

Switch from base 16 to base 2

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16-base system (hexadecimal)

Hex or hexadecimal is a counting system based on 16 characters. This counting system is particularly interesting, because in the decimal system often, there are only 10 digits to represent numbers. Since the hex system has 16 digits, the 6 additional digits (in addition to the 10 digits in the decimal) are denoted by the first 6 letters of the English alphabet. Therefore, the hex digits include **0, 1, 2, 3, 4, 5, 6, 7, 8, 9** and **A, B, C, D, E, F**. This digital system is most commonly used in mathematics and information technology. In HTML programming, the **color** attribute can be represented by a 6-digit hexadecimal number: **FFFFFF** represents white, **000000** represents black, etc.

0	0	6	6	C	12
1	1	7	7	D	13
2	2	8	8	E	14
3	3	9	9	F	15
4	4	A	10		
5	5	B	11		

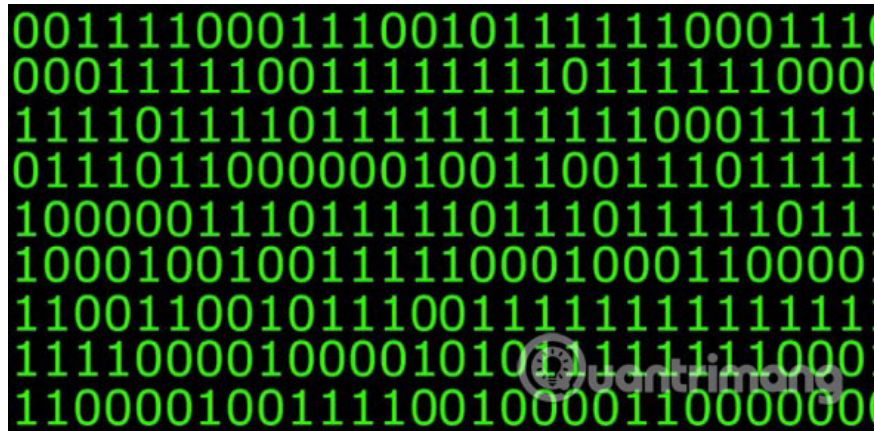
Base 2 system (binary system)

The binary system uses two characters, **0** and **1**, to represent a value.

Binary systems were applied in ancient Egypt, China and India for many different purposes. In the modern world, binary has become the language of electronic science and computers. This is the most efficient system for detecting electrical signals: Turn off (**0**) and turn on (**1**). It is also the basis for the binary code used to

compose data on the computer. Even the digital text you are currently reading also includes binary numbers.

Reading some binary is easier than you think. This is a quantitative position-based system, so each digit in a binary number is raised to powers of 2, starting from the rightmost position of 2^0 . In base 2 system, each binary digit refers to 1 bit.



How to read binary numbers

To convert binary to decimal, some basic knowledge of how to read binary numbers can help. As mentioned above, in binary counting using quantitative positions, each bit (binary digit) is a power of 2. This means that all binary numbers can be expressed in terms of power of 2, with the rightmost position is 2^0 .

For example, binary numbers $(1010)_2$ can also be written as follows:

$$(1 * 2^3) + (0 * 2^2) + (1 * 2^1) + (0 * 2^0)$$

Example of conversion from base 16 to base 2

1. $(1E3)_{16} = (0001\ 1110\ 0011)_2$
2. $(0A2B)_{16} = (0000\ 1010\ 0010\ 1011)_2$
3. $(7E0C)_{16} = (0111\ 1110\ 0000\ 1100)_2$

Conversion table from base 16 to base 2

Mechanical number 16 Circular number

200000100012001030011401005010160110701118100091001A1010B1011C1100D1101E1110F1111

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