

Introduction to Assembly Language

Machine Code: Machine Code a computer programming language consisting of binary (0, 1) or hexadecimal instructions which a computer can respond to directly.

Sometimes referred to as machine code or object code, machine language is a collection of binary digits or bits that the computer reads and interprets. Machine language is the only language a computer is capable of understanding, without a previous transformation. This language is really difficult.

Machine code is used to directly control a computer's (CPU). Machine code is a strictly numerical language which is intended to run as fast as possible.

Currently, programmers almost never write programs directly in machine code, because it requires attention to numerous details that a high-level language handle automatically. Compilers and interpreters are used to convert a high-level language into machine code. While the machine code does not need a compiler or interpreter.

Short for American Standard Code for Information Interexchange, ASCII is a standard that assigns letters, numbers, and other characters in the 256 slots available in the 8-bit code. The ASCII decimal (Dec) number is created from binary, which is the language of all computers. As shown in the table below, the lowercase "h" character (Char) has a decimal value of 104, which is "01101000" in binary.

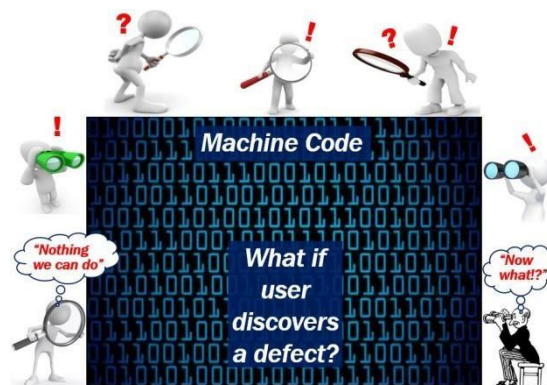
ASCII was first developed and published in 1963 by the X3 committee, a part of the ASA (American Standards Association). The ASCII standard was first published as ASA X3.4-1963, with ten revisions of the standard being published between 1967 and 1986.

ASCII control characters			ASCII printable characters						Extended ASCII characters							
00	NULL	(Null character)	32	space	64	@	96	`	128	Ç	160	á	192	Ł	224	Ó
01	SOH	(Start of Header)	33	!	65	A	97	a	129	ü	161	í	193	ł	225	ô
02	STX	(Start of Text)	34	"	66	B	98	b	130	é	162	ó	194	Ł	226	õ
03	ETX	(End of Text)	35	#	67	C	99	c	131	â	163	ú	195	ł	227	ö
04	EOT	(End of Trans.)	36	\$	68	D	100	d	132	ä	164	ñ	196	Ł	228	ø
05	ENQ	(Enquiry)	37	%	69	E	101	e	133	à	165	Ñ	197	ł	229	ő
06	ACK	(Acknowledgement)	38	&	70	F	102	f	134	Å	166	°	198	Ł	230	µ
07	BEL	(Bell)	39	'	71	G	103	g	135	ç	167	°	199	Ł	231	þ
08	BS	(Backspace)	40	(72	H	104	h	136	ê	168	¿	200	Ł	232	ÿ
09	HT	(Horizontal Tab)	41)	73	I	105	i	137	ë	169	®	201	Ł	233	Û
10	LF	(Line feed)	42	*	74	J	106	j	138	è	170	™	202	Ł	234	Ü
11	VT	(Vertical Tab)	43	+	75	K	107	k	139	ï	171	½	203	Ł	235	Ý

Computers convert text and other data into binary with an assigned ASCII value. Once the ASCII value is known, that value can be converted to binary. In the following example, we take the word hope, and show how it is converted to binary that the computer understands.

Converting the text "hope" into Binary

Characters	h	o	p	e
ASCII Values	104	111	112	101
Binary Values	01101000	01101111	01110000	01100101



If the user discovers a defect or bug there is nothing, he or she can do to correct it. The programming language code is not human-readable.

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W1-0.ram
0011000000000000 ; read n -> acc ;
10110000000001010 ; jump to Done if n < 0. ;
01010000000010000 ; add sum to the acc ;
00100000000010000 ; store the new sum ;
10010000000000000 ; go back & read in next number ;
00010000000010000 ; load the final sum ;
01000000000000000 ; output the final sum ;
00000000000000000 ; stop ;
00000000000000000 ; 2-byte location where sum is stored ;
00000000000000000 ;
00000000000000000 ;
00000000000000000 ;

```

Fig.: Shows A simple Machine Language Program

Why the Machine language is required?

(1) Machine languages are the only languages understood by computers thus it is very much required in the computer system. (2) Machine Code, it can be used to directly control a computer's central processing unit (CPU).

Ada Lovelace, who is been credited as the first computer programmer in history.

The first computer programming language was created in 1883, when a woman named Ada Lovelace worked with Charles Babbage on his very early mechanical computer, the Analytical Engine. While Babbage was concerned with simply computing numbers, Ada Lovelace saw that the numbers the computer worked with could represent something other than just amounts of things.