

Binary Numbers

Friday, September 30, 2022 5:30 PM

The Base-10 Expansion.

$$\begin{array}{ccccccc} & & & 2 & 5 & 4 & 3 \\ & & & \boxed{1000} & \boxed{100} & \boxed{10} & \boxed{1} \\ & & & 3 & 2 & 1 & 0 \end{array}$$
$$= 2 \times 10^3 + 5 \times 10^2 + 4 \times 10 + 3$$

Binary Expansion $(1001)_2 = 1 \times 2^3 + 0 + 0 + 1 = 9$

$$(11)_2 = 3$$

$$(110)_2 = 6$$

$$(1001)_2 = 9$$

$$0 \ 0 \ 1 \ = 1$$

$$0 \ 1 \ 0 \ = 2$$

$$0 \ 1 \ 1 \ = 3$$

$$1 \ 0 \ 0 \ = 4$$

$$\rightarrow 1 \ 0 \ 1 \ = 5$$

$$1 \ 1 \ 0 \ = 6$$

$$1 \ 1 \ 1 \ = 7$$

$$1 \ 0 \ 0 \ 0 \ = 8$$

$$\rightarrow 1 \ 0 \ 0 \ 1 \ = 9$$

$$1 \ 0 \ 1 \ 0 \ = 10 \ A$$

$$1 \ 0 \ 1 \ 1 \ = 11 \ B$$

$$1 \ 1 \ 0 \ 0 \ = 12 \ C$$

$$1 \ 1 \ 1 \ 1 \ = 15 \ F$$

$$1 \ 1 \ 0 \ 1 \ = 13 \ D$$

$$1 \ 1 \ 1 \ 0 \ = 14 \ E$$

Adding in binary system

$$\begin{array}{r}
 6 \\
 + 3 \\
 \hline
 = 9
 \end{array}
 \qquad
 \begin{array}{r}
 1 \\
 110 \\
 + 011 \\
 \hline
 = 1001
 \end{array}$$

EXERC 5-4

$$T(n) = 4T\left(\frac{n}{2}\right) + n^2 \log n ?$$

$$R = \log_2 4 = 2$$

$$f(n) = n^2 \log n \neq \Omega(n^{2+\epsilon}) \text{ for any } \epsilon > 0$$