ASCII

American Standard Code for Information Interchange

A binary is a two-headed canary.

Luckily, counting in binary is as easy as 1, 10, 11, …

There are only 10 types of people in the world.
Those that understand binary and those that don't.

Q: What happened in the binary race?
A: 01

(which is to say: Zero won)

A 65

64	32	16	8	4	2	1

A 65

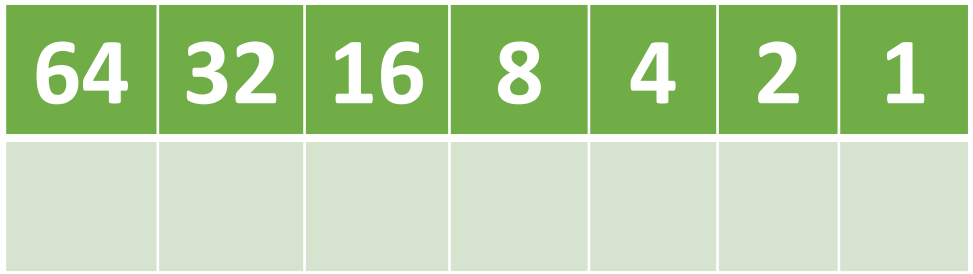
64	32	16	8	4	2	1
1	0	0	0	0	0	1

A 65

64	32	16	8	4	2	1
1	0	0	0	0	0	1

A in binary is 1000001

H 72



H 72

64	32	16	8	4	2	1
1	0	0	1	0	0	0

H 72

64	32	16	8	4	2	1
1	0	0	1	0	0	0

H in binary is 1001000

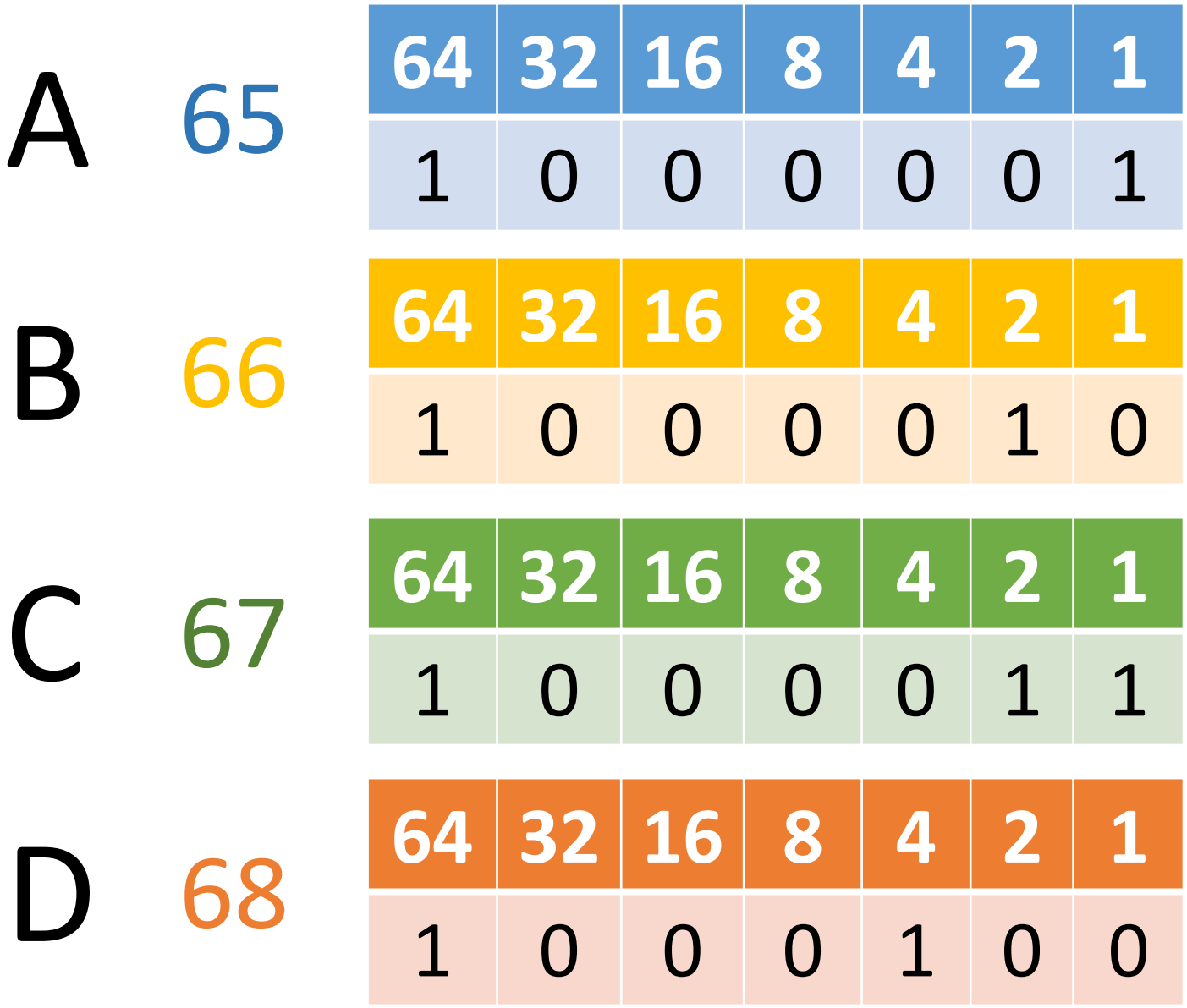
Binary	Oct	Dec	Hex	Glyph
011 0000	060	48	30	0
011 0001	061	49	31	1
011 0010	062	50	32	2
011 0011	063	51	33	3
011 0100	064	52	34	4
011 0101	065	53	35	5
011 0110	066	54	36	6
011 0111	067	55	37	7
011 1000	070	56	38	8
011 1001	071	57	39	9

