# Bits and Bytes

Prerequisite: Know **Binary** and **Hex**. View previous document, “**Binary, Decimal, and Hex**” for help.

## Bits

A **bit** (short for “**BI**nary digi**T**”) is the smallest unit of data in a computer. The bit can be represented by a 1 or 0. A single bit can be used to represent on/off or yes/no but a string of bits can represent complex data.

For example, computers run on electricity, so when a computer wants to send information from one place to another it sends these "pulses" of electricity over a wire. A higher voltage pulse will mean a 1, and a lower voltage pulse will mean a 0. But there are other parts of a computer that still use 0s and 1s that aren't electric, like the hard drive. The hard drive stores 1s and 0s by changing the magnetic poles of small parts of a metal disk. Positive and negative charges would be 1s or 0s.

|  |  |
| --- | --- |
| Binary | Hexadecimal |
| 0000 | 0 |
| 0001 | 1 |
| 0010 | 2 |
| 0011 | 3 |
| 0100 | 4 |
| 0101 | 5 |
| 0110 | 6 |
| 0111 | 7 |
| 1000 | 8 |
| 1001 | 9 |
| 1010 | A |
| 1011 | B |
| 1100 | C |
| 1101 | D |
| 1110 | E |
| 1111 | F |

A **nibble** (sometimes spelled **nybble or nyble**) is a string of four bits. Nibbles can be used to represent a single hexadecimal digit as there are exactly 16 combinations between those four bits.

## Bytes

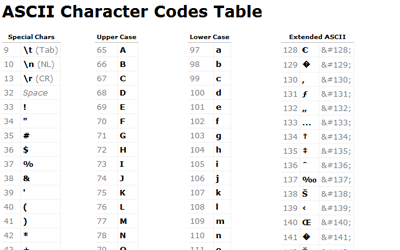
A **byte** consists of 8 bits, sometimes also referred to as an octet. A byte generally comprises 8 bits that represent a letter in the alphabet, a single digit number, a punctuation mark, or other character.

So how exactly does a byte hold information? For example, ASCII tables are used to translate a byte to a letter in the alphabet. Below is a small portion of the table. On the left hand side is the value and on the right side is the letter it represents.

Fox example: This word is four bytes long.

Binary: 01000010 01001001 01010100 01010011

Decimal: 66 105 116 115



ASCII: B i t s

So the binary stream is the word “Bits”.

This is only one example. Bits and bytes can hold all digital data at its lowest level.