

## IEEE Floats cont:

$$1 = 3f800000$$

Exp:

$$0x01 \text{ to } 0xFE \Rightarrow (-1)^{sb} \times 2^{e-127} \times 1. \text{ Mantissa}$$

$$\text{Mantissa} = 000000 \dots$$

$$e - 127 = 0 \therefore e = 127_{10} \\ = 01111111$$

$$sb = 0$$

$$\begin{array}{c} \underbrace{0}_{3} \mid \underbrace{01111111}_{F} \mid \underbrace{000 \dots}_{8} \\ 000000 \end{array}$$

$$-2_{10} = C0000000$$

$$7F7F FFFF = 3.4028234 \times 10^{38}$$

$$\text{Exp} = 0x00 \Rightarrow (-1)^{sb} \times 2^{-126} \times 0. \text{ mantissa}$$

$$+0 = 00000000_{16}$$

$$-0 = 80000000_{16}$$

$$\text{Exp} = 0xFF$$

$$\text{If mantissa} = 0 \Rightarrow (-1)^{s_b} \times \infty$$

$$+\infty = 7F800000$$

$$-\infty = FF800000$$

$$\text{If mantissa} \neq 0 \Rightarrow \text{NaN}$$

$$7F7F\text{FFFF}$$

$$0111\ 1111\ 0111\ 1111\ 1111\ 1111\ 1111\ 1111$$

$$s_b = 0$$

$$e = 1111\ 1110 = 254$$

$$= FE_{16}$$

$$\therefore x = (-1)^0 \times 2^{254-127} \times 1. (\text{mantissa})$$

$$\sum_{i=0}^{m=-23} 2^i = 2^{-23} \times \sum_{i=0}^{23} 2^i$$

$$\begin{aligned} 2^0 + \dots + 2^{-23} &= 2^{-23} (2^{23} + \dots + 2^0) \\ &= 2^{23-23} + \dots + 2^{0-23} \\ &= 2^{-23} (2^{24} - 1) \end{aligned}$$

$$\begin{aligned} x &= (-1)^0 \times 2^{127} \times 2^{-23} (2^{24} - 1) \\ &= 2^{104} \times 2^{24} - 2^{104} \end{aligned}$$

dept.ee.wits.ac.za/labproj

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