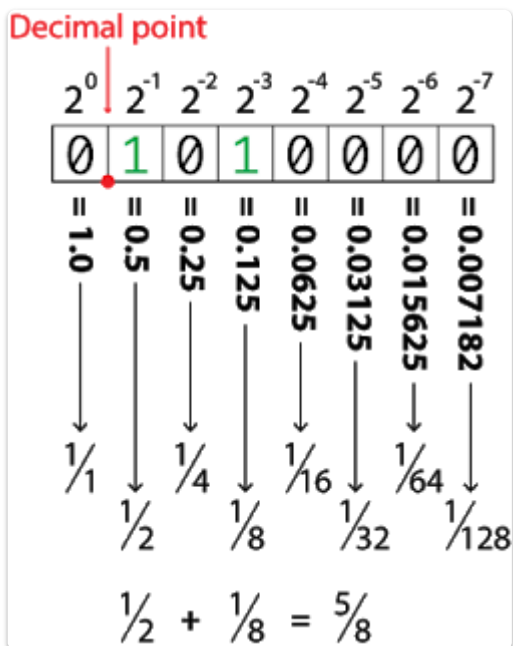


10. Binary Fractions



Position	2^2	2^1	2^0	.	2^{-1}	2^{-2}
Value	1	1	1	.	1	1

Essentially, whatever position is below 2^0 becomes the decimal.

If we ignore the 2^{-1} and 2^{-2} , we know that

$$1 + 2 + 4 = 7$$

Now let's do the same but for the **-1s** and **-2s**, it's quite literally the same thing but it's a fraction.

$$1 * (2^{-1}) + 1 * (2^{-2}) = 2^{-1} + 2^{-2} = \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$

So we have **7** and **$\frac{3}{4}$** , $\frac{3}{4} = 0.75$. Combine it and we have **$=7.75$**

2^2	2^1	2^0	.	2^{-1}	2^{-2}
1	1	1	.	1	1

Converting decimal to binary decimal

Say we want to convert the decimal number **4.25** into binary decimal. First we separate the integer part (**4**) and the fractional part (**0.25**) to binary

1. Integer Part to binary

2^2	2^1	2^0
1	0	0

Decimal Part to binary

2^{-1}	2^{-2}
0	1

Now combine the two binary numbers

2^2	2^1	2^0	.	2^{-1}	2^{-2}
1	0	0	.	0	1

Hence, **4.25** in decimal is **100.01** in binary.

See Also

[1. Binary and Data](#)

[9. Binary Negative Numbers](#)