

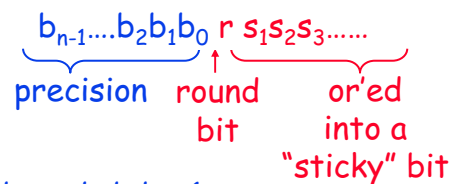
Round and Sticky

- When two significands are aligned for addition, some bits of the smaller value appears to not matter

$$\begin{array}{r} 9.999 \times 10^1 \\ + 0.01610 \times 10^1 \\ \hline 10.01510 \times 10^1 \end{array}$$

Can we throw them away? Not quite!

- Given the number $b_{n-1} \dots b_2 b_1 b_0 \text{ b b b b b } \dots$



- if $r == 0$ then $b_{n-1} \dots b_2 b_1 b_0$
- if $r == 1$ && $sticky == 1$ then $b_{n-1} \dots b_2 b_1 b_0 + 1$
- if $r == 1$ && $sticky == 0$ then round to even

Guard

- When subtracting 2 significands
 - one may lose the MSB
 - requires a left-shift to normalize
 - must keep an extra "guard" bit just in case

$$\begin{array}{r} 1.000 \times 2^0 \\ - 1.111 \times 2^{-3} \\ \hline \end{array}$$

$$\begin{array}{r} 1.000 \times 2^0 \\ - 0.0011s \times 2^0 \\ \hline 0.1100s \times 2^0 \end{array}$$

$$1.100s \times 2^{-1}$$

- What happens if one loses more than 1 MSB in subtraction?
 - only possible if two subtracted values are similar in magnitude
 - at most 1 initial right-shift in the first place

1 guard, 1 round and 1 sticky are sufficient always!