

FOLLOWING THE TRAIL OF

EVIDENCE

FORENSIC KIT



MemorialMuseum.com

A large, light gray fingerprint graphic is centered on the page, serving as a background for the main title. The ridges of the fingerprint are clearly visible and flow from the top left towards the bottom right.

DIGITAL FORENSICS

FOLLOWING THE TRAIL OF EVIDENCE

FORENSIC KIT



MemorialMuseum.com

DIGITAL FORENSICS

Converting Binary Data to Readable ASCII Characters

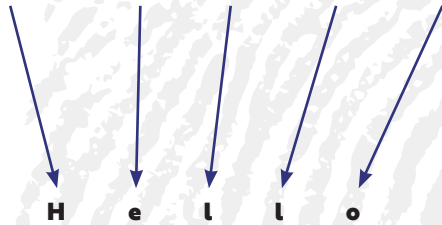
Computers work and communicate using bits and bytes. Bits are used in a base 2 or binary number system that represents numeric values using two unique digits (0 and 1). Computing devices use binary numbering to represent electronic circuit voltage state, (i.e. on/off switch), which considers 0 voltage input as off and 1 input as on.

Eight bits are called a byte. One byte character sets contain 256 characters. By utilizing the full capacity of one byte it is possible to store any single value within the range of 0 and 255. The English Alphabet has 52 standard characters [A-Z, a-z], 10 digits [0-9] and numerous punctuations, special characters and symbols. A standard is needed to govern which character is assigned to which binary code. This is the ASCII (American Standard Code for Information Interchange); ASCII defines codes for 128 characters.

Using an ASCII chart, you can look at bytes of data and determine which alpha or numeric character they represent and decode a message. Here is an example with 5 bytes of data.

Each group of 8 bits (one byte) defines a character on the ASCII chart. Using the ASCII chart, I would look up the first group of 8 bits (one byte) which in the example below is 01001000. This sequence on the ASCII chart represents a capital "H". The next byte represents a lower case "e" and the next byte represents a lower case "l". If you notice, the next 8 bits are identical to the previous 8 bits, so we have another lower case "l". The final character is a lower case "o".

01001000 01100101 01101100 01101100 01101111



I decoded the message! Now it's your turn.

DIGITAL FORENSICS EXERCISE

Below you will find bytes of data (groups of 8 bits). Your job is to use the ASCII chart provided to decode the bytes to the characters they represent. When using the chart, look at the column labeled "bin" and find the associated character (char) – these are highlighted in yellow in the chart.

HINT: Blank spaces in sentences also are represented by one byte of data and will be found between words.

01001110 01101111 00100000 01100011 01101100 01110101 01100101 01110011 00100000

01101000 01100101 01110010 01100101 00101110 00100000 01001100 01001111 01001100

FOLLOWING THE TRAIL OF EVIDENCE

FORENSIC KIT



MemorialMuseum.com

ASCII CHART

DEC	HEX	OCT	BIN	CHAR	DEC	HEX	OCT	BIN	CHAR
0	0x0	00	00000000	NUL	34	0x22	042	00100010	"
1	0x1	01	00000001	SOH	35	0x23	043	00100011	#
2	0x2	02	00000010	STX	36	0x24	044	00100100	\$
3	0x3	03	00000011	ETX	37	0x25	045	00100101	%
4	0x4	04	00000100	EOT	38	0x26	046	00100110	&
5	0x5	05	00000101	ENQ	39	0x27	047	00100111	'
6	0x6	06	00000110	ACK	40	0x28	050	00101000	(
7	0x7	07	00000111	BEL	41	0x29	051	00101001)
8	0x8	010	00001000	BS	42	0x2A	052	00101010	*
9	0x9	011	00001001	HT	43	0x2B	053	00101011	+
10	0xA	012	00001010	LF	44	0x2C	054	00101100	,
11	0xB	013	00001011	VT	45	0x2D	055	00101101	-
12	0xC	014	00001100	FF	46	0x2E	056	00101110	.
13	0xD	015	00001101	CR	47	0x2F	057	00101111	/
14	0xE	016	00001110	SO	48	0x30	060	00110000	0
15	0xF	017	00001111	SI	49	0x31	061	00110001	1
16	0x10	020	00010000	DLE	50	0x32	062	00110010	2
17	0x11	021	00010001	DC1	51	0x33	063	00110011	3
18	0x12	022	00010010	DC2	52	0x34	064	00110100	4
19	0x13	023	00010011	DC3	53	0x35	065	00110101	5
20	0x14	024	00010100	DC4	54	0x36	066	00110110	6
21	0x15	025	00010101	NAK	55	0x37	067	00110111	7
22	0x16	026	00010110	SYN	56	0x38	070	00111000	8
23	0x17	027	00010111	ETB	57	0x39	071	00111001	9
24	0x18	030	00011000	CAN	58	0x3A	072	00111010	:
25	0x19	031	00011001	EM	59	0x3B	073	00111011	;
26	0x1A	032	00011010	SUB	60	0x3C	074	00111100	<
27	0x1B	033	00011011	ESC	61	0x3D	075	00111101	=
28	0x1C	034	00011100	FS	62	0x3E	076	00111110	>
29	0x1D	035	00011101	GS	63	0x3F	077	00111111	?
30	0x1E	036	00011110	RS	64	0x40	0100	01000000	@
31	0x1F	037	00011111	US	65	0x41	0101	01000001	A
32	0x20	040	00100000	SPC	66	0x42	0102	01000010	B
33	0x21	041	00100001	!	67	0x43	0103	01000011	C

