**Binary code**

A **Binary code** is a way of representing [text](http://en.wikipedia.org/wiki/Plain_text) or [computer processor instructions](http://en.wikipedia.org/wiki/Instruction_(computer_science))in [binary number system](http://en.wikipedia.org/wiki/Binary_number_system)i.e 0 and 1. This is accomplished by assigning a string of bits to each particular symbol or instruction. For example, a [binary string](http://en.wikipedia.org/wiki/String_(computing)) of eight binary digits ([bits](http://en.wikipedia.org/wiki/Bit)) can represent any of 256 possible values and can therefore correspond to a variety of different symbols, letters or instructions.

In computing and telecommunication, binary codes are used for any of a variety of methods of [encoding](http://en.wikipedia.org/wiki/Encoding) data, such as [character strings](http://en.wikipedia.org/wiki/Character_string), into bit strings. Those methods may be fixed-width or [variable-width](http://en.wikipedia.org/wiki/Variable-length_code). In a fixed-width binary code, each letter, digit, or other character, is represented by a bit string of the same length; that bit string, interpreted as a [binary number](http://en.wikipedia.org/wiki/Binary_number), is usually displayed in code tables in [octal](http://en.wikipedia.org/wiki/Octal), [decimal](http://en.wikipedia.org/wiki/Decimal) or [hexadecimal](http://en.wikipedia.org/wiki/Hexadecimal) notation. There are many [character sets](http://en.wikipedia.org/wiki/Character_sets) and many [character encodings](http://en.wikipedia.org/wiki/Character_encoding) for them.

A bit string, interpreted as a binary number, can be [translated into a decimal number](http://en.wikipedia.org/wiki/Binary_numeral_system#Decimal). For example, the lowercase "a" as represented by the bit string 01100001 can also be represented as the decimal number 97.

**History of Binary Code**

Binary numbers can be traced back to 100 BC. Binary Code was first introduced by the English mathematician and philosopher [Eugene Paul Curtis](http://en.wikipedia.org/wiki/Eugene_Paul_Curtis) during the 17th century.In 1847, a mathematician [George Boole](http://en.wikipedia.org/wiki/George_Boole) describes an algebraic system of logic, now known as [Boolean algebra](http://en.wikipedia.org/wiki/Boolean_algebra_(logic)). Boole’s system was based on binary, on-off approach that consisted the three most basic operations: AND, OR, and NOT. This system was not put into use until a graduate student from Massachusetts Institute of Technology named[Claude Shannon](http://en.wikipedia.org/wiki/Claude_Shannon) wrote his thesis in 1937, which became a starting point for the use of the binary code in practical applications such as computers, electric circuits, and more.

Binary-coded decimal

BCD was used in many early [decimal computers](http://en.wikipedia.org/wiki/Decimal_computer). In [computing](http://en.wikipedia.org/wiki/Computing) and [electronic](http://en.wikipedia.org/wiki/Electronics) systems, **binary-coded decimal** (**BCD**) is a digital encoding method for numbers using [decimal](http://en.wikipedia.org/wiki/Decimal) notation, with each decimal digit represented by its own [binary](http://en.wikipedia.org/wiki/Binary_numeral_system) sequence. In BCD, a [numeral](http://en.wikipedia.org/wiki/Numerical_digit) is usually represented by four [bits](http://en.wikipedia.org/wiki/Bit) which, in general, represent the decimal range 0 through 9. Other bit patterns are sometimes used for a [sign](http://en.wikipedia.org/wiki/Sign_(mathematics)) or for other indications (e.g., error or overflow). Uncompressed (or *zoned*) BCD consumes a [byte](http://en.wikipedia.org/wiki/Byte) for each represented numeral, whereas compressed (or *packed*) BCD typically carries two numerals in a single byte by taking advantage of the fact that four bits will represent the full numeral range.

BCD's main virtue is ease of conversion between machine- and human-readable formats, as well as a more precise machine-format representation of decimal quantities. As compared to typical binary formats, BCD's principal drawbacks are a small increase in the complexity of the circuits needed to implement basic mathematical operations and less efficient usage of storage facilities.