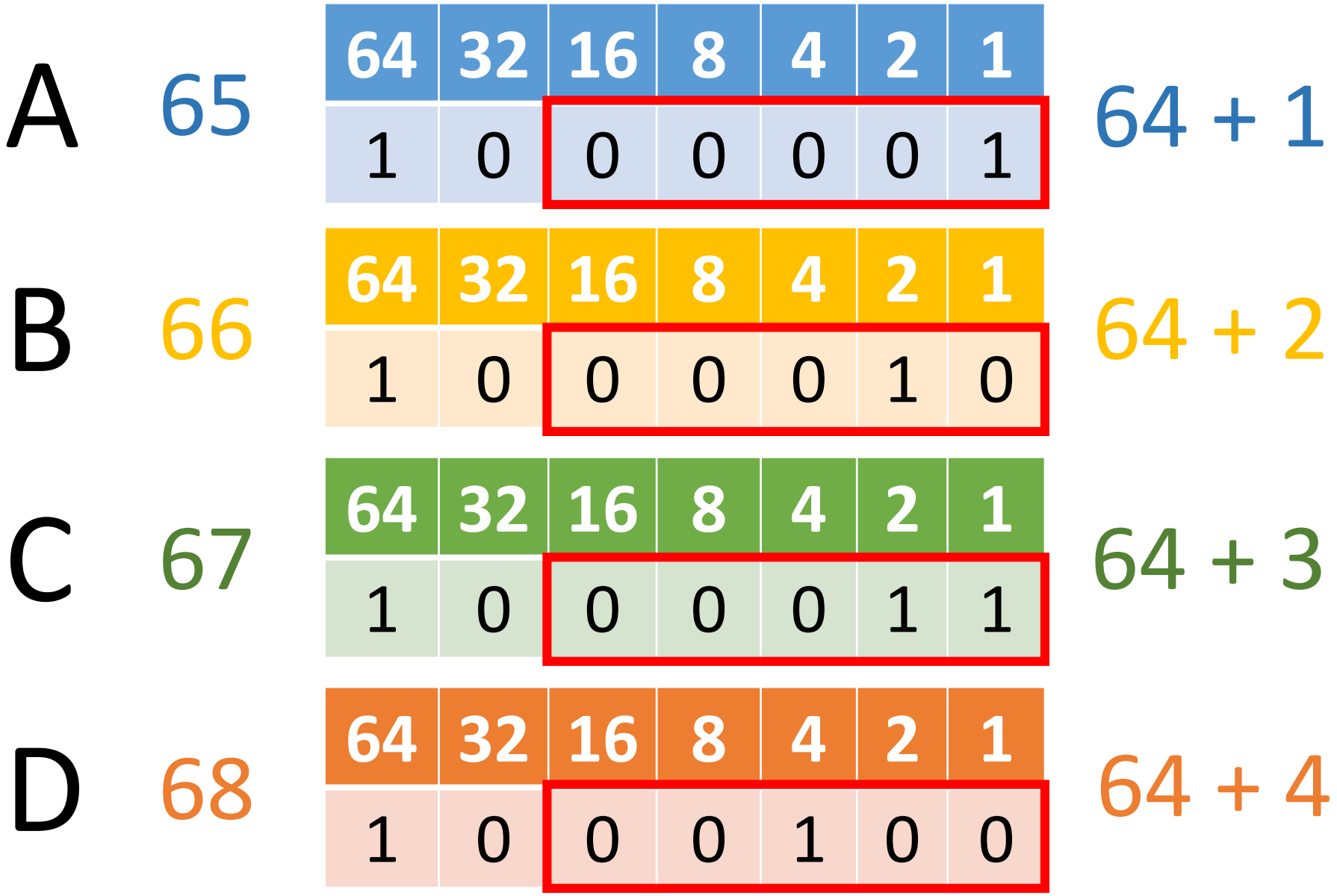
Binary	Oct	Dec	Hex	Glyph
100 0000	100	64	40	@
100 0001	101	65	41	A
100 0010	102	66	42	B
100 0011	103	67	43	C
100 0100	104	68	44	D
100 0101	105	69	45	E
100 0110	106	70	46	F
100 0111	107	71	47	G
100 1000	110	72	48	H

