Bit array

Definition

* A mapping from some domain (like a range of integers) to values in the set {0, 1};
* The values can be interpreted as unlocked/locked, dark/light, absent/present
* Access to a single bit can be managed by applying an index to the array
* Little endian – least significant bit indicates the smallest index number
* Big endian – most significant bit indicates the smallest index number

# Basic operations

* Setting a bit on 1 – OR (ex: 11101010 OR 00000100 = 11101110)
* Setting a bit on 0 – AND (ex: 11101010 AND 11111101 = 11101000)
* Verifying if a bit is set – AND & 0-testing (ex: 11101010 AND 0000001 => last bit not set)
* Invert a bit – XOR (ex: 11101010 XOR 00000100 = 11101110)
* Invert all bits – NOT (ex: NOT 11101010 = 00010101)

Given 2 bit arrays of the same size representing set, we can compute their union (OR), intersection (AND), set theoretic difference (a AND (NOT b)).

# Complex operations

### Hamming weight – the number of bits set on 1 or 0

* + Useful in several disciplines information theory, coding theory, and cryptography