

Floating-Point Numbers: All Together Now!

Once all the parts of the floating-point number are obtained, converting it to decimal is just a matter of applying the following formula:

Example:

$$1 \times 2^1 \times 1.010000000000000000000000_2 = 2.5$$

Notice that the Mantissa actually represents a fraction with an implicit 1 in front of it, instead of an integer! In addition to representing real numbers, the IEEE 754 representation can also indicate...

the set of numbers known as denormalized numbers (including zero),

$$1 \times 2^0 \times 0.00102610_2 = 0$$

If this is all zeroes, the float is zero!

positive or negative infinity,

$$1 \times 2^{\infty} \times 0_2 = \pm \infty$$

and even when something is not a number! This is called NaN.

$$1 \times 2^{\infty} \times \neq 0_2 = \text{NaN}$$

NaNs aren't comparable, but they can be different!