

# **ASSIGNMENT 6**

**ELP780 Software Lab**

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A report presented for the assignment on  
**Python Basics and Lex and Yacc**

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# 1. Problem Statement 1

## 1.1 Objective :

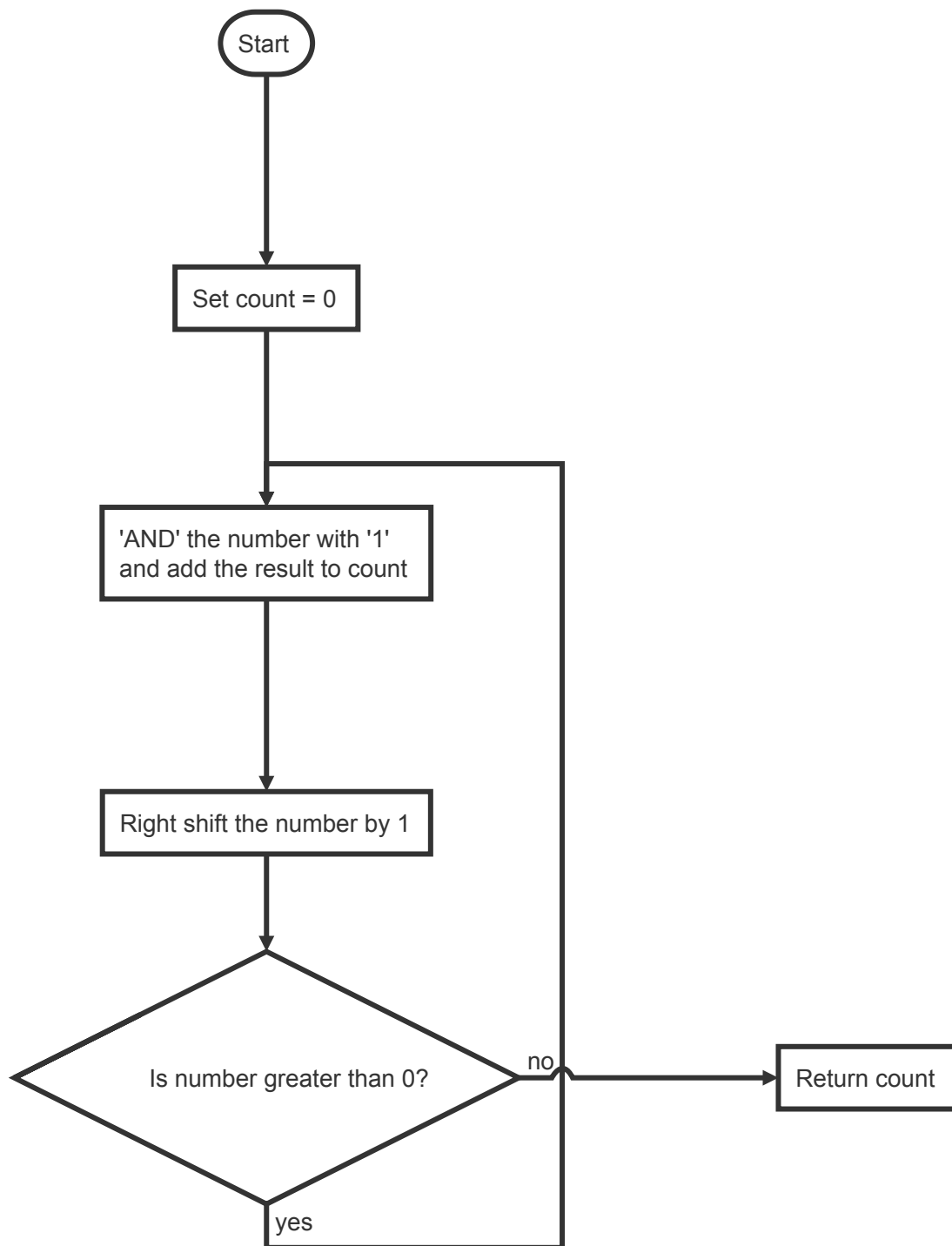
- Given two non-zero numbers A and B, count the number of 1s in their binary representations and output if their bit balanced (number of 1s are equal) or bit biased (number of 1s are unequal)