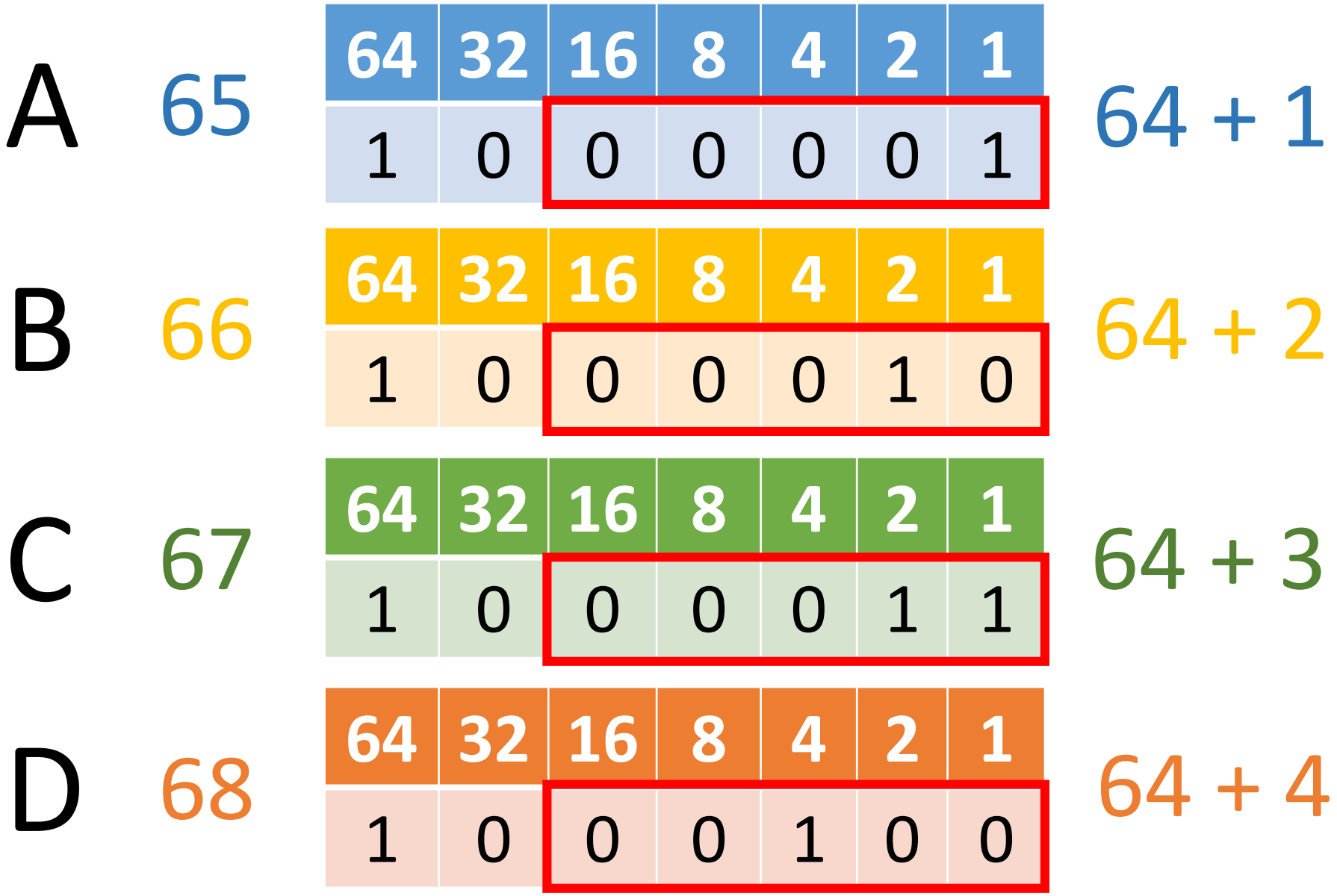
Binary	Oct	Dec	Hex	Glyph
110 0000	140	96	60	`
110 0001	141	97	61	a
110 0010	142	98	62	b
110 0011	143	99	63	c
110 0100	144	100	64	d
110 0101	145	101	65	e
110 0110	146	102	66	f
110 0111	147	103	67	g
110 1000	150	104	68	h

Some patterns

Found in ASCII


A
65
64 32 16 8 4 2 1
1 0 0 0 0 0 1
B
66
64 32 16 8 4 2 1
1 0 0 0 0 1 0
C
67
64 32 16 8 4 2 1
1 0 0 0 0 1 1
D
68
64 32 16 8 4 2 1
1 0 0 0 1 0 0


A
65
64 32 16 8 4 2 1
1 0 0 0 0 0 1
64 + 1
B
66
64 32 16 8 4 2 1
1 0 0 0 0 1 0
64 + 2
C
67
64 32 16 8 4 2 1
1 0 0 0 0 1 1
64 + 3
D
68
64 32 16 8 4 2 1
1 0 0 0 1 0 0
64 + 4


A
65
64 32 16 8 4 2 1
1 0 0 0 0 0 1
64 + 1
B
66
64 32 16 8 4 2 1
1 0 0 0 0 1 0
64 + 2
C
67
64 32 16 8 4 2 1
1 0 0 0 0 1 1
64 + 3
D
68
64 32 16 8 4 2 1
1 0 0 0 1 0 0
64 + 4

A 65

64	32	16	8	4	2	1
1	0	0	0	0	0	1

64 + 1

A is the first letter.

