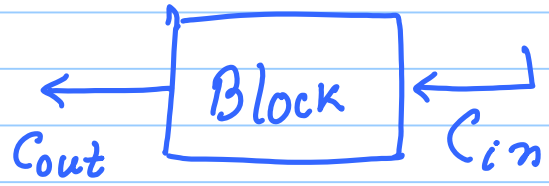
Aug - 17

Note Title 17-08-2012

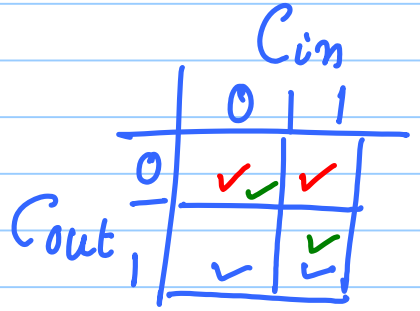


a_1

b_1^t

$G \rightarrow a_1 \wedge b_1$

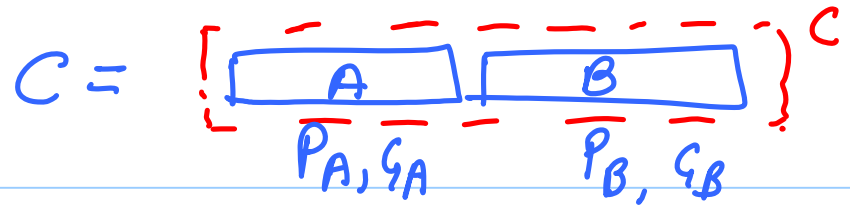
$P \rightarrow a_1 \oplus b_1$



✓ → generate

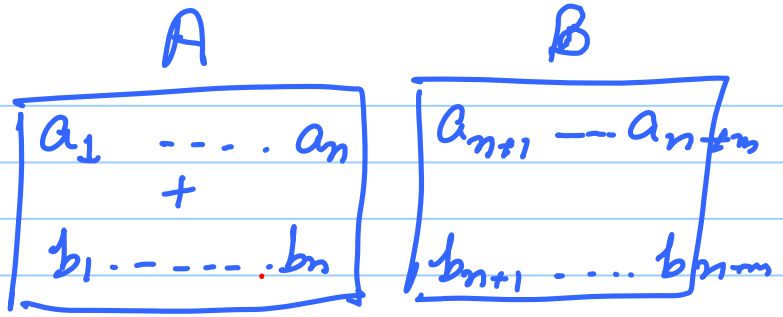
✓ → absorb

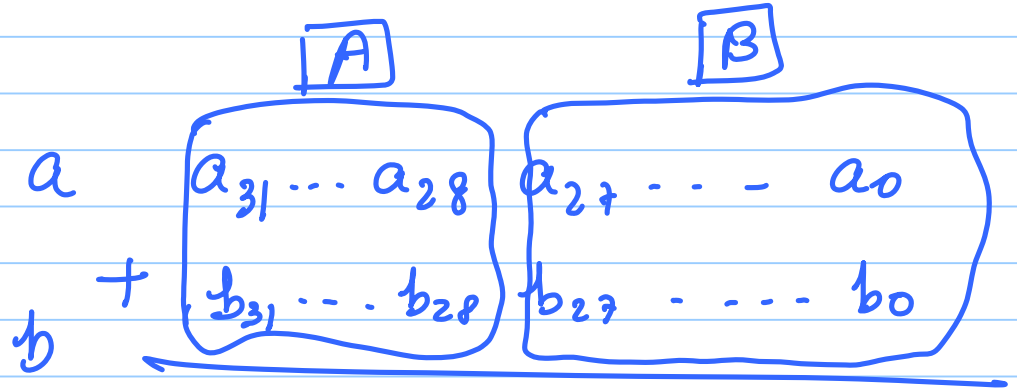
✓ → propagate



$$P_C = P_A \cdot P_B$$

$$G_C = G_A + G_B P_A$$





$$\begin{array}{r} a_1\ a_0 \\ +\ b_1\ b_0 \\ \hline - \ - \ - \end{array}$$

$P_0 = a_0 \oplus b_0$ $\qquad$ $P_1 = a_1 \oplus b_1$

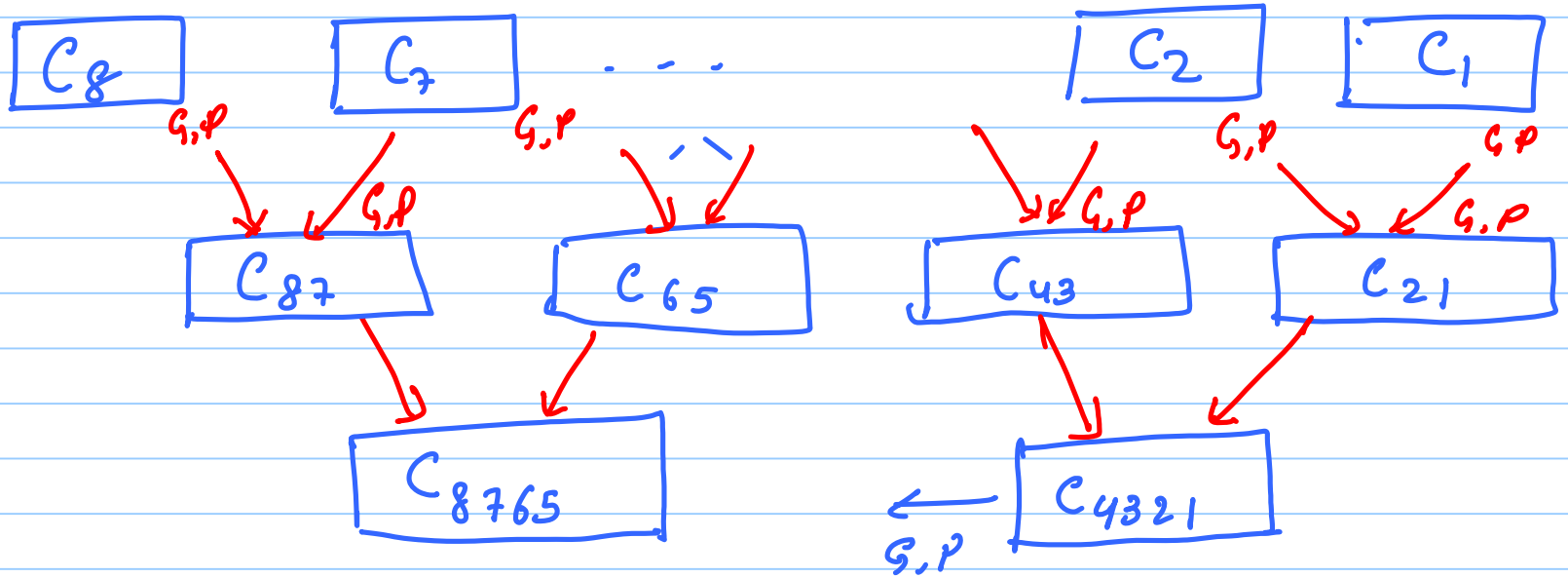
$G_0 = a_0 . b_0$ $\qquad$ $G_1 = a_1 . b_1$

$P_{01} = P_0 . P_1 = (a_0 \oplus b_0)(a_1 \oplus b_1)$

$G_{01} = G_1 + P_1 . G_0 = a_1 . b_1 + (a_1 \oplus b_1) . a_0 . b_0$

Carry Lookahead Adder [O(log(n))]

found 1



(G,P of a block containing the first 16 bits)

Original problem:

Round-2

$$+ \begin{bmatrix} a_{31} & \cdots & a_{16} \\ b_{31} & \cdots & b_{16} \end{bmatrix} \begin{bmatrix} a_{15} & \cdots & a_0 \\ b_{15} & \cdots & b_0 \end{bmatrix}$$

C_{16}

$$C_{16} = G_{0-15}$$

$$+ \begin{bmatrix} a_{31} & \cdots & a_{24} \\ b_{31} & \cdots & b_{24} \end{bmatrix} \begin{bmatrix} a_{23} & \cdots & a_{16} \\ b_{23} & \cdots & b_{16} \end{bmatrix}$$

