

SWE 514 Computer Systems

Project (due final exam date)

(This project can be implemented in groups of at most two students.)

(Use C or C++ or Java or Python language to implement the project)

In this project, you will implement a program called `bitcalc` that generates A86 assembly code for a sequence of expressions and assignment statements that involve `&`, `|` and `?` operations defined as follows:

Operation	Meaning
<code>a & b</code>	Bitwise AND
<code>a b</code>	Bitwise OR
<code>a ? b</code>	Evaluates to <code>b</code> if <code>a > 0</code> and <code>0</code> otherwise

Expressions will be infix expressions and may also contain parenthesis. Assume `&` has higher precedence than `|` and `?`. Both `|` and `?` have the same precedence. An example of `bitcalc` usage is given below:

```
bitcalc
Suppose the file example.bit contains:

x = 81
y = ff
x = ( x & y ) | 0f
y = x | y ? 03
x
y

%bitcalc example.bit
  example.asm was generated.
%a86 example.asm
%example
8f
03
```

Please note the following:

- You can assume all values and results of operations will fit into 8 bits.
- You can assume that an undefined variable has value 0.
- You can assume variable names are single characters from the character ranges `g-z` and `G-Z`.
- You can assume there is a blank between each input token.
- All constants are written in 2-digit hexadecimal format.
- If the statement is an expression, you output the value of the expression as a 2-digit hexadecimal number.

Grading

You should bring your own computer and give a demo of your project. Your project will be graded according to the following criteria:

Documentation (written document describing how you implemented your project)	12%
Comments in your code	8%
Implementation and tests	80%