

rmzyx


$10^4 10^3 10^2 10^1 10^0 \rightarrow \text{Base}$

$$\underbrace{r \times 10^4}_{\text{R}} + \underbrace{m \times 10^3}_{\text{M}} + \underbrace{2 \times 10^2}_{\text{H}} + \underbrace{7 \times 10^1}_{\text{T}} + \underbrace{x \times 10^0}_{\text{U}}$$

★ they could be base 2, 8, 10, 16, ...

? I wonder why we don't have base 3, or basically all Prim numbers!

Nibble



A diagram of a byte structure. It consists of a horizontal rectangle divided into two equal halves by a vertical line. Each half is further divided into four smaller rectangular sections, representing four bits each. The entire structure is enclosed in a larger rectangular frame. Below the diagram, the word 'byte' is written in a handwritten style.

byte

~
&
|
^

they should be different

★ All applied Bitwise

★ $x \& 1 \rightarrow$ check for even/odd :-

? what is the differences between

&/| &&/|| ?

SHIFT Operation



Bitmask : any pattern of bit used with bitwise operation to change a given argument.

binary to unsigned

$$\text{B2U}_w(\vec{x}) = \sum_{i=0}^{w-1} x_i 2^i$$

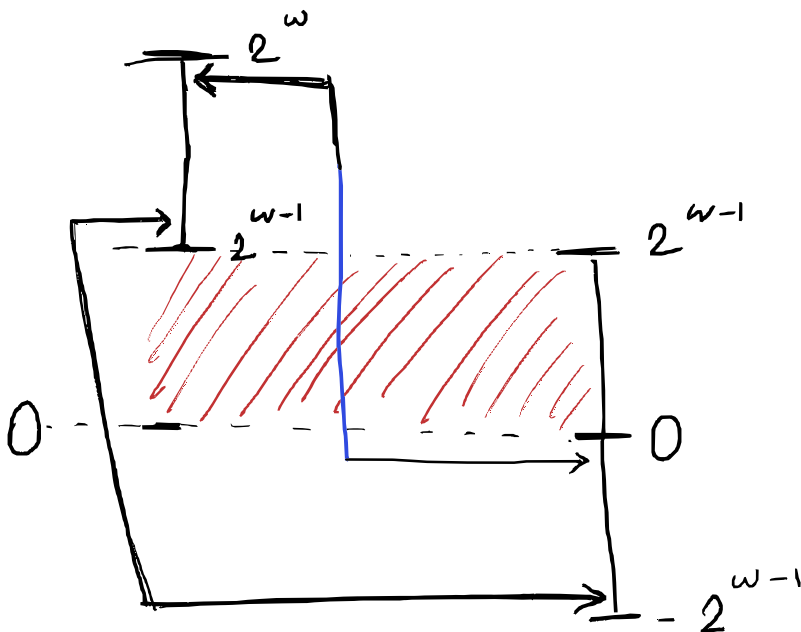
binary to signed
 → Two's complement

$$\text{B2T}_w(\vec{x}) = -x_{w-1} 2^{w-1} + \sum_{i=0}^{w-2} x_i 2^i$$

$$U_{\text{MAX}_w} = 2 T_{\text{MAX}_w} + 1$$

since T is asymmetric "
 e.g. $-128 \leftrightarrow 127$

$$U \rightleftharpoons T$$



Truncating

★ we truncated W bit number to K bit
now how to know its decimal value?

$$\text{B2U}_K ([x_K, x_{K-1}, \dots, x_0]) =$$

$$\text{B2U}_W ([x_{W-1}, x_{W-2}, \dots, x_0]) \bmod 2^K$$

$$\text{B2T}_K ([x_K, x_{K-1}, \dots, x_0]) =$$

$$\text{U2T}_K (\text{B2T}_W ([x_{W-1}, x_{W-2}, \dots, x_0]) \bmod 2^K)$$

Q. B (question box)

why $[x_K, x_{K-1}, \dots, x_0]$ but

$[x_{W-1}, x_{W-2}, \dots, x_0]$?

if ID understood

the formulas are
vague to me.