
Overview of Computers

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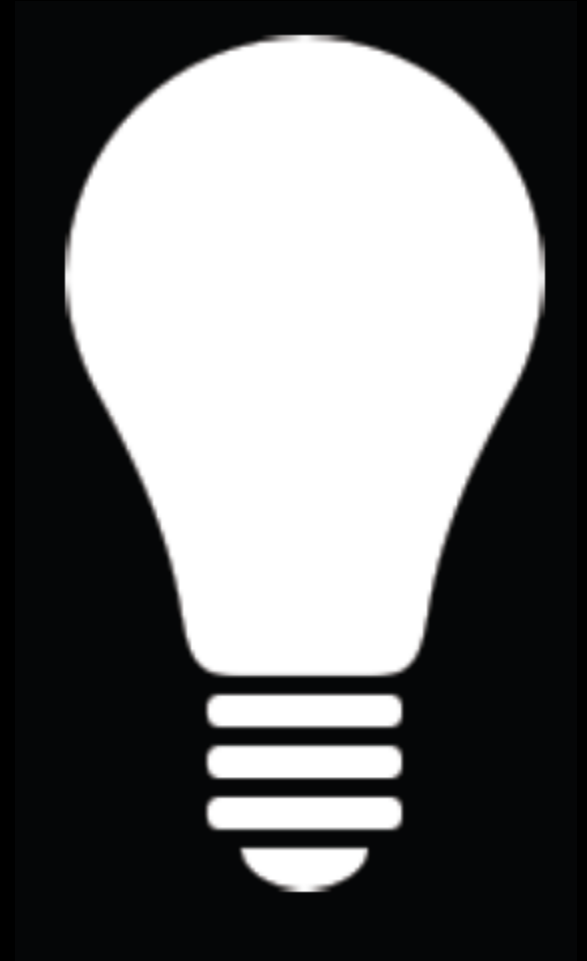
What do computers understand?

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01101000	01110100	01110100	01110000
01110011	00111010	00101111	00101111
01110111	01110111	01110111	00101110
01111001	01101111	01110101	01110100
01110101	01100010	01100101	00101110
01100011	01101111	01101101	00101111
01110111	01100001	01110100	01100011
01101000	00111111	01110110	00111101
01100100	01010001	01110111	00110100
01110111	00111001	01010111	01100111
01011000	01100011	01010001	11010101

What do computers understand?

- Binary
 - 0/1
 - True/False
 - On/Off



Decimal Notation

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123

100	10	1	- Places
1	2	3	

$$123 = 1 \times 100 + 2 \times 10 + 3 \times 1$$

Binary Notation

Binary Notation

01000011

Binary to Decimal

<u>Binary Number</u>	<u>Decimal Equivalent</u>
$11_2 \rightarrow$	
$1101_2 \rightarrow$	
$10011_2 \rightarrow$	
$100110_2 \rightarrow$	

Binary to Decimal

<u>Binary Number</u>	<u>Decimal Equivalent</u>
$11_2 \rightarrow$	$1*2 + 1*1 = 3$
$1101_2 \rightarrow$	$1*8 + 1*4 + 1*2 + 1*1 = 13$
$10011_2 \rightarrow$	$1*16 + 0*8 + 0*4 + 1*2 + 1*1 = 19$
$100110_2 \rightarrow$	$1*32 + 0*16 + 0*8 + 1*4 + 1*2 + 0*1 = 38$

What about letters?

ASCII:

American Standard Code for Information Interchange

0	NUL	16	DLE	32	SPC	48	0	64	@	80	P	96	`	112	p
1	SOH	17	DC1	33	!	49	1	65	A	81	Q	97	a	113	q
2	STX	18	DC2	34	"	50	2	66	B	82	R	98	b	114	r
3	ETX	19	DC3	35	#	51	3	67	C	83	S	99	c	115	s
4	EOT	20	DC4	36	\$	52	4	68	D	84	T	100	d	116	t
5	ENQ	21	NAK	37	%	53	5	69	E	85	U	101	e	117	u
6	ACK	22	SYN	38	&	54	6	70	F	86	V	102	f	118	v
7	BEL	23	ETB	39	'	55	7	71	G	87	W	103	g	119	w
8	BS	24	CAN	40	(	56	8	72	H	88	X	104	h	120	x
9	HT	25	EM	41	)	57	9	73	I	89	Y	105	i	121	y
10	LF	26	SUB	42	*	58	:	74	J	90	Z	106	j	122	z
11	VT	27	ESC	43	+	59	;	75	K	91	[	107	k	123	{
12	FF	28	FS	44	,	60	<	76	L	92	\	108	l	124	|
13	CR	29	GS	45	-	61	=	77	M	93	]	109	m	125	}
14	SO	30	RS	46	.	62	>	78	N	94	^	110	n	126	~
15	SI	31	US	47	/	63	?	79	O	95	_	111	o	127	DEL

01001000 01001001

72 73

HI

Representing Text

011001100110111101101111011000100110000101110010

The diagram illustrates the binary representation of the word "foobar". The word is split into six characters: 'f', 'o', 'o', 'b', 'a', and 'r'. Each character is enclosed in a box, and the boxes are arranged horizontally. Above each box is an upward-pointing arrow indicating its corresponding 8-bit binary value. The binary values are: 'f' (01100110), 'o' (01101111), 'o' (01101111), 'b' (01100010), 'a' (01100001), and 'r' (01110010). The entire sequence of binary values is shown as a single continuous string of 48 bits.

Character	Binary Value
"f"	01100110
"o"	01101111
"o"	01101111
"b"	01100010
"a"	01100001
"r"	01110010

Representing Text

- The size of a file = number of bytes stored in the file
- 1 KB = bytes

Representing Text

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- 1 KB = 1024 bytes = 2^{10} bytes

Representing Text

- The size of a file = number of bytes stored in the file
- 1 KB = 1024 bytes = 2^{10} bytes
- 1 MB = 1024 KB = 2^{20} bytes
- 1 GB = 1024 MB = 2^{30} bytes
- 1 TB = 1024 GB = 2^{40} bytes