B 66

64	32	16	8	4	2	1
1	0	0	0	0	1	0

64 + 2

B is the second letter.

C 67

64	32	16	8	4	2	1
1	0	0	0	0	1	1

64 + 3

C is the third letter.

D 68

64	32	16	8	4	2	1
1	0	0	0	1	0	0

64 + 4

D is the fourth letter.

A 65

64	32	16	8	4	2	1
1	0	0	0	0	0	1

a 97

64	32	16	8	4	2	1
1	1	0	0	0	0	1

B 66

64	32	16	8	4	2	1
1	0	0	0	0	1	0

b 98

64	32	16	8	4	2	1
1	1	0	0	0	1	0

A 65

64	32	16	8	4	2	1
1	0	0	0	0	0	1

a 97

64	32	16	8	4	2	1
1	1	0	0	0	1	0

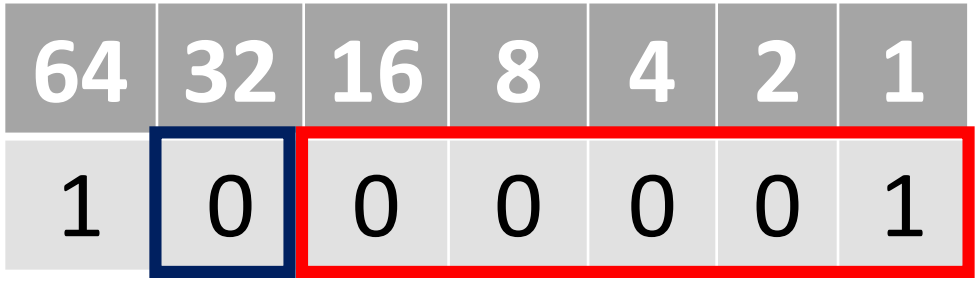
B 66

64	32	16	8	4	2	1
1	0	0	0	0	1	0

b 98

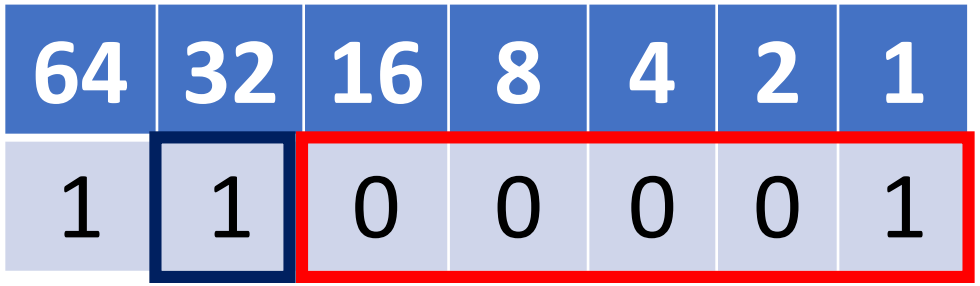
64	32	16	8	4	2	1
1	1	0	0	0	1	0

