Bits, Data Types, and Operations

Bits

Definition 0.1
Bits, or *binary digits* represent either the presence (1) or absence of a voltage (0). One wire can differentiate between a zero or one, but in order to differentiate a large number of distinct values and to assign them unique representations, we need a large number of bits.
In reality, electronic circuits differ from voltages close to zero to voltages far from zero

Data Types

Using bits, there are many different ways to represent the same value. For example, to represent 5, you can have the number 5, or five fingers held up, 5 tally marks, the string 5, roman numerals, etc.

Definition 0.2
Data type: a particular representation where operations in the computer can operate on information encoded in the representation.

Unsigned Integers

Definition 0.3
Unsigned Integers: data type with no sign, only a magnitude.

We can represent unsigned integers as strings of binary digits. To do this we use the binary system, similar to the decimal system.

Note 0.1
Unsigned integers are useful when we know that we know for sure that we don't need negative numbers.

Theorem 0.1
Range for unsigned integers: 0 to $2^k - 1$