

Introduction to Programming EE2310 Homework 2-2

103061142 楊淳佑

Problem

Use two unsigned chars to store an unsigned fixed-point value. Design a program to calculate the multiplication of two above fixed-point values.

My Solution

Use bitwise operation to calculate with chars.

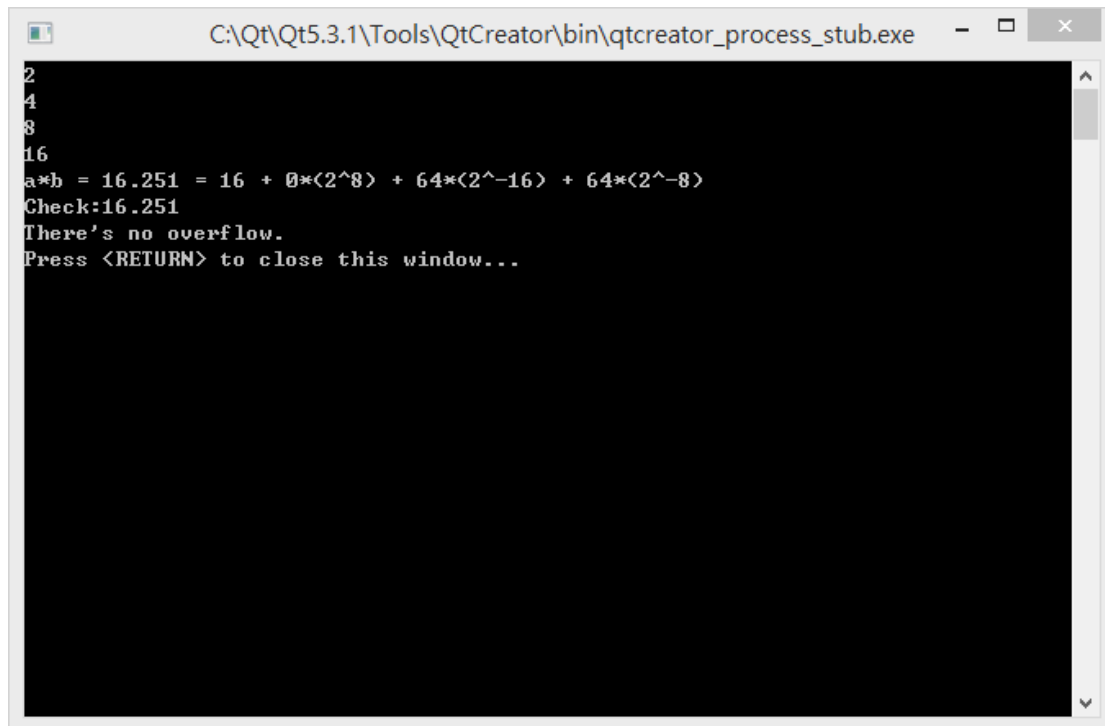
Additional Features

- The main calculation are all done with char type.
- The problem regarding the overflow of char were treated.
- Use `if` to detect if there is overflow or not.

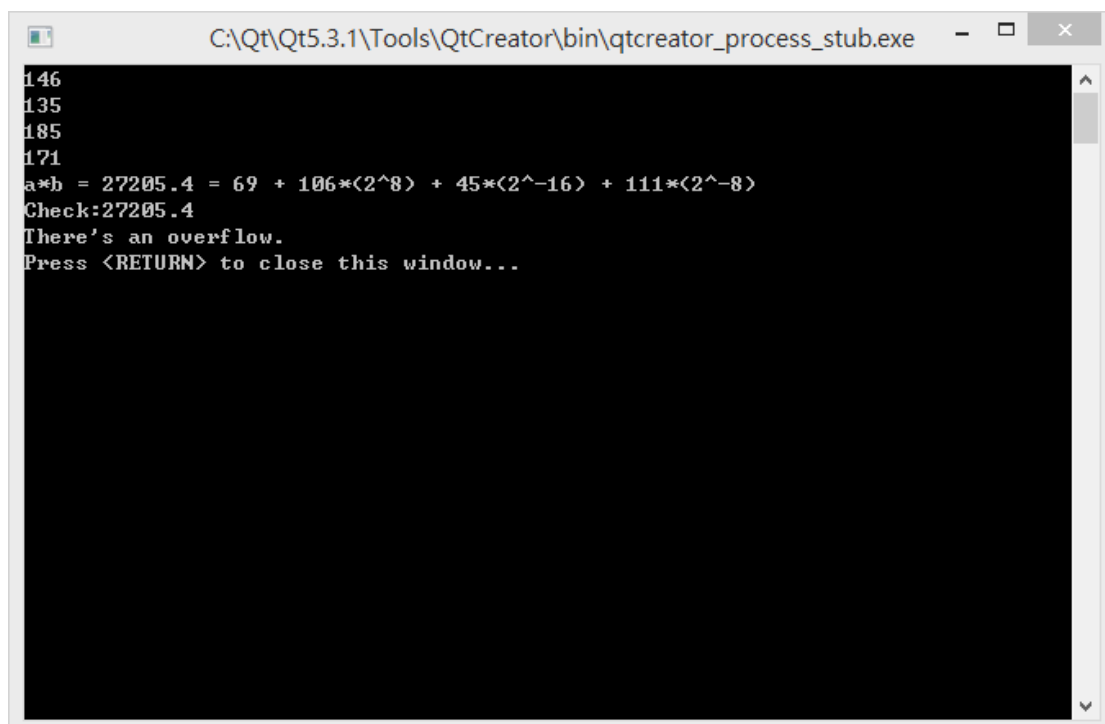
Program Flow & Structure

LINE	int main()
09~12	1) Cin into buffers (<code>m,n,p,q</code>) and save to unsigned chars (<code>a1,a2,b1,b2</code>).
16	2) Calculate <code>a*b</code> (shifted) with chars and save to <code>abS</code> . <div>My method: Left shift all the parts 16 bits to calculate. Shift back after calculation.</div>
20~24	3) Shift back integer and fractional part of <code>abS</code> respectively and save each parts into separate chars (<code>intA,intB,fracA,fracB</code>).
27~28	<div>p.s. Overflow parts included (<code>intB & fracA</code>).</div>
31~32	4) Calculate <code>a*b</code> by using <code>intA,intB,fracA,fracB</code> and save the final results to <code>abO</code> . Print out the results. 5) Save the original value of <code>a & b</code> into float (<code>fa,fb</code>). Use them to calculate <code>a*b</code> directly and compare with <code>abO</code> to verify the result of step(1)~(4). Check if there is overflow or not.

Output Result



```
C:\Qt\Qt5.3.1\Tools\QtCreator\bin\qtcreator_process_stub.exe
2
4
8
16
a*b = 16.251 = 16 + 0*(2^8) + 64*(2^-16) + 64*(2^-8)
Check:16.251
There's no overflow.
Press <RETURN> to close this window...
```



```
C:\Qt\Qt5.3.1\Tools\QtCreator\bin\qtcreator_process_stub.exe
146
135
185
171
a*b = 27205.4 = 69 + 106*(2^8) + 45*(2^-16) + 111*(2^-8)
Check:27205.4
There's an overflow.
Press <RETURN> to close this window...
```