## 1.2 Algorithm and Implementation :

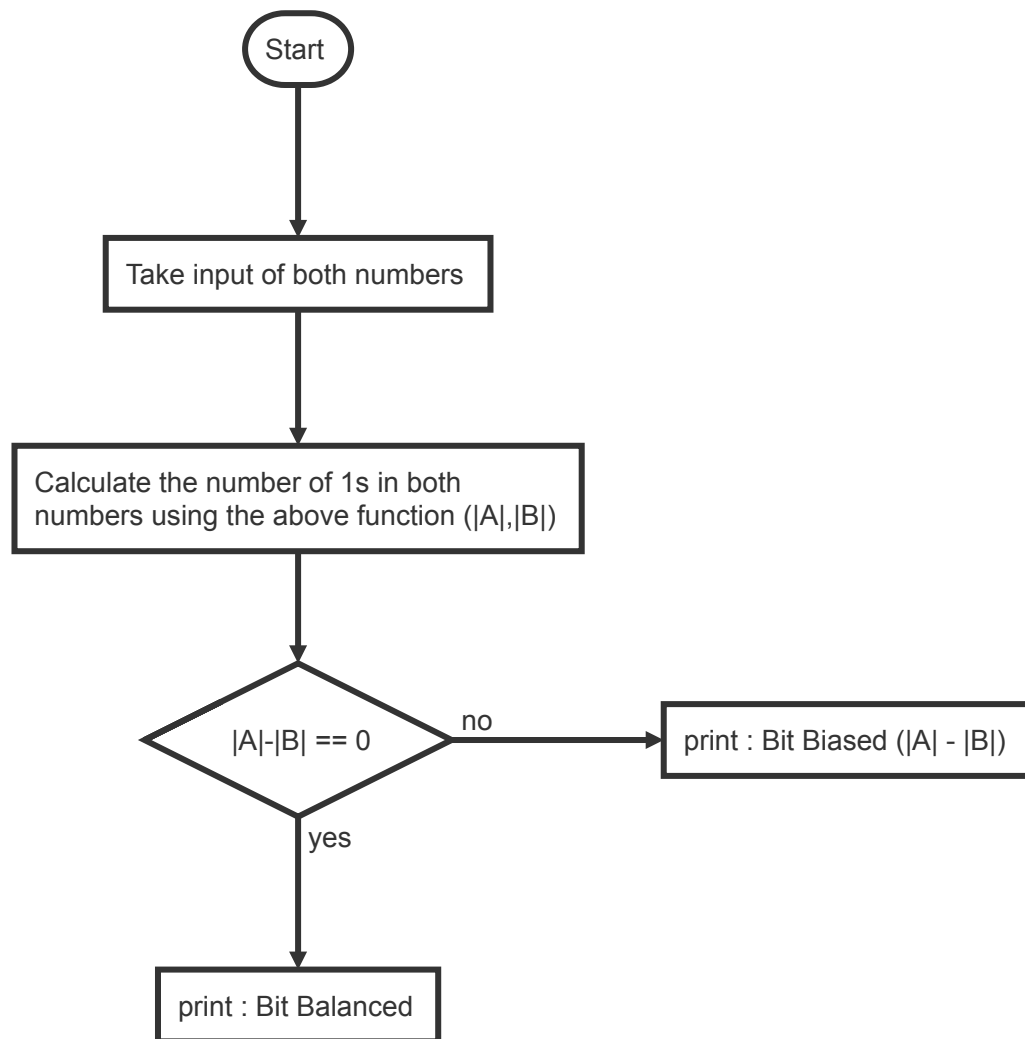
- **Function to calculate number of 1's in binary representation of a number :**
  - Initialisation : count = 0 ( to store number of 1's)
  - 'AND' the number with '1' to get the LSB and add it to count (increment if it is '1' else remains same)
  - Right shift the number by 1 to get the next higher bit in the position of LSB
  - Repeat till the number is greater than 0 (has atleast one '1' in its representation)
- Take the input for both numbers
- Calculate the number of 1s in both numbers using the above function (Let the result be |A| and |B|)
- IF ( $|A| - |B| == 0$ ):  
    print : Bit Balanced
- ELSE :  
    print : Bit Biased ( $|A| - |B|$ )