A 65



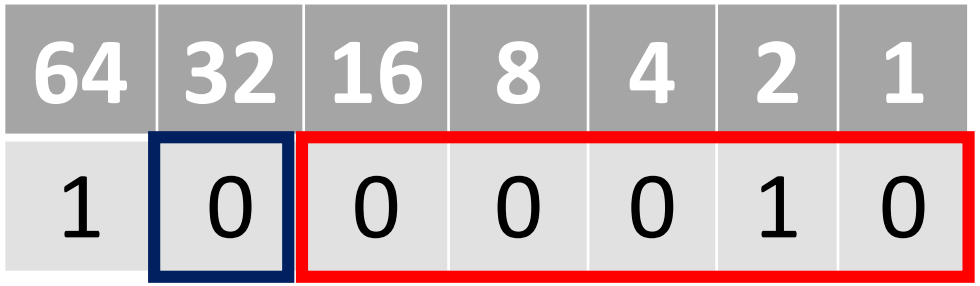
64 + 1

a 97



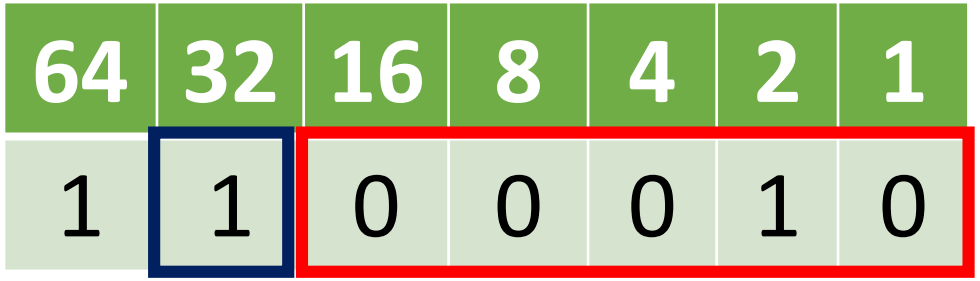
64+32+1

B 66



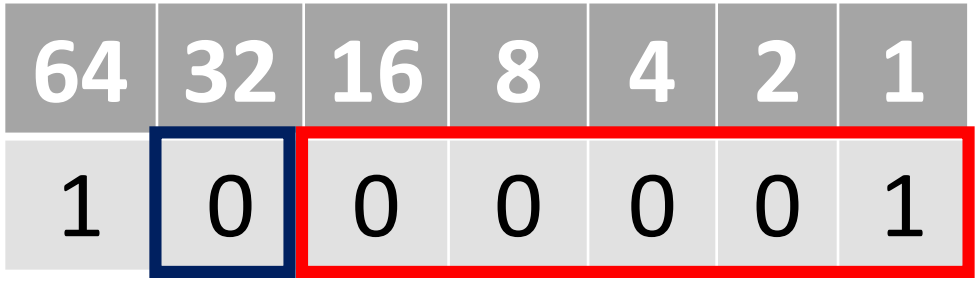
64 + 2

b 98



64+32+2

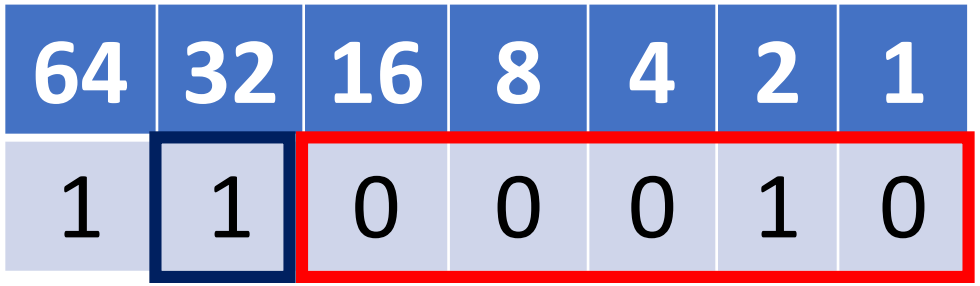
A 65



64 + 1

A is the first letter.

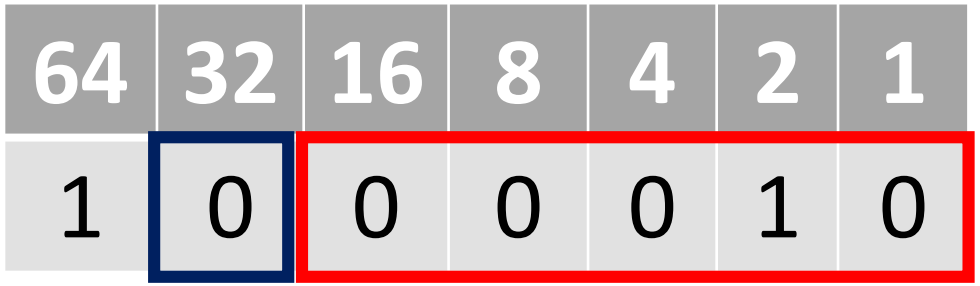
a 97



64+32+1

a is the first lower case letter.

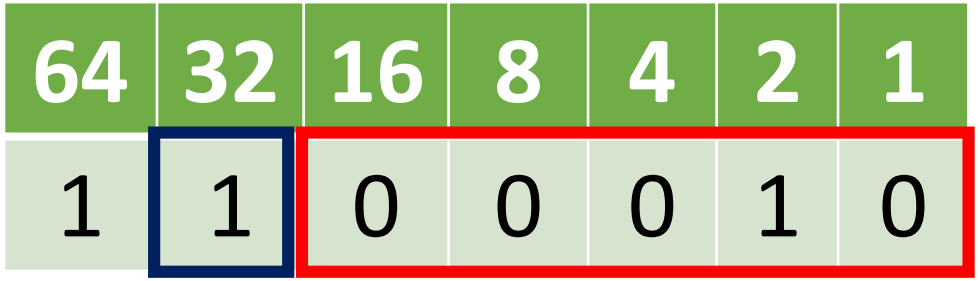
B 66



64 + 2

B is the second letter.

b 98



64+32+2

b is the second lower case letter.

Patterns in ASCII

64	32	16	8	4	2	1
1	0	0	0	0	0	1

The designers of ASCII were quite clever.

