|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| cs2 | cs1|cin | cs0 | Operation | Xi | Yi | Cin(i) | Cin(0) |
| 0 | 0 | 0 | Add | Ai | Bi | Cout(i-1) | 0 |
| 0 | 0 | 1 | Transfer A | Ai | 0 | Cout(i-1) | 0 |
| 0 | 1 | 0 | Add with carry | Ai | Bi | Cout(i-1) | 1 |
| 0 | 1 | 1 | Increment A | Ai | 0 | Cout(i-1) | 1 |
| 1 | X | 0 | AND | Ai Bi | 0 | 0 | 0 |
| 1 | X | 1 | XOR | Ai | Bi | 0 | 0 |

Xi  = Ai (¬cs2 + cs0 ) + Ai\*Bi\*cs2 \* ¬cs0

Xi  = Ai (¬cs2 + cs0 + Bi\*cs2 \* ¬cs0 )

Xi  = Ai (¬cs2 + cs0 + Bi )

Yi  = (cs2 xnor cs0)Bi

Cin(0) = ¬cs2 \* cs1

Cin(i) = ¬cs2 \* Cin(i-1)

ZF = nor of all Ai

CF = Cout(3)

SF = F3

OF = Cout(2) xor Cout(3)

What OF and CF means when logical operations are performed?

toal ic = 10

|  |  |  |  |
| --- | --- | --- | --- |
| gate | gate count | i count | reason |
| full adder | 4 | 7482 dual 2 binary adder \* 2 | main parallel adder |
| 1 bit not | 1 , (+1 for nor) , (+1 for xnor ) | 7404 hex inverter \* 1 | ~cs2 , |
| 2 bit and | 4 + 4 +4 + 4 | 7408 quad 2 bit and \*4 | input in carry | input in X| Cin |input in Y |
| 2 bit xnor | 1 | 1 xor + 1 not | cs2 xnor cs0 , |
| 4 bit nor | 1 | 3 or + 1 not | zf |
| 2 bit or | 1 , 4 , (+3 for nor ) | 7432 quad 2 bit or\*2 | ~cs2 + cs0 , (~cs2 + cs0) + Bi |
| 2 bit xor | 1 , (+1 for xnor) | 7486 quad 2 bit xor \* 1 | of |