### 1.3 Flowchart :

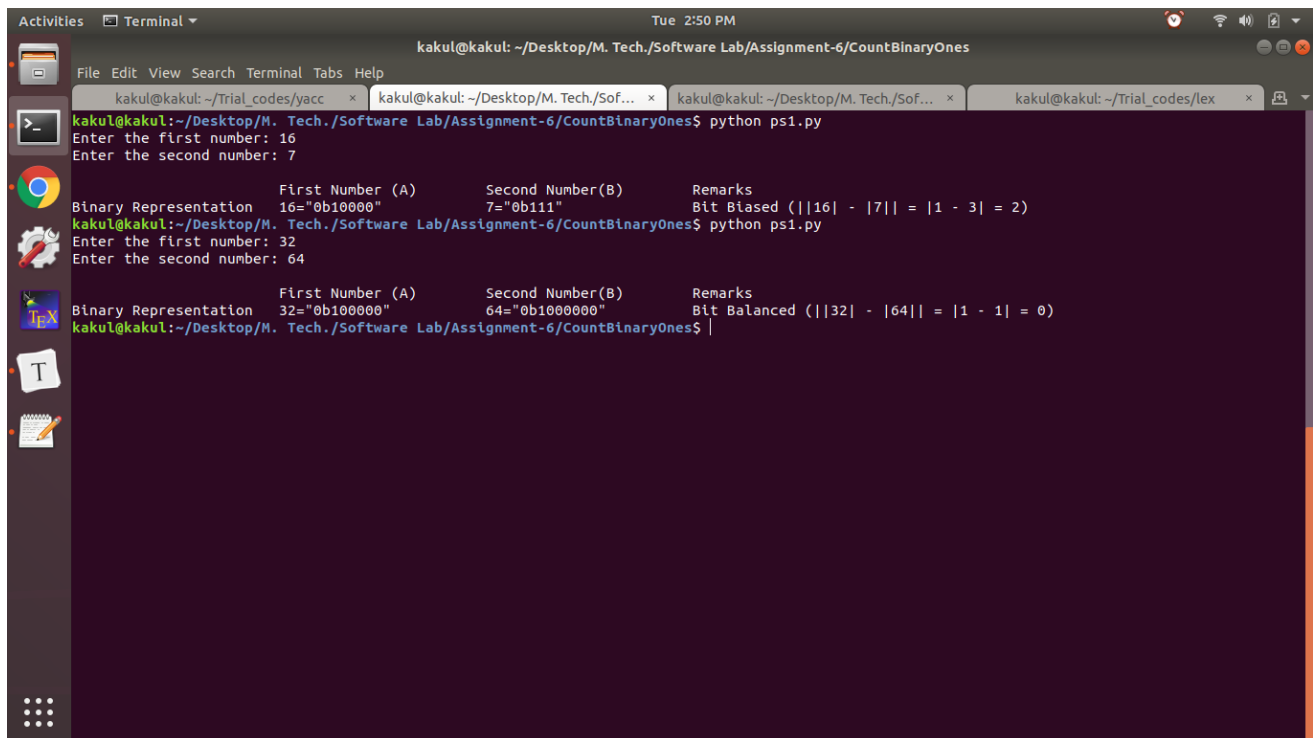
#### 1.3.1 Function to calculate number of 1s in binary representation :



### 1.3.2 Main program :



### 1.4 Screenshots :



```
kakul@kakul: ~/Desktop/M. Tech./Software Lab/Assignment-6/CountBinaryOnes
Enter the first number: 16
Enter the second number: 7

Binary Representation    First Number (A)    Second Number(B)    Remarks
16="0b10000"           7="0b111"           Blt Biased (|16| - |7| = |1 - 3| = 2)

kakul@kakul:~/Desktop/M. Tech./Software Lab/Assignment-6/CountBinaryOnes$ python ps1.py
Enter the first number: 32
Enter the second number: 64

Binary Representation    First Number (A)    Second Number(B)    Remarks
32="0b100000"           64="0b1000000"      Bit Balanced (|32| - |64| = |1 - 1| = 0)

kakul@kakul:~/Desktop/M. Tech./Software Lab/Assignment-6/CountBinaryOnes$
```

