

Sept 7th

Note Title

07-09-2011

Division

2) 

0010
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100 X
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0010
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1000
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Restoring Division

$10 \div 3 \quad (1010 \div 11)$

$\begin{array}{c} LH \quad RH \\ \boxed{\quad} \boxed{1010} \end{array}$

1) 

0001	010 X
------	-------

0001	0100
------	------

3) 

0101
------

000
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- 011

0010
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0001
------

 ✓

4) 

0100
------

001 X
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0001
------

  
R 

0011
------

  
Q

$$T(n) = (\# \text{ of stages}) \times (\text{complexity per stage})$$
$$= n \times (\log n)$$

Stage: 1) shift  $O(1)$

2) compare  $O(\log n)$  X (speedup 2x)

3) subtract  $O(\log n)$

4) LSB of the quotient  $O(1)$

# non-restoring

$$10 \div 3 \quad (1010 \div 11)$$

$$\begin{array}{r} 0011 \\ \underline{-3} \\ 1101 \end{array}$$

$$\begin{array}{r} 1) \quad \boxed{0001} \quad \boxed{010 \times} \\ \quad \quad 1101 \\ \hline \quad \quad \boxed{1110} \quad \boxed{0100} \end{array}$$

dividend

divisor  $\rightarrow d$   
 $(x - dx2^n)$

$$\begin{array}{r} 2) \quad \boxed{1100} \quad \boxed{100 \times} \\ \quad \quad +11 \\ \quad \quad \boxed{1111} \quad \boxed{1000} \end{array}$$

$(2x - 2 \times dx2^n)$

$(2x - dx2^n)$

$$\begin{array}{r} 3) \quad \boxed{1111} \quad \boxed{000 \times} \\ \quad \quad +11 \end{array}$$

0010      0001

4) 0100      001x  
-011

0001      0011

(Minor 2: Prepare such steps & tables).

For any stage

1) Left shift

2) If (+)ve

subtract divisor

If (-)ve

add divisor

3) If (+)ve

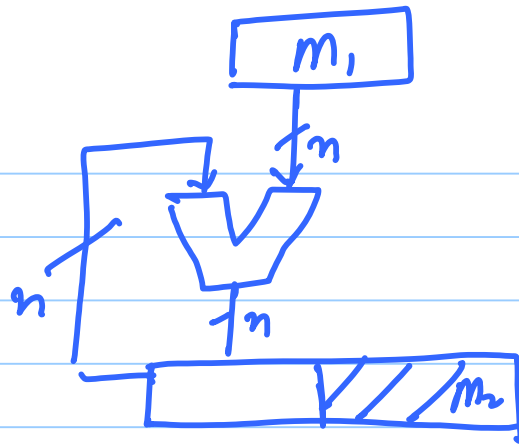
write 1 in

LSB of quotient

If (-)ve

write 0

Multiply



$$\frac{m_1}{m_2} \quad p$$

(We have done)

Floating Point

2.56789

Sign bit

1

8 bits

Exponent

(E)

23

mantissa.

1.1101011

1010

$$1 + 2^{-1} \times 1 + 2^{-2} \times 1$$

$$2^{-3} \times 0 + 2^{-4} \times 1 \dots$$

$$0 \times 2^0 + 1 \times 2^3$$
$$+ 1 \times 2^1$$
$$+ 0 \times 2^2$$

Normalizing the number.

$$10.10 = \underline{1.01} \times 2^{\text{exponent}}$$

mantissa

$$1.(\underbrace{01 \dots}_{23 \text{ digits}}) \times 2^{(E-127)}$$

E	m	S	Value.
255	0	+1	$+\infty$

Denormalized  
Number.

$$0.\underbrace{\hspace{2cm}}_m \times 2^{-126}$$

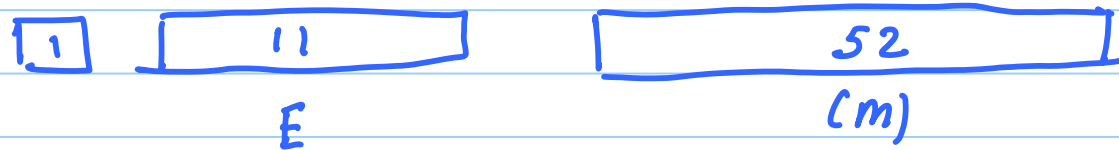
$$255 \mid 0 \mid -1 \mid -\infty$$

$$255 \mid \neq 0 \mid NA \mid NAN$$

$$0 \mid 0 \mid NA \mid 0$$

$$0 \mid \neq 0 \mid \pm 1 \mid \text{Denormalized number.}$$

### Double Precision



$$1.\underbrace{\hspace{2cm}}_m \times 2^{E-1023}$$

$$0.0001 \times 2^{-126}$$

$$0.11 \underbrace{\hspace{15em}}_{29} \times 2^{-126}$$

29

$$\approx 1 \times 2^{-126}$$