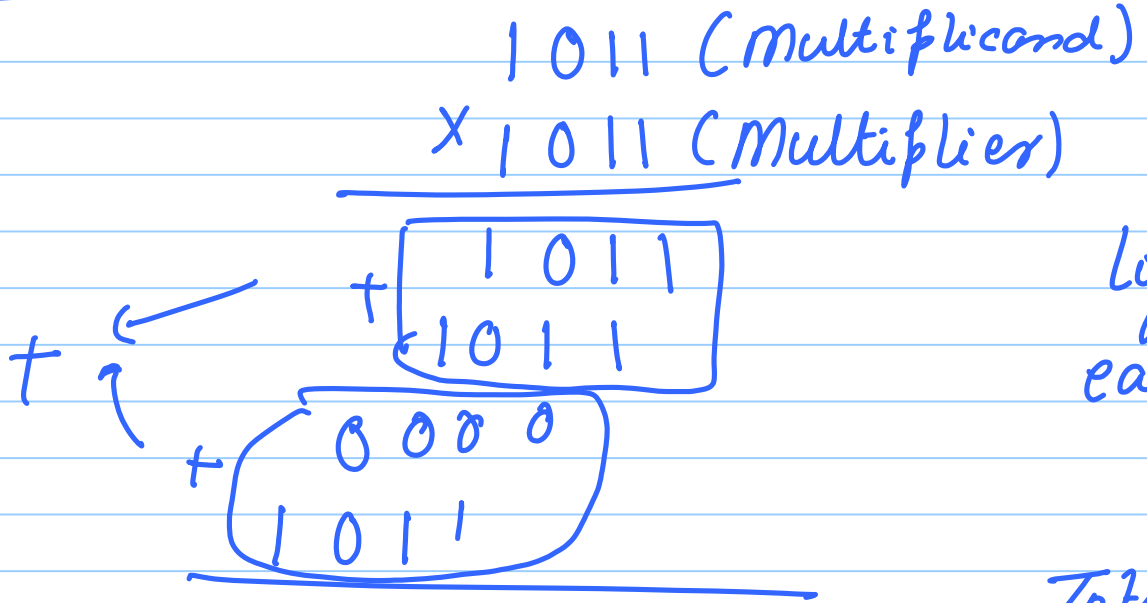
C_{24}, C_{16}

$$C_{24} = G_{16-23} + P_{16-23} C_{16}$$

In Round 2:

You compute the C_{in} of each sub-block recursively until you reach the leaves. At that point use a ripple carry adder.

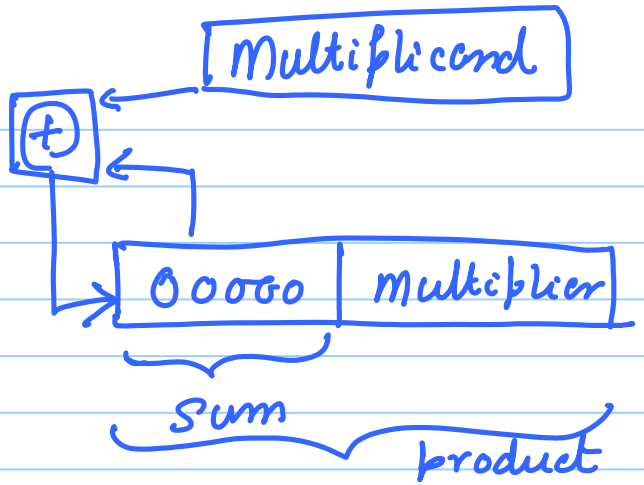
Multiplication



log(n) levels

each level takes $O(\log(n))$ time

Total: $O((\log(n))^2)$



repeat n times.

1) Take a look at LSB of multiplier.
2) If 0, go to step 4
3) If 1, sum += multiplicand
4) shift product 1 position right

Multiply two n bit numbers.

time: $O(n \log n)$ (Bad ☹)

Target: $(\log(n))^2$ -

Target for Wednesday: $O(\log(n))$