FOLLOWING THE TRAIL OF EVIDENCE

FORENSIC KIT



MemorialMuseum.com

ASCII CHART

DEC	HEX	OCT	BIN	CHAR
68	0x44	0104	01000100	D
69	0x45	0105	01000101	E
70	0x46	0106	01000110	F
71	0x47	0107	01000111	G
72	0x48	0110	01001000	H
73	0x49	0111	01001001	I
74	0x4A	0112	01001010	J
75	0x4B	0113	01001011	K
76	0x4C	0114	01001100	L
77	0x4D	0115	01001101	M
78	0x4E	0116	01001110	N
79	0x4F	0117	01001111	O
80	0x50	0120	01010000	P
81	0x51	0121	01010001	Q
82	0x52	0122	01010010	R
83	0x53	0123	01010011	S
84	0x54	0124	01010100	T
85	0x55	0125	01010101	U
86	0x56	0126	01010110	V
87	0x57	0127	01010111	W
88	0x58	0130	01011000	X
89	0x59	0131	01011001	Y
90	0x5A	0132	01011010	Z
91	0x5B	0133	01011011	[
92	0x5C	0134	01011100	\
93	0x5D	0135	01011101]
94	0x5E	0136	01011110	^
95	0x5F	0137	01011111	_
96	0x60	0140	01100000	`
97	0x61	0141	01100001	a
98	0x62	0142	01100010	b
99	0x63	0143	01100011	c
100	0x64	0144	01100100	d
101	0x65	0145	01100101	e

DEC	HEX	OCT	BIN	CHAR
102	0x66	0146	01100110	f
103	0x67	0147	01100111	g
104	0x68	0150	01101000	h
105	0x69	0151	01101001	i
106	0x6A	0152	01101010	j
107	0x6B	0153	01101011	k
108	0x6C	0154	01101100	l
109	0x6D	0155	01101101	m
110	0x6E	0156	01101110	n
111	0x6F	0157	01101111	o
112	0x70	0160	01110000	p
113	0x71	0161	01110001	q
114	0x72	0162	01110010	r
115	0x73	0163	01110011	s
116	0x74	0164	01110100	t
117	0x75	0165	01110101	u
118	0x76	0166	01110110	v
119	0x77	0167	01110111	w
120	0x78	0170	01111000	x
121	0x79	0171	01111001	y
122	0x7A	0172	01111010	z
123	0x7B	0173	01111011	{
124	0x7C	0174	01111100	
125	0x7D	0175	01111101	}
126	0x7E	0176	01111110	~
127	0x7F	0177	01111111	Del
128	0x80	0200	10000000	Ç
129	0x81	0201	10000001	ü
130	0x82	0202	10000010	é
131	0x83	0203	10000011	â
132	0x84	0204	10000100	ä
133	0x85	0205	10000101	à
134	0x86	0206	10000110	Å
135	0x87	0207	10000111	ç

