**Experiment No.: 3    Date:13/10/2020**

**LEX**

**Aim**: To study LEX and write a LEX program to convert decimal numbers to hexadecimal numbers.

**Theory:**

**Algorithm to Convert From Decimal To Another Base**

1. Let *n* be the decimal number.
2. Let *m* be the number, initially empty, that we are converting to. We'll be composing it right to left.
3. Let *b* be the *base* of the number we are converting to.
4. Repeat until n becomes 0  
      Divide *n* by ***b***, letting the result be *d* and the remainder be *r*.  
      Write the remainder, r, as the leftmost digit of *b*.  
      Let *d* be the new value of *n*.

Let's use the algorithm to convert 45 into binary.

Let n = 45.

Let b = 2.

Repeat

45 divided by b is 45/2 = 22 remainder 1. So *d=22* and *r=1*. So *m= 1* and the new *n* is 22.

22 divided by b is 22/2 = 11 remainder 0. So *d=11* and *r=1*. So *m= 01* and the new *n* is 11.

11 divided by b is 11/2 = 5 remainder 1. So *d=5* and *r=1*. So *m= 101* and the new *n* is 5.

5 divided by b is 5/2 = 2 remainder 1. So *d=2* and *r=1*. So *m= 1101* and the new *n* is 2.

2 divided by b is 2/2 = 1 remainder 0. So *d=1* and *r=0*. So *m= 01101* and the new *n* is 1.

1 divided by b is 1/2 = 0 remainder 1. So *d=0* and *r=1*. So *m=101101* and the new *n* is 0.

So 4510 = 1011012

Let's use it to convert 99 into binary.

Let n = 99.

Let b = 2.

Repeat

99 divided by b is 99/2 = 49 remainder 1. So *d=49* and *r=1*. So *m= 1* and the new *n* is 49.

49 divided by b is 49/2 = 24 remainder 1. So *d=24* and *r=1*. So *m= 11* and the new *n* is 24.

24 divided by b is 24/2 = 12 remainder 0. So *d=12* and *r=0*. So *m= 011* and the new *n* is 12.

12 divided by b is 12/2 = 6 remainder 0. So *d=6* and *r=0*. So *m= 0011* and the new *n* is 6.

6 divided by b is 6/2 = 3 remainder 0. So *d=3* and *r=0*. So *m= 00011* and the new *n* is 3.

3 divided by b is 3/2 = 1 remainder 1. So *d=1* and *r=1*. So *m= 100011* and the new *n* is 1.

1 divided by b is 1/2 = 0 remainder 1. So *d=0* and *r=1*. So *m=1100011* and the new *n* is 0.

So 9910 = 11000112

Let's use it to convert 45 into hexadecimal.

Let n = 45.

Let b = 16.

Repeat

45 divided by b is 45/16 = 2 remainder 13. So *d=2* and *r=13*. So *m= D* and the new *n* is 2.

2 divided by b is 2/16 = 0 remainder 2. So *d=0* and *r=2*. So *m=2D* and the new *n* is 0.

So 4510 = 2D16.

Let's use it to convert 99 into hexadecimal.

Let n = 99.

Let b = 16.

Repeat

99 divided by b is 99/16 = 6 remainder 3. So *d=6* and *r=3*. So *m= 3* and the new *n* is 6.

6 divided by b is 6/16 = 0 remainder 6. So *d=0* and *r=6*. So *m=63* and the new *n* is 0.

So 9910 is 6316.

ECHO copies yytext to the scanner’s output.

Whatever token we have recently found (or matched) will be copied to the output.

**PROGRAM**

root@kali:~# vi expt3prgm1

%{

    /\* Definition section \*/

    #include<stdio.h>

    int num, r, digit=0, count, pcount=0, i;

    char a[20];

%}

DIGIT [0-9]

/\* Rule Section \*/

%%

{DIGIT}+ { num=atoi(yytext);

        while(num!=0)

        {

            r=num%16;

            digit='0'+r;

            if(digit>'9')

            digit+=7;

            a[count++]=digit;

            num=num/16;

        }

        for(i=count-1;i>=pcount;--i)

                printf("%c", a[i]);

                pcount=count;

        }

.|\n    ECHO;

%%

// driver code

int main()

{

    yylex();

    return 0;

}

root@kali:~# lex expt3prgm1

root@kali:~# gcc -lfl lex.yy.c

**OUTPUT:**

root@kali:~# ./a.out

99

63

100

64

10

A

15

F

16

10

45

2D

F

F

2D

2D

^Z

[1]+ Stopped ./a.out

**Conclusion**:  LEX program to convert decimal numbers to hexadecimal numbers was successfully implemented