- If the 64-bit is a 1, you have a letter.
- If the 32-bit is a 1, you have a lower-case letter. If it is a 0, you have an upper-case letter.
- The remaining bits tell you which letter it is in the alphabet, starting at A as 1.

What letter is this?

64	32	16	8	4	2	1
1	1	0	0	1	0	1

The first bit of the alphabet:

1	2	3	4	5	6	7	8	9	10
a	b	c	d	e	f	g	h	i	j

What letter is this?

64	32	16	8	4	2	1
1	1	0	0	1	0	1

Lowercase 5th letter e

The first bit of the alphabet:

1	2	3	4	5	6	7	8	9	10
a	b	c	d	e	f	g	h	i	j

What letter is this?

64	32	16	8	4	2	1
1	0	0	1	0	0	1

The first bit of the alphabet:

1	2	3	4	5	6	7	8	9	10
a	b	c	d	e	f	g	h	i	j

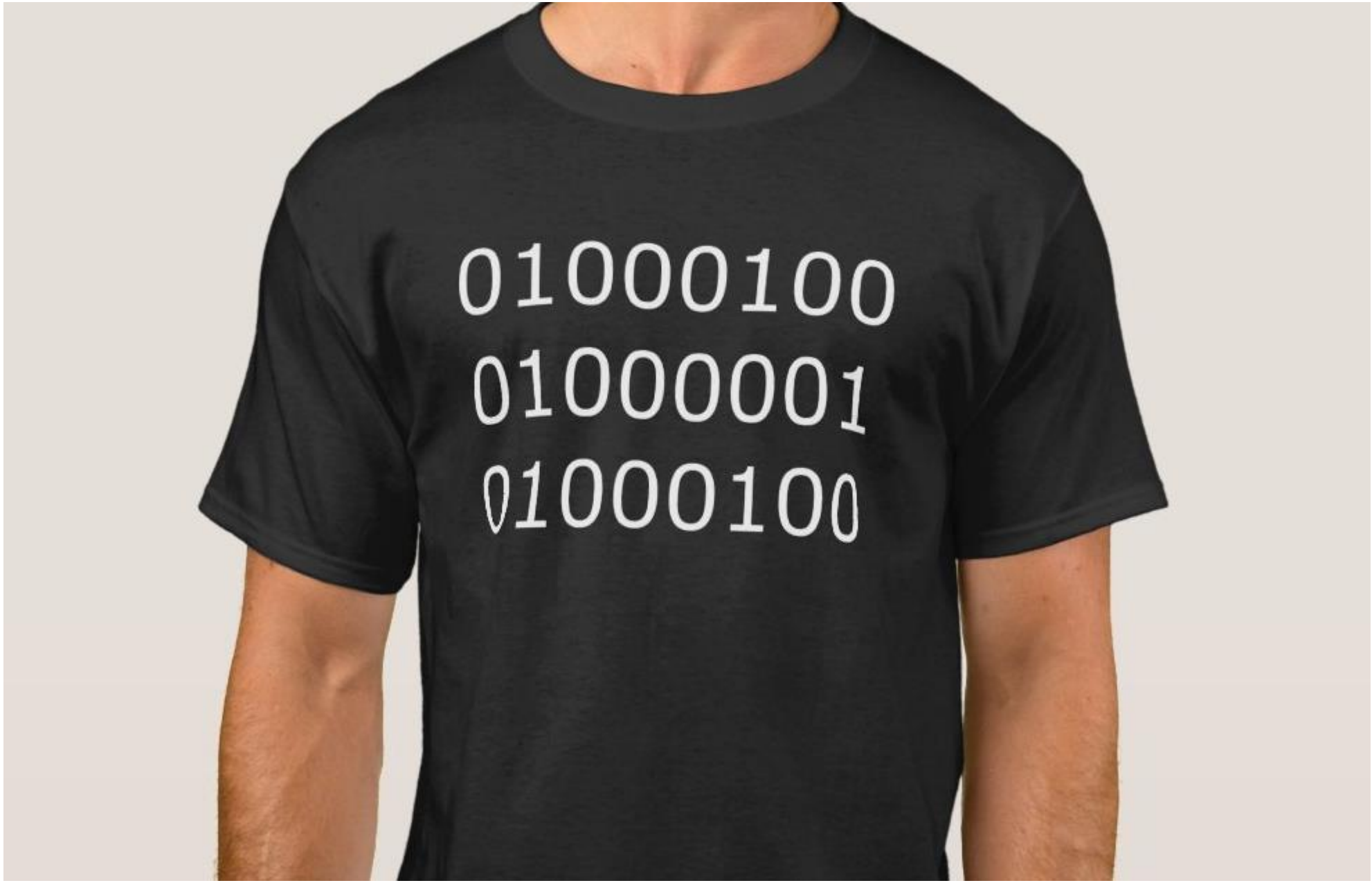
What letter is this?

