return 1;
}

int main()
{
yylex();
return 0;
}
```



```
s1842@administrator-rusa:~/s7$ nano l1.l
s1842@administrator-rusa:~/s7$ lex l1.l
s1842@administrator-rusa:~/s7$ cc lex.yy.c
s1842@administrator-rusa:~/s7$ ./a.out
42
Integer
3.14
Float
6.022E23
Exponential
car
Other
```

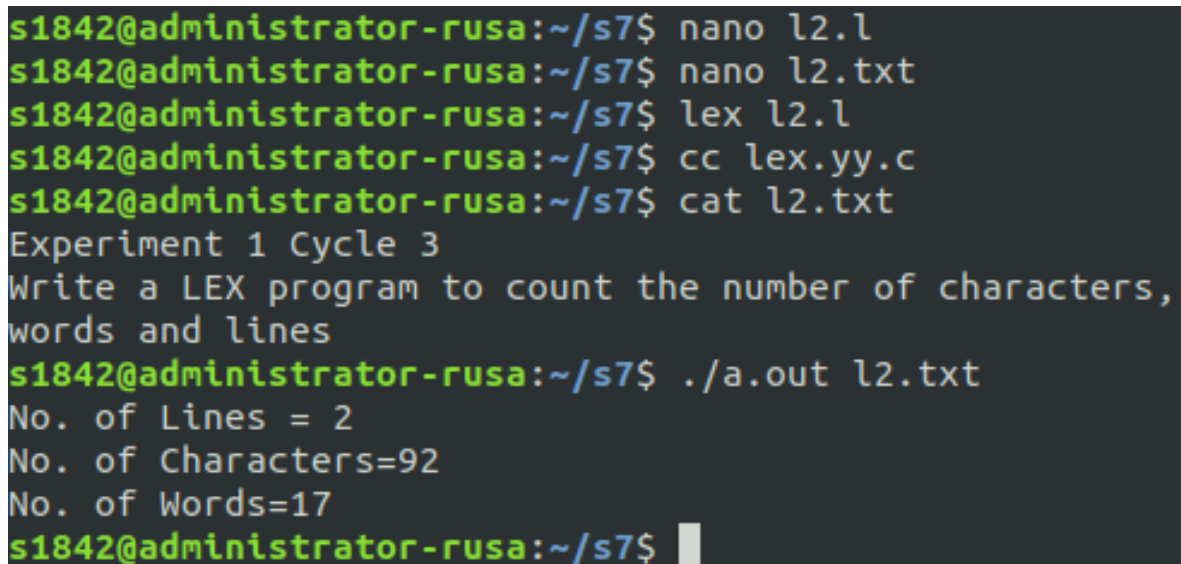
2 LEX program to count the number of characters, words and lines

```
%{
int nlines,nwords,nchars;
}%

%%
\n {
nchars++;nlines++;
}

[^ \n\t]+ {nwords++, nchars=nchars+yyleng;}
. {nchars++;}
%%
int yywrap(void)
{
return 1;
}
int main(int argc, char*argv[])
{
yyin=fopen(argv[1],"r");
yylex();
printf("No. of Lines = %d\nNo. of Characters=%d\nNo. of
Words=%d\n",nlines,nchars,nwords);

return 0;
}
```



```
s1842@administrator-rusa:~/s7$ nano l2.l
s1842@administrator-rusa:~/s7$ nano l2.txt
s1842@administrator-rusa:~/s7$ lex l2.l
s1842@administrator-rusa:~/s7$ cc lex.yy.c
s1842@administrator-rusa:~/s7$ cat l2.txt
Experiment 1 Cycle 3
Write a LEX program to count the number of characters,
words and lines
s1842@administrator-rusa:~/s7$ ./a.out l2.txt
No. of Lines = 2
No. of Characters=92
No. of Words=17
s1842@administrator-rusa:~/s7$
```

3 LEX program to eliminate comment lines in a given C program

```
%{
#include<stdio.h>
%}
%%
\\\/.* ;
\\\/*(.*\n)*.*\\\/ ;
%%
main()
{
yyin=fopen("l3.c","r");
yylex();
}
int yywrap()
{
return 1;
}
```

```
s1842@administrator-rusa:~/s7$ cat l3.c
// Simple C program to display "Hello World"

// Header file for input output functions
#include <stdio.h>

/* main function - where the execution of program begin
s */
int main()
{

    // prints hello world
    printf("Hello World");

    return 0;
}

s1842@administrator-rusa:~/s7$ ./a.out

#include <stdio.h>

int main()
{

    printf("Hello World");

