BITS AND BYTES

ASCII, The American Standard Code for Information Interchange

Computers use binary digits that can only have two values called 0 and 1. A bit is a single binary digit. It represents the smallest unit of data (just like the good old American penny). However, computers usually do not operate on single bits, rather they store and manipulate a fixed number of bits. Most often, the smallest unit or number of bits a computer works with is eight bits. These eight bits make up a byte. ASCII codes use eight bits, and those eight bits represent a single character, such as the letter A or the number 7. Thus, the computer can store and manipulate an individual byte (a single character) or a group of bytes (several characters, a word) at a time. These individual bytes, or groups of bytes, form the basic unit of memory.

Primary storage capacities are usually specified in number of bytes. The symbol "K" is used whenever we refer to the size of memory, especially when the memory is quite large.The symbol K is equal to 1,024 units or positions of storage. Therefore, if a computer has 512K bytes (not bits) of primary storage, then it can hold 512 X 1,024 or 524,288 characters (bytes) of data in its memory.

Computers use the binary number system using binary digits. People find that system inconvenient and prefer the octal system (which allows the digits 0,1,2...7), the hexadecimal (HEX) system (which allows the digits 0,1,2...9,A. B...F), or the familiar decimal system (which allows the digits 0,1,2...9).

A Table of the ASCII Characters

Decimal	Octal	Hex	Binary	Value	Description
0	0	0	00000000	NUL	(Nullchar.)
1	1	1	00000001	SOH	(StartofHeader)
2	2	2	00000010	STX	(StartofText)
3	3	3	00000011	ETX	(EndofText)
4	4	4	00000100	EOT	(EndofTransmission)
5	5	5	00000101	ENQ	(Enquiry)
6	6	6	00000110	ACK	(Acknowledgment)
7	7	7	00000111	BEL	(Bell)
8	10	8	00001000	BS	(Backspace)
9	11	9	00001001	HT	(HorizontalTab)
10	12	00A	00001010	LF	(LineFeed)
11	13	00B	00001011	VT	(VerticalTab)
12	14	00C	00001100	FF	(FormFeed)
13	15	00D	00001101	CR	(CarriageReturn)
14	16	00E	00001110	SO	(ShiftOut)
15	17	00F	00001111	SI	(ShiftIn)
16	20	10	00010000	DLE	(DataLinkEscape)
17	21	11	00010001	DC1	(XON)(DeviceControl1)

Decimal	Octal	Hex	Binary	Value	Description
18	22	12	00010010	DC2	(DeviceControl2)
19	23	13	00010011	DC3	(XOFF)(DeviceControl3)
20	24	14	00010100	DC4	(DeviceControl4)
21	25	15	00010101	NAK	(NegativAcknowledgemnt)
22	26	16	00010110	SYN	(SynchronousIdle)
23	27	17	00010111	ETB	(EndofTrans.Block)
24	30	18	00011000	CAN	(Cancel)
25	31	19	00011001	EM	(EndofMedium)
26	32	01A	00011010	SUB	(Substitute)
27	33	01B	00011011	ESC	(Escape)
28	34	01C	00011100	FS	(FileSeparator)
29	35	01D	00011101	GS	(GroupSeparator)
30	36	01E	00011110	RS	(ReqsttoSend)(Rec.Sep.)
31	37	01F	00011111	US	(UnitSeparator)
32	40	20	00100000	SP	(Space)
33	41	21	00100001	!	(exclamationmark)
34	42	22	00100010	"	(double quote)
35	43	23	00100011	#	(numbersign)
36	44	24	00100100	$	(dollarsign)
37	45	25	00100101	%	(percent)
38	46	26	00100110	&	(ampersand)
39	47	27	00100111	'	(singlequote)
40	50	28	00101000	(	(left/openparenthesis)
41	51	29	00101001	)	(right/closingparenth.)
42	52	02A	00101010	*	(asterisk)
43	53	02B	00101011	+	(plus)
44	54	02C	00101100	,	(comma)
45	55	02D	00101101	-	(minusordash)
46	56	02E	00101110	.	(dot)
47	57	02F	00101111	/	(forwardslash)
48	60	30	00110000	0	
49	61	31	00110001	1	
50	62	32	00110010	2	
51	63	33	00110011	3	
52	64	34	00110100	4	
53	65	35	00110101	5	
54	66	36	00110110	6	
55	67	37	00110111	7	
56	70	38	00111000	8	
57	71	39	00111001	9	
58	72	03A	00111010	:	(colon)
59	73	03B	00111011	;	(semi-colon)
60	74	03C	00111100	<	(lessthan)
61	75	03D	00111101	=	(equalsign)

Decimal	Octal	Hex	Binary	Value	Description
62	76	03E	00111110	>	(greaterthan)
63	77	03F	00111111	?	(questionmark)
64	100	40	01000000	@	(ATsymbol)
65	101	41	01000001	A	
66	102	42	01000010	B	
67	103	43	01000011	C	
68	104	44	01000100	D	
69	105	45	01000101	E	
70	106	46	01000110	F	
71	107	47	01000111	G	
72	110	48	01001000	H	
73	111	49	01001001	I	
74	112	04A	01001010	J	
75	113	04B	01001011	K	
76	114	04C	01001100	L	
77	115	04D	01001101	M	
78	116	04E	01001110	N	
79	117	04F	01001111	O	
80	120	50	01010000	P	
81	121	51	01010001	Q	
82	122	52	01010010	R	
83	123	53	01010011	S	
84	124	54	01010100	T	
85	125	55	01010101	U	
86	126	56	01010110	V	
87	127	57	01010111	W	
88	130	58	01011000	X	
89	131	59	01011001	Y	
90	132	05A	01011010	Z	
91	133	05B	01011011	[	(left/openingbracket)
92	134	05C	01011100	\	(backslash)
93	135	05D	01011101	]	(right/closingbracket)
94	136	05E	01011110	^	(caret/circumflex)
95	137	05F	01011111	_	(underscore)
96	140	60	01100000	`	
97	141	61	01100001	a	
98	142	62	01100010	b	
99	143	63	01100011	c	
100	144	64	01100100	d	
101	145	65	01100101	e	
102	146	66	01100110	f	
103	147	67	01100111	g	
104	150	68	01101000	h	
105	151	69	01101001	i	

Decimal	Octal	Hex	Binary	Value	Description
106	152	06A	01101010	j	
107	153	06B	01101011	k	
108	154	06C	01101100	l	
109	155	06D	01101101	m	
110	156	06E	01101110	n	
111	157	06F	01101111	o	
112	160	70	01110000	p	
113	161	71	01110001	q	
114	162	72	01110010	r	
115	163	73	01110011	s	
116	164	74	01110100	t	
117	165	75	01110101	u	
118	166	76	01110110	v	
119	167	77	01110111	w	
120	170	78	01111000	x	
121	171	79	01111001	y	
122	172	07A	01111010	z	
123	173	07B	01111011	{	(left/openingbrace)
124	174	07C	01111100	l	(verticalbar)
125	175	07D	01111101	}	(right/closingbrace)
126	176	07E	01111110	~	(tilde)
127	177	07F	01111111	DEL	(delete)