FOLLOWING THE TRAIL OF EVIDENCE

FORENSIC KIT



MemorialMuseum.com

ASCII CHART

DEC	HEX	OCT	BIN	CHAR	DEC	HEX	OCT	BIN	CHAR
136	0x88	0210	10001000	è	170	0xAA	0252	10101010	˘
137	0x89	0211	10001001	é	171	0xAB	0253	10101011	½
138	0x8A	0212	10001010	è	172	0xAC	0254	10101100	¾
139	0x8B	0213	10001011	ï	173	0xAD	0255	10101101	i
140	0x8C	0214	10001100	î	174	0xAE	0256	10101110	«
141	0x8D	0215	10001101	ì	175	0xAF	0257	10101111	»
142	0x8E	0216	10001110	Ä	176	0xB0	0260	10110000	⋮
143	0x8F	0217	10001111	Å	177	0xB1	0261	10110001	⋮
144	0x90	0220	10010000	É	178	0xB2	0262	10110010	⋮
145	0x91	0221	10010001	æ	179	0xB3	0263	10110011	
146	0x92	0222	10010010	Æ	180	0xB4	0264	10110100	‡
147	0x93	0223	10010011	ô	181	0xB5	0265	10110101	‡
148	0x94	0224	10010100	ö	182	0xB6	0266	10110110	‡
149	0x95	0225	10010101	ò	183	0xB7	0267	10110111	‡
150	0x96	0226	10010110	û	184	0xB8	0270	10111000	‡
151	0x97	0227	10010111	ù	185	0xB9	0271	10111001	‡
152	0x98	0230	10011000	ÿ	186	0xBA	0272	10111010	
153	0x99	0231	10011001	Ö	187	0xBB	0273	10111011	‡
154	0x9A	0232	10011010	Ü	188	0xBC	0274	10111100	‡
155	0x9B	0233	10011011	ƒ	189	0xBD	0275	10111101	‡
156	0x9C	0234	10011100	£	190	0xBE	0276	10111110	‡
157	0x9D	0235	10011101	¥	191	0xBF	0277	10111111	‡
158	0x9E	0236	10011110	ƒ	192	0xC0	0300	11000000	⌒
159	0x9F	0237	10011111	f	193	0xC1	0301	11000001	⌒
160	0xA0	0240	10100000	á	194	0xC2	0302	11000010	⌒
161	0xA1	0241	10100001	í	195	0xC3	0303	11000011	⌒
162	0xA2	0242	10100010	ó	196	0xC4	0304	11000100	—
163	0xA3	0243	10100011	ú	197	0xC5	0305	11000101	†
164	0xA4	0244	10100100	ñ	198	0xC6	0306	11000110	†
165	0xA5	0245	10100101	Ñ	199	0xC7	0307	11000111	†
166	0xA6	0246	10100110	ª	200	0xC8	0310	11001000	ℒ
167	0xA7	0247	10100111	º	201	0xC9	0311	11001001	ℒ
168	0xA8	0250	10101000	¿	202	0xCA	0312	11001010	ℒ
169	0xA9	0251	10101001	ƒ	203	0xCB	0313	11001011	ℒ

FOLLOWING THE TRAIL OF EVIDENCE

FORENSIC KIT



MemorialMuseum.com

ASCII CHART

DEC	HEX	OCT	BIN	CHAR
204	0xCC	0314	11001100	⏏
205	0xCD	0315	11001101	=
206	0xCE	0316	11001110	⏏
207	0xCF	0317	11001111	⏏
208	0xD0	0320	11010000	⏏
209	0xD1	0321	11010001	⏏
210	0xD2	0322	11010010	⏏
211	0xD3	0323	11010011	⏏
212	0xD4	0324	11010100	⏏
213	0xD5	0325	11010101	⏏
214	0xD6	0326	11010110	⏏
215	0xD7	0327	11010111	⏏
216	0xD8	0330	11011000	⏏
217	0xD9	0331	11011001	⏏
218	0xDA	0332	11011010	⏏
219	0xDB	0333	11011011	⏏
220	0xDC	0334	11011100	⏏
221	0xDD	0335	11011101	⏏
222	0xDE	0336	11011110	⏏
223	0xDF	0337	11011111	⏏
224	0xE0	0340	11100000	α
225	0xE1	0341	11100001	β
226	0xE2	0342	11100010	Γ
227	0xE3	0343	11100011	π
228	0xE4	0344	11100100	Σ
229	0xE5	0345	11100101	σ

DEC	HEX	OCT	BIN	CHAR
230	0xE6	0346	11100110	μ
231	0xE7	0347	11100111	τ
232	0xE8	0350	11101000	Φ
233	0xE9	0351	11101001	Θ
234	0xEA	0352	11101010	Ω
235	0xEB	0353	11101011	δ
236	0xEC	0354	11101100	∞
237	0xED	0355	11101101	φ
238	0xEE	0356	11101110	ε
239	0xEF	0357	11101111	∩
240	0xF0	0360	11110000	≡
241	0xF1	0361	11110001	±
242	0xF2	0362	11110010	≥
243	0xF3	0363	11110011	≤
244	0xF4	0364	11110100	∫
245	0xF5	0365	11110101	∫
246	0xF6	0366	11110110	÷
247	0xF7	0367	11110111	≈
248	0xF8	0370	11111000	°
249	0xF9	0371	11111001	·
250	0xFA	0372	11111010	·
251	0xFB	0373	11111011	√
252	0xFC	0374	11111100	n
253	0xFD	0375	11111101	²
254	0xFE	0376	11111110	■
255	0xFF	0377	11111111	