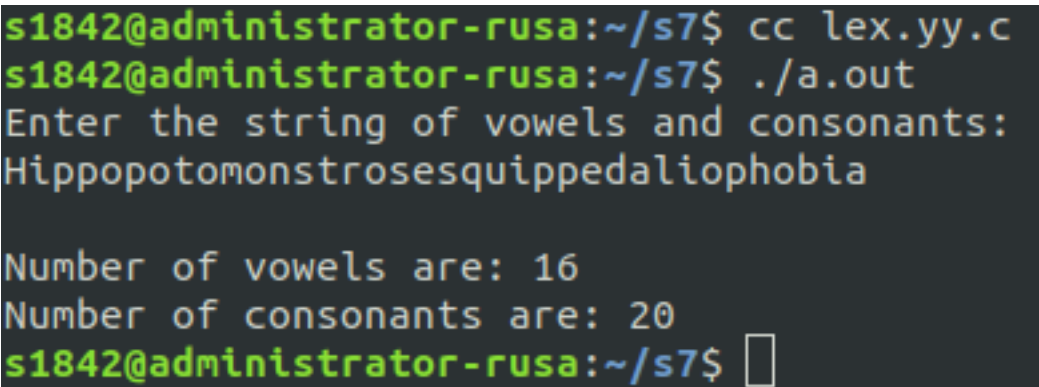
    return 0;
}

s1842@administrator-rusa:~/s7$
```

4 LEX program to count the number of vowels and consonants in a given string

```
%{
int vow_count=0;
int const_count =0;
%}

%%
[aeiouAEIOU] {vow_count++;}
[a-zA-Z] {const_count++;}
%%
int yywrap(){
int main()
{
printf("Enter the string of vowels and consonants:\n");
yylex();
printf("Number of vowels are: %d\n", vow_count);
printf("Number of consonants are: %d\n", const_count);
return 0;
}
```



A terminal window showing the compilation and execution of the LEX program. The user is at a prompt 's1842@administrator-rusa:~/s7\$'. They compile 'lex.yy.c' with 'cc', then run './a.out'. The program prompts 'Enter the string of vowels and consonants:' and the user enters 'Hippopotomonstrosesquippedaliophobia'. The program outputs 'Number of vowels are: 16' and 'Number of consonants are: 20'. The prompt returns to 's1842@administrator-rusa:~/s7\$'.

```
s1842@administrator-rusa:~/s7$ cc lex.yy.c
s1842@administrator-rusa:~/s7$ ./a.out
Enter the string of vowels and consonants:
Hippopotomonstrosesquippedaliophobia

Number of vowels are: 16
Number of consonants are: 20
s1842@administrator-rusa:~/s7$
```

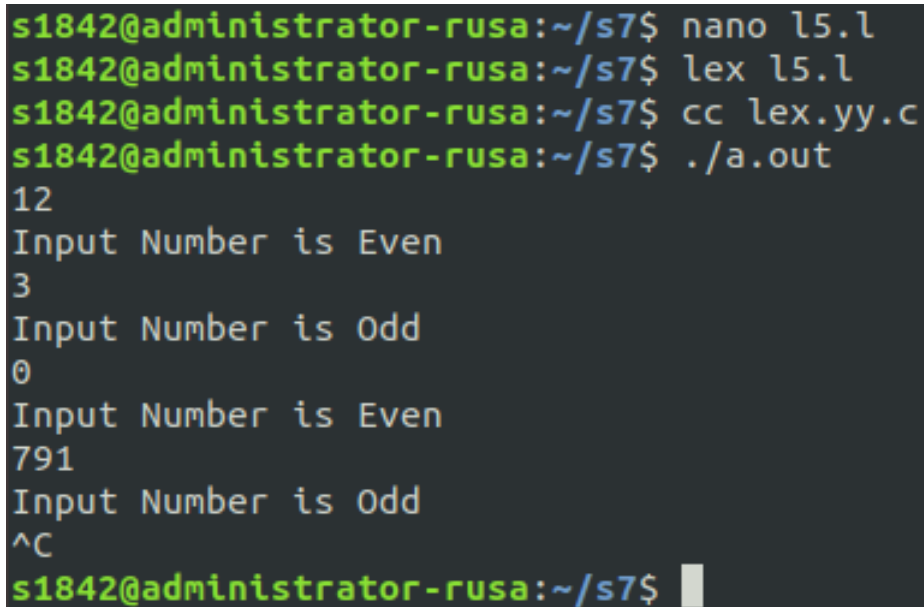
5 LEX program to check whether a given number is even or odd

```
%{
int i;
}%

%%
[0-9]+ {i = atoi(yytext);

if(i%2==0)
printf("Input Number is Even");

else
printf("Input Number is Odd");
};
%%
int yywrap(){}
int main()
{
yylex();
return 1;
}
```



```
s1842@administrator-rusa:~/s7$ nano l5.l
s1842@administrator-rusa:~/s7$ lex l5.l
s1842@administrator-rusa:~/s7$ cc lex.yy.c
s1842@administrator-rusa:~/s7$ ./a.out
12
Input Number is Even
3
Input Number is Odd
0
Input Number is Even
791
Input Number is Odd
^C
s1842@administrator-rusa:~/s7$
```

1.4 Result

Implemented the lex programs in Ubuntu 20.04 with kernel and the above outputs were obtained.