

$$\text{Number} = (-1)^s * M * 2^e$$

Sign Fraction Exponent

If s = 1 number is negative, else positive

M (mantissa) fraction value

-For normalized number M = [1.0, 2.0]

-Denormalized case M = [0.0, 1.0]

Advantages for representing s, m and e in a binary string:

-Bigger range, less number of bytes to encode

Range is symmetric, left most is signed bit w/ no value

Encoding E:

0000 -> m is expressed as 0.something

1 - 14 -> m is expressed as 1.____

1111 -> m is expressed as inf, nan

$$\text{____} = 1.011 * 2^{-3}$$

$$0100 \quad -3 + \text{bias} \\ = 4$$

$$\text{Bias} = 2^4 - 1 = 2^3 - 1 = +7$$

20.375 -> binary

$$(20)_{b10} = (10100)_{b2}$$

$$0.375 * 2 = 0.75$$

$$0.75 * 2 = 1.5$$

$$0.5 * 2 = 1$$

011 in front of decimal

10100.011

$$1.0100011 * 2^4$$

$$(20.375)_{b10} = (-1)^0 * (1.0100011)_{b2} * 2^4$$

$$\text{Number} = (-1)^s * M * 2^e$$

$$s=0$$

$$\text{exp}=1011$$

$$\text{Frac}=010$$