

DIGITAL INTEGERS

Why

We want to associate elements of $\boldsymbol{\mathsf{Z}}$ with bits trings for use on digital computers. 1

Definition

A digital integer is a bit-string. The set of d-bit integers is the set of length-d bit strings $\{0,1\}^d$. For example, the set of 8-bit digital integers is the set $\{0,1\}^8$.

Correspondence with Z

The bit string $x \in \{0,1\}^d$ corresponds to the integer $\sum_{i=1}^d x_i 2^i$.

Notation

We denote the set of 8-bit (16-bit, 32-bit, 64-bit) integers by int64 (int8, int16, int32).

It is easy to embed $x \in \mathtt{int8}$ by considering $x' \in \mathtt{int16}$ defined by

$$x' = (x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, 0, 0, 0, 0, 0, 0, 0, 0)$$

In other words, we associate an 8-bit integer with a 16-bit integer.

Naturally, we associate the integers with bit strings.

Signed integers

2

¹Future editions will discuss digital computers.

²Future editions will include an account of signed integers, or will place this in another sheet.