64	32	16	8	4	2	1
1	0	0	1	0	0	1

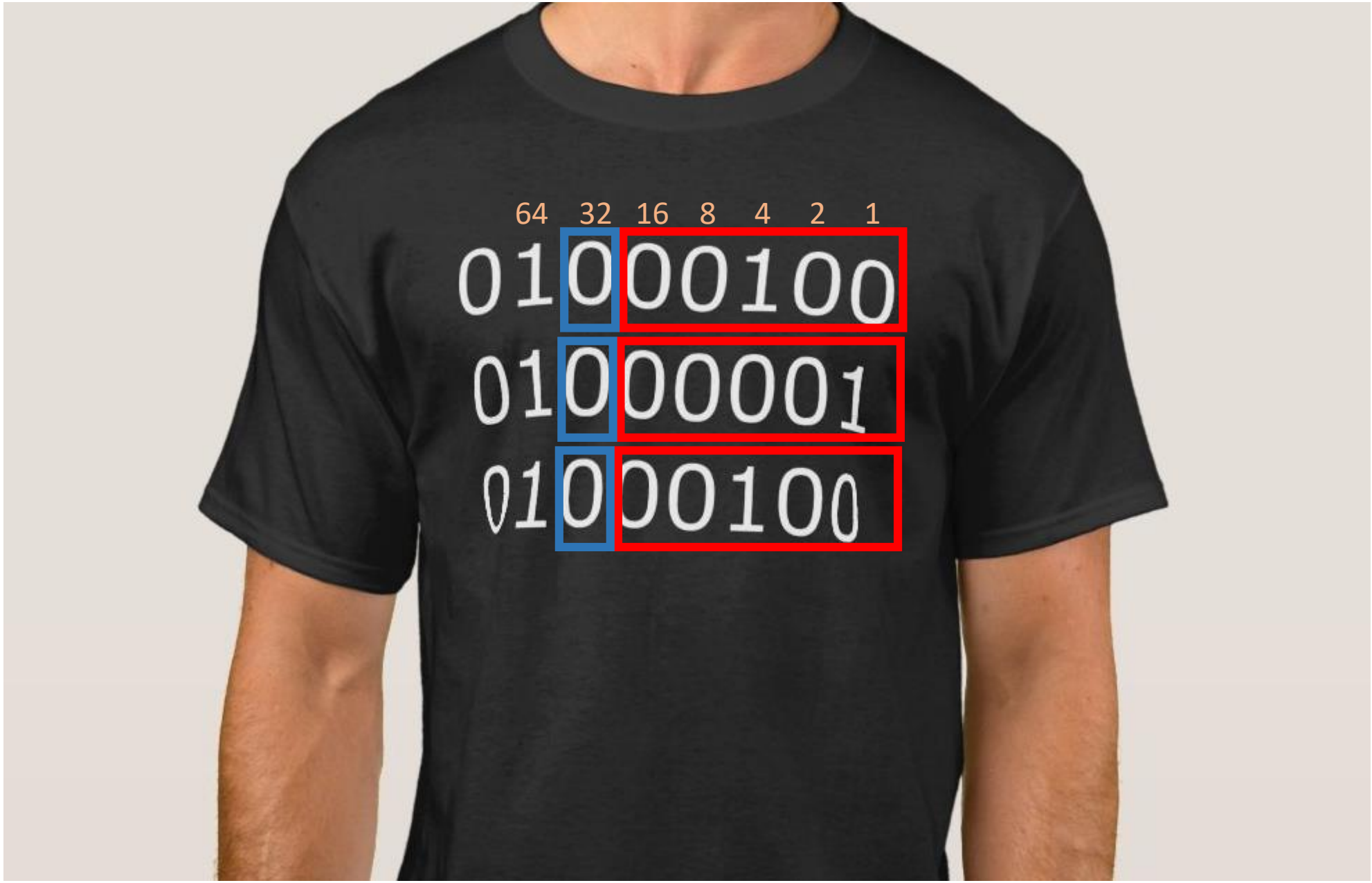
Uppercase 9th letter I

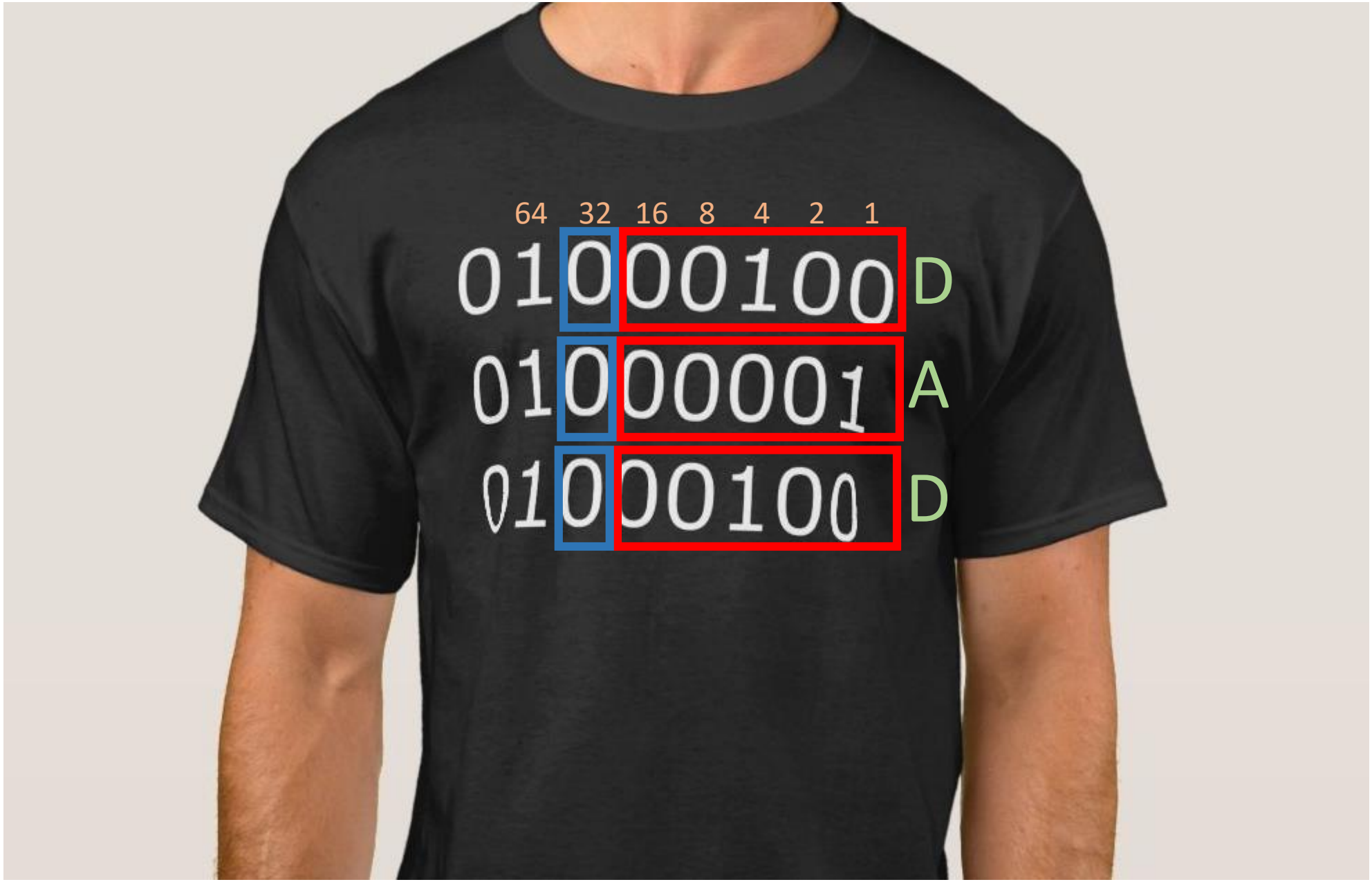
The first bit of the alphabet:

1	2	3	4	5	6	7	8	9	10
a	b	c	d	e	f	g	h	i	j


01000100
01000001
01000100


64 32 16 8 4 2 1
01000100
01000001
01000100


64 32 16 8 4 2 1
01000100
01000001
01000100


64 32 16 8 4 2 1
01000100 D
01000001 A
01000100 D

Welcome

Pillow and Blanket

A non-binary shirt, written in binary.

ASCII

- Stands for American Standard Code for Information Interchange (you don't have to know that)
- It is used to translate letters to a number. The number is then translated to binary.
- It is how simple text is stored in binary.
- It only works for English characters. It is too short to do other languages.
