

Non-Restore Division

Algorithm

OCTOBER

Inputs $A[15:0]$, $B[15:0]$
 Outputs Result $[15:0]$, OF bit.

Reg $[45:0]$ Rem:

23	16	7
0	A	0...0

- remove sign from A, B \rightarrow make unsigned division
 Last solution Rem $[15:0]$, add sign
 IF $B=0$ OR $RH\text{ Rem} > [15:6]$

Start: if $B=0 \rightarrow$ return overflow;
 $sign = A[15] \oplus B[15];$
 if $(A[15]) \quad A = \sim A + 1;$ // remove sign
 if $(B[15]) \quad B = \sim B + 1;$ // remove sign
 $Rem[23:8] = A;$ // 23 + shift left
 Flag $F = 1$, counter $cnt = 23$
 while $cnt > 0$, $cnt--$;
 if $(F) \wedge Rem < B;$
 else $Rem += B;$
~~if $(Rem > 0)$ Rem~~ if $(Rem > 0)$ {
 ~~$Rem < B$~~
 $Rem < B;$
 $Rem[0] = 1;$
 $F = 1;$
 } else {
 $Rem < B;$
 ~~$Rem < B$~~
 }
 }

OCTOBER

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

OCTOBER 2014

After $cnt=0$:
 check for overflow, adjust sign
 return $Rem[15:0]$, overflow flag

Designs Comparison

		Carry Select Adder	Carry Look Ahead Adder
Time	R2R	Data required time: 1467.6 Data arrival time: 1282.8 Slack: 184.8	Data required time: 1460.1 Data arrival time: 1074.5 Slack: 385.6
	I2R	Data required time: 1461.3 Data arrival time: 1288.9 Slack: 172.4	Data required time: 1461.3 Data arrival time: 1280.2 Slack: 181.1
	R2O	Data required time: 1350.0 Data arrival time: 570.4 Slack: 779.6	Data required time: 1050.0 Data arrival time: 563.4 Slack: 486.6
Area (squm)		863/Cells: 497	729/Cells: 413
Power (uw)		1164.110718	887.116211