**BCD in Electronics**

BCD is very common in electronic systems where a numeric value is to be displayed, especially in systems consisting solely of digital logic, and not containing a microprocessor. By utilizing BCD, the manipulation of numerical data for display can be greatly simplified by treating each digit as a separate single sub-circuit. This matches much more closely the physical reality of display hardware—a designer might choose to use a series of separate identical [seven-segment displays](http://en.wikipedia.org/wiki/Seven-segment_display) to build a metering circuit.

**List of binary codes**

This is a list of some **binary codes** that are (or have been) used to represent [text](http://en.wikipedia.org/wiki/Plain_text) as a sequence of [binary digits](http://en.wikipedia.org/wiki/Binary_digit) "0" and "1". Fixed-width binary codes use a set number of bits to represent each character in the text, while in [variable-width](http://en.wikipedia.org/wiki/Variable-length_code) binary codes, the number of bits may vary from character to character.

**Five-bit binary codes**

A number of different five-bit codes were used for early [punched tape](http://en.wikipedia.org/wiki/Punched_tape) systems.Five bits per character only allows for 32 different characters, so many of the five bit codes used two sets of characters per value referred to as FIGS (figures) and LTRS (letters), and reserved two characters to switch between these sets. This effectively allowed the use of 60 characters.

**Six-bit binary codes**

Six bits per character allows 64 distinct characters to be represented. For Example:

* International Telegraph Alphabet No 3 (ITA3) - also known as the RCA code.
* [Six-bit BCD](http://en.wikipedia.org/wiki/BCD_(6-bit)) (Binary Coded Decimal), used by early [mainframe](http://en.wikipedia.org/wiki/Mainframe_computer) computers.
* [Six-bit ASCII](http://en.wikipedia.org/wiki/Six-bit_character_code) subset of the primitive [seven-bit ASCII](http://en.wikipedia.org/wiki/ASCII)

**Seven-bit binary codes**

Examples of seven-bit binary codes are:

* [ASCII](http://en.wikipedia.org/wiki/ASCII) - The ubiquitous ASCII code was originally defined as a seven-bit character set.
* CCIR 476 - Extends ITA2 from 5 to 7 bits, using the extra 2 bits as [check digits](http://en.wikipedia.org/wiki/Parity_bit)
* International Telegraph Alphabet No 4 (ITA4)

# ASCII

The **American Standard Code for Information Interchange** is a [character-encoding scheme](http://en.wikipedia.org/wiki/Character_encoding) originally based on the [English alphabet](http://en.wikipedia.org/wiki/English_alphabet). ASCII codes represent [text](http://en.wikipedia.org/wiki/Character_(computing)) in [computers](http://en.wikipedia.org/wiki/Computer), [communications](http://en.wikipedia.org/wiki/Telecommunication) equipment, and other devices that use text. Most modern character-encoding schemes are based on ASCII, though they support many additional characters.ASCII developed from [telegraphic codes](http://en.wikipedia.org/wiki/Telegraph_code). Its first edition was published during 1963, ASCII was ordered for more convenient sorting (i.e., alphabetization) of lists and added features for devices.

ASCII includes definitions for 128 characters: 33 are non-printing [control characters](http://en.wikipedia.org/wiki/Control_character) (many now obsolete) that affect how text and space is processed and 95 printable characters, including the [space](http://en.wikipedia.org/wiki/Space_(punctuation)) (which is considered an invisible graphic).ASCII was the most commonly used character encoding on the World Wide Web until December 2007, when it was surpassed by [UTF-8](http://en.wikipedia.org/wiki/UTF-8)(Unicode Transformation Formate-8).

**Eight-bit binary codes**

* Extended ASCII - A number of standards extend [ASCII](http://en.wikipedia.org/wiki/ASCII) to eight bits by adding a further 128 characters, such as:
  + [ISO/IEC 8859](http://en.wikipedia.org/wiki/ISO/IEC_8859)
  + [Mac OS Roman](http://en.wikipedia.org/wiki/Mac_OS_Roman)
  + [Windows-1252](http://en.wikipedia.org/wiki/Windows-1252)
* [EBCDIC](http://en.wikipedia.org/wiki/EBCDIC) - Used in early [IBM](http://en.wikipedia.org/wiki/IBM) computers and current [System i](http://en.wikipedia.org/wiki/IBM_System_i) and [System z](http://en.wikipedia.org/wiki/IBM_System_z) computers

**10 bit binary codes**

* AUTOSPEC - Also known as Bauer code. AUTOSPEC repeats a five-bit character twice, but if the character is one with odd parity, the repetition is inverted

**16 bit binary codes**

* [UCS-2](http://en.wikipedia.org/wiki/UCS-2)([Universal Character Set](http://en.wikipedia.org/wiki/Universal_Character_Set)) (16-bit [code unit](http://en.wikipedia.org/wiki/Code_unit))An obsolete encoding capable of representing the [basic multilingual plane](http://en.wikipedia.org/wiki/Basic_multilingual_plane) of Unicode.

