

1s and 0s

Abstraction



MEOW



CAT

Power Supply



ON

"1" $\overline{\quad}$ Vdd (ON)
voltage
+5 VDC

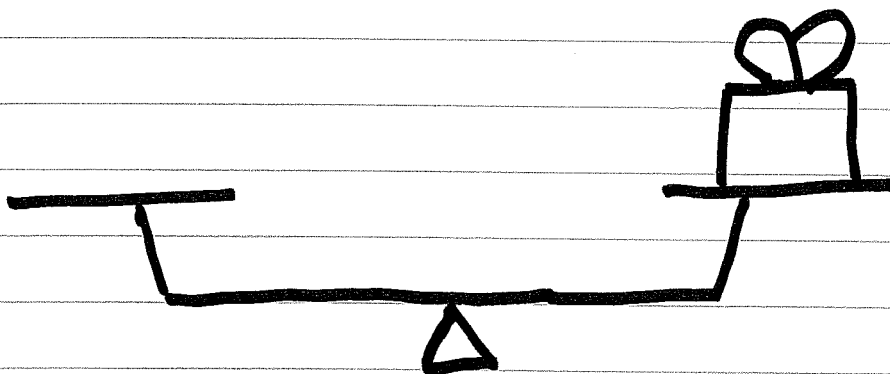
"0" $\overline{\quad}$ GND (off)

NUMBERS

$$\begin{aligned} 735 &= 7 \times 100 + 3 \times 10 + 5 \times 1 \\ &= 7 \times 10^2 + 3 \times 10^1 + 5 \times 10^0 \\ &\quad \text{Base (radix)} \uparrow \end{aligned}$$

Computers and Digital Logic use
1s and 0s to form numbers

Binary Digit
(Bit) $\left\{ \begin{array}{l} 0 \\ 1 \end{array} \right.$



$\boxed{1}$ $\boxed{2}$ $\boxed{15}$

$\boxed{1}$

$\boxed{1}$

0 - 15 gundys

$\boxed{1}$

2^0

$\boxed{2}$

2^1

$\boxed{4}$

2^2

$\boxed{8}$

2^3

$$15 = 8 + 4 + 2 + 1$$

$$= 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

↑
radix (base) = 2 (binary)

$$15_{10} = 1111_2$$

$$11 = 8 + \quad + 2 + 1$$

$$= 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$= 1011_2 \rightarrow \text{Bit}$$

$$\begin{array}{cccc} 4 & 3 & 2 & 1 & 0 \\ 1 & 0 & 0 & 0 & 1 \\ \hline \end{array} 10001_2 = 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 1 \times 16 + 1 \times 1 = 17_{10}$$

$$\begin{array}{ccccccc} & 1 & 0 & 0 & 0 & 1 & 2 = 17_{10} \\ & \uparrow & & & & \uparrow & \\ \text{MSB} & & & & & & \text{LSB} \end{array}$$

MSB = most-significant bit

LSB = least-significant bit

1 0 1 0 : 0 1 1 1 ← 8-bits

8-bits \equiv 1 byte

4-bits \equiv 1 nibble