Figure 1 : Results of PS1

## 2. Problem Statement 2

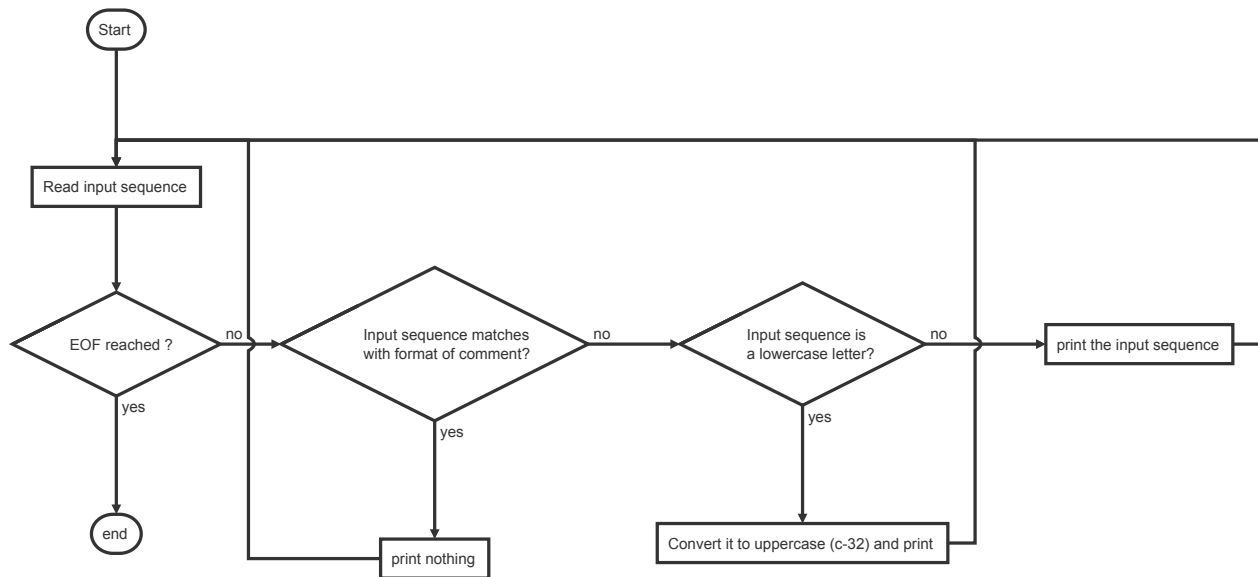
### 2.1 Objective :

- create a preprocessor for assembler that will translate any 8085 assembly code into full capital letters and all numerals and remove the comments

### 2.2 Algorithm and Implementation :

- Read the file
- IF (Input sequence matches with format of comment) :
  - print nothing
- ELSE IF (Input sequence is a lowercase letter)
  - Convert it to uppercase (c-32) and print
- ELSE
  - print the input sequence

### 2.3 Flowchart :



## 2.4 Screenshots :

```
Activities Terminal Tue 5:14 PM
kakul@kakul: ~/Desktop/M. Tech./Software Lab/2020EET2173_6/asm2allcaps

File Edit View Search Terminal Tabs Help
kakul@kakul: ~/Trial_codes/yacc x kakul@kakul: ~/Desktop/M. Tech./Software Lab/2020... x kakul@kakul: ~/Desktop/M. Tech./Software Lab/Assig... x

kakul@kakul:~/Desktop/M. Tech./Software Lab/2020EET2173_6/asm2allcaps$ cat asm_code.txt
extern _GetStdHandle@4

section .data
str: db 'hello, world',0x0D,0x0A
strlen: equ $-str

MVI D, 01 ; initialize register D with 01
MVI E, 01 ; initialize register E with 01
LDA 2050 ; loads the content of memory location 2050 in accumulator A
sub D ; subtract value of D from A.
JZ 2011 ; make jump to memory location 2011
; if zero flag is set
; increments value of register D by 1.
; Since it is used two times,
; therefore value of D is incremented by 2
; increments value of register E by 1
; make jump to memory location 2007
; moves the value of register E in accumulator A
; stores value of A in 3050
; stops executing the program and halts
; any further execution

kakul@kakul:~/Desktop/M. Tech./Software Lab/2020EET2173_6/asm2allcaps$ cat asm_out_code.txt
kakul@kakul:~/Desktop/M. Tech./Software Lab/2020EET2173_6/asm2allcaps$ ./a.out asm_code.txt asm_out_code.txt
kakul@kakul:~/Desktop/M. Tech./Software Lab/2020EET2173_6/asm2allcaps$ cat asm_out_code.txt
EXTERN _GETSTDHANDLE@4

SECTION .DATA
STR: DB 'HELLO, WORLD',0X0D,0X0A
STRLEN: EQU $-STR

MVI D, 01
MVI E, 01
LDA 2050
SUB D
```