**32 bit binary codes**

* [UTF-32/UCS-4](http://en.wikipedia.org/wiki/UTF-32/UCS-4) - A four-bytes-per-character representation of [Unicode](http://en.wikipedia.org/wiki/Unicode)

**Variable length binary codes**

* [UTF-8](http://en.wikipedia.org/wiki/UTF-8) - Encodes characters in a way that is mostly compatible with [ASCII](http://en.wikipedia.org/wiki/ASCII) but can also encode the full repertoire of Unicode characters with sequences of up to 4 8-bit bytes
* [UTF-16](http://en.wikipedia.org/wiki/UTF-16) - Extends UCS-2 to cover the whole of Unicode with sequences of 1 or 2 16-bit elements
* [GB 18030](http://en.wikipedia.org/wiki/GB_18030) - A full-Unicode variable length code designed for compatibility with older Chinese multibyte encodings
* [Huffman coding](http://en.wikipedia.org/wiki/Huffman_coding) - A technique for expressing more common characters using shorter bit strings than are used for less common characters

# Unicode

**Unicode** is a [computing](http://en.wikipedia.org/wiki/Computing)[industry standard](http://en.wikipedia.org/wiki/Technical_standard) for the consistent [encoding](http://en.wikipedia.org/wiki/Character_encoding), representation and handling of [text](http://en.wikipedia.org/wiki/Character_(computing)) expressed in most of the world's [writing systems](http://en.wikipedia.org/wiki/Writing_system). Developed in conjunction with the [Universal Character Set](http://en.wikipedia.org/wiki/Universal_Character_Set) standard ,the latest version of Unicode consists of a repertoire of more than 110,000 [characters](http://en.wikipedia.org/wiki/Character_(computing)) covering 100 [scripts](http://en.wikipedia.org/wiki/Script_(Unicode)), a set of code charts for visual reference, an encoding methodology and set of standard [character encodings](http://en.wikipedia.org/wiki/Character_encoding), an enumeration of character properties such as upper and lower [case](http://en.wikipedia.org/wiki/Letter_case), a set of reference data [computer files](http://en.wikipedia.org/wiki/Computer_file), and a number of related items, such as character properties, rules for [normalization](http://en.wikipedia.org/wiki/Unicode_normalization), decomposition, [collation](http://en.wikipedia.org/wiki/Collation), rendering, and [bidirectional](http://en.wikipedia.org/wiki/Bi-directional_text) display order (for the correct display of text containing both right-to-left scripts, such as [Arabic](http://en.wikipedia.org/wiki/Arabic_script) and [Hebrew](http://en.wikipedia.org/wiki/Hebrew_script), and left-to-right scripts). The most recent version is **Unicode 6.1**.

Unicode standard has been implemented in many recent technologies, including [XML](http://en.wikipedia.org/wiki/XML), the [Java programming language](http://en.wikipedia.org/wiki/Java_(programming_language)), the [Microsoft .NET Framework](http://en.wikipedia.org/wiki/.NET_framework), and modern [operating systems](http://en.wikipedia.org/wiki/Operating_system).

[Unicode can be implemented](http://en.wikipedia.org/wiki/Comparison_of_Unicode_encodings) by different [character encodings](http://en.wikipedia.org/wiki/Character_encoding). The most commonly used encodings are [UTF-8](http://en.wikipedia.org/wiki/UTF-8), [UTF-16](http://en.wikipedia.org/wiki/UTF-16) and the now-obsolete [UCS-2](http://en.wikipedia.org/wiki/UCS-2). UTF-8 uses one [byte](http://en.wikipedia.org/wiki/Byte) for any [ASCII](http://en.wikipedia.org/wiki/ASCII) characters, which have the same code values in both UTF-8 and ASCII encoding, and up to four bytes for other characters. UTF-16 extends UCS-2, using two 16-bit units (4 × 8 bit) to handle each of the additional characters.