- With ASCII, you can't discard the leading zeros: 0000001 can not be written as 1.

USASCII code chart

Bits b_7 b_6 b_5 →	0 0 0	0 0 1	0 1 0	0 1 1	1 0 0	1 0 1	1 1 0	1 1 1
b_4 b_3 b_2 b_1 ↓ Row / Column →	0	1	2	3	4	5	6	7
0 0 0 0	0	NUL	DLE	SP	0	@	P	`	p
0 0 0 1	1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	2	STX	DC2	"	2	B	R	b	r
0 0 1 1	3	ETX	DC3	#	3	C	S	c	s
0 1 0 0	4	EOT	DC4	$	4	D	T	d	t
0 1 0 1	5	ENQ	NAK	%	5	E	U	e	u
0 1 1 0	6	ACK	SYN	&	6	F	V	f	v
0 1 1 1	7	BEL	ETB	'	7	G	W	g	w
1 0 0 0	8	BS	CAN	(	8	H	X	h	x
1 0 0 1	9	HT	EM	)	9	I	Y	i	y
1 0 1 0	10	LF	SUB	*	:	J	Z	j	z
1 0 1 1	11	VT	ESC	+	;	K	[	k	{
1 1 0 0	12	FF	FS	,	<	L	\	l	|
1 1 0 1	13	CR	GS	-	=	M	]	m	}
1 1 1 0	14	SO	RS	.	>	N	^	n	~
1 1 1 1	15	SI	US	/	?	O	_	o	DEL