Figure 2 : Results of PS2

```
Activities Terminal Tue 5:16 PM
kakul@kakul: ~/Desktop/M. Tech./Software Lab/2020EET2173_6

File Edit View Search Terminal Tabs Help
kakul@kakul: ~/Trial_codes/yacc x kakul@kakul: ~/Desktop/M. Tech./Software Lab/2020... x kakul@kakul: ~/Desktop/M. Tech./Software Lab/Assig... x

commit 5af7cc3c4a839cfff258a30d1769ae8e75610ae6b (HEAD -> master, origin/master)
Author: kakul19 <kakulshrivastava.1@gmail.com>
Date: Tue Nov 17 17:15:57 2020 +0530

Report

commit 5d667225f93eb4159a2de17679be7d3cb271ce33
Author: kakul19 <kakulshrivastava.1@gmail.com>
Date: Tue Nov 17 17:03:08 2020 +0530

PS2 modified

commit 269e6949ad962b1b426db11387fbf81c6917db98
Author: kakul19 <kakulshrivastava.1@gmail.com>
Date: Tue Nov 17 15:32:31 2020 +0530

PS2 completed with lex only

commit 0d6da0f3c3ec99bffd197ab8f2a11e2e45a86b0d
Author: kakul19 <kakulshrivastava.1@gmail.com>
Date: Tue Nov 17 14:03:11 2020 +0530

PS1 completed with comments

commit 546161fc8580216f57c431747576863e79e5e3ad
Author: kakul19 <kakulshrivastava.1@gmail.com>
Date: Tue Nov 17 13:50:31 2020 +0530

PS1 completed

commit 7ead1bfebbbf5d5f29c987c1c1bf5e90df7551b
Author: kakul19 <kakulshrivastava.1@gmail.com>
Date: Tue Nov 17 12:55:52 2020 +0530

Directories created
kakul@kakul:~/Desktop/M. Tech./Software Lab/2020EET2173_6$
```

Figure 3 : Git log

### 3. Appendix



### 3.1 Code for Problem Statement 1

```
#Function to calculate number of 1's in binary representation of a number

def count_ones(n):
    count=0          #Initializing count to store number of 1's

    while(n>0):      #Iterating till the number is greater than 0
        (has atleast one '1' in its representation)
        count=count + (n & 1)  #'AND' the number with 1 to get the LSB and
        add it to count (increment if it is '1' else remains same)
        n=(n>>1)           #Right shift the number by 1 to get the next
        higher bit in the position of LSB

    return count      #Return the value of count after iteration is
    complete

a=int(input("Enter the first number: "))    #Take the input of first number
b=int(input("Enter the second number: "))   #Take the input of second number

A=count_ones(a)          #Count number of 1s in first
number
B=count_ones(b)          #Count number of 1s in second
number

#Printing the output in desired format

print("\n\t\t\t\tFirst Number (A) \tSecond Number(B) \tRemarks")
print("Binary Representation \t{}=\n{}\n" \t\t{}=\n{}\n" \t\t{} (|{|}| - |{|}| =
|{|} - {|}| = {|}) "
        .format(a,bin(a),b,bin(b), "Bit Balanced" if (A-B==0) else "Bit
Biased",a,b,A,B,abs(A-B))
```

### 3.2 Code for Problem Statement 2

```
%{
    #include<stdio.h>

}%

%%
[;].* {fprintf(yyout, "");}

[a-z] {fprintf(yyout,"%c",yytext[0]-32);}

. {fprintf(yyout, "%s", yytext); }
%%

yywrap();

int main(int argc, char **argv)
{
```

```
extern FILE *yyin, *yyout;  
yyin = fopen(argv[1], "r");  
yyout = fopen(argv[2], "w");  
yylex();  
return 0;  
  
}
```

## References

1. *Lex and Yacc: A Brisk Tutorial* , <https://www2.cs.arizona.edu/~debray/Teaching/CSc453/DOCS/tutorial-large.pdf>
2. *flex & bison* , [http://web.iitd.ac.in/~sumeet/flex\\_bison.pdf](http://web.iitd.ac.in/~sumeet/flex_bison.pdf)