

Recursive - Multiply

$$xy = x \cdot y = x_1y_1 \cdot 2^n + [(x_1+x_0)(y_1+y_0) - x_1y_1 - x_0y_0] \cdot 2^{\frac{n}{2}} + x_0y_0$$

n : number of bits

ตัวอย่าง $x = 1101_2$, $y = 1010_2$

$x_1=11$ $x_0=01$ $y_1=10$ $y_0=10$

$A = x_1y_1$

$B = x_0y_0$

$C = (x_1+x_0)(y_1+y_0)$

$$xy = A \cdot 2^n + (C-A-B) \cdot 2^{\frac{n}{2}} + B$$

carries

$1101_2 \times 1010_2$

check: $13 \times 10 = 130 = 10000010_2$

$x = 1101_2$, $y = 1010_2$

$x_1=11$ $x_0=01$ $y_1=10$ $y_0=10$

ตัวอย่าง $x = 101_2$, $y = 111_2$

ผลลัพธ์ 0 จะถูกเพิ่มเข้ามา

treat $n = 4$ เหมือนเดิม

$$xy = A \cdot 2^n + (C-A-B) \cdot 2^{\frac{n}{2}} + B$$

$A = x_1y_1 = (11)_2 \times (10)_2 = (110)_2$

$B = x_0y_0 = (01)_2 \times (10)_2 = (10)_2$

$C = (x_1+x_0)(y_1+y_0) = (11+01)_2 \times (10+10)_2 = (10000)_2$

Shift left four times

$xy = 102 \cdot 2^4 + (10000 - 110 - 10) \cdot 2^2 + 10 = 10000010_2 \#$