

CHAPTER 2

BINARY NUMBERS



5 MIN



CLASS

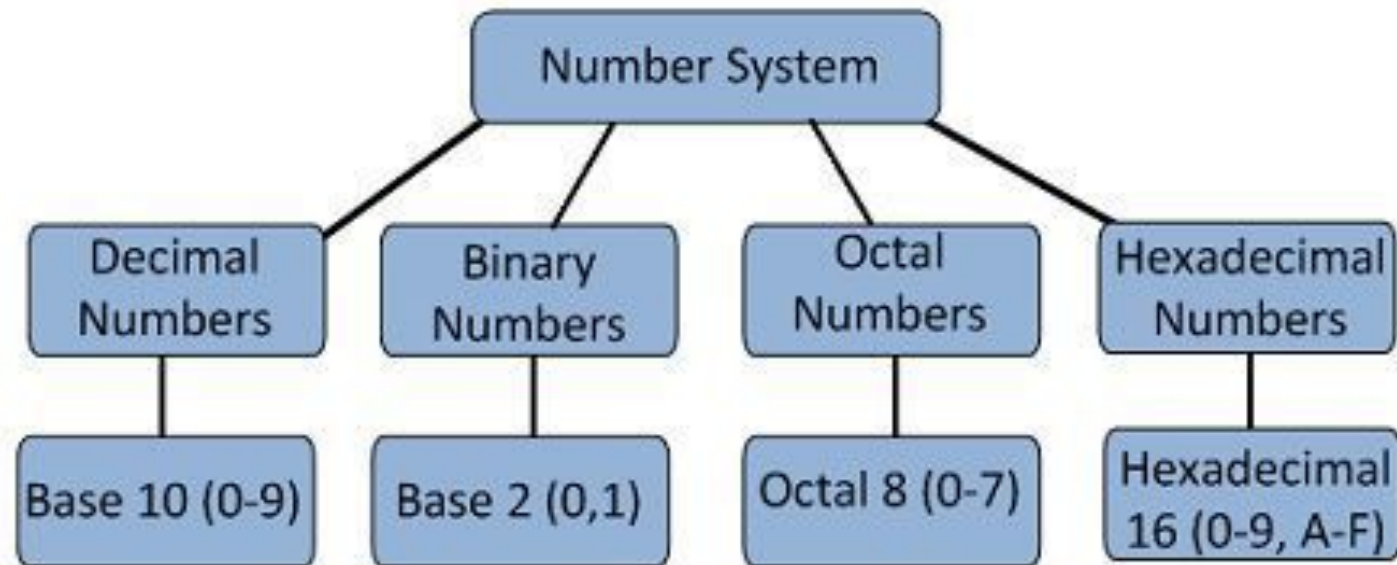
COMPETITION

Powers of 2

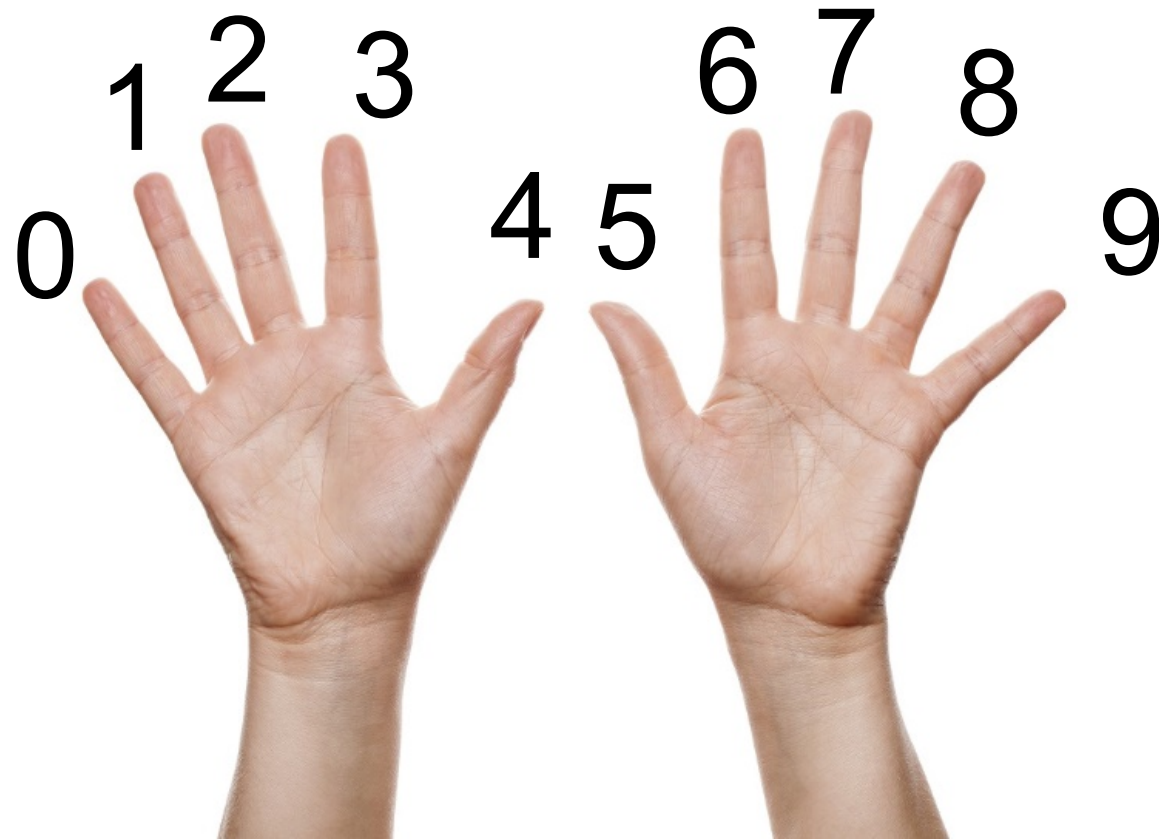


A Numeral System is a writing system for expressing numbers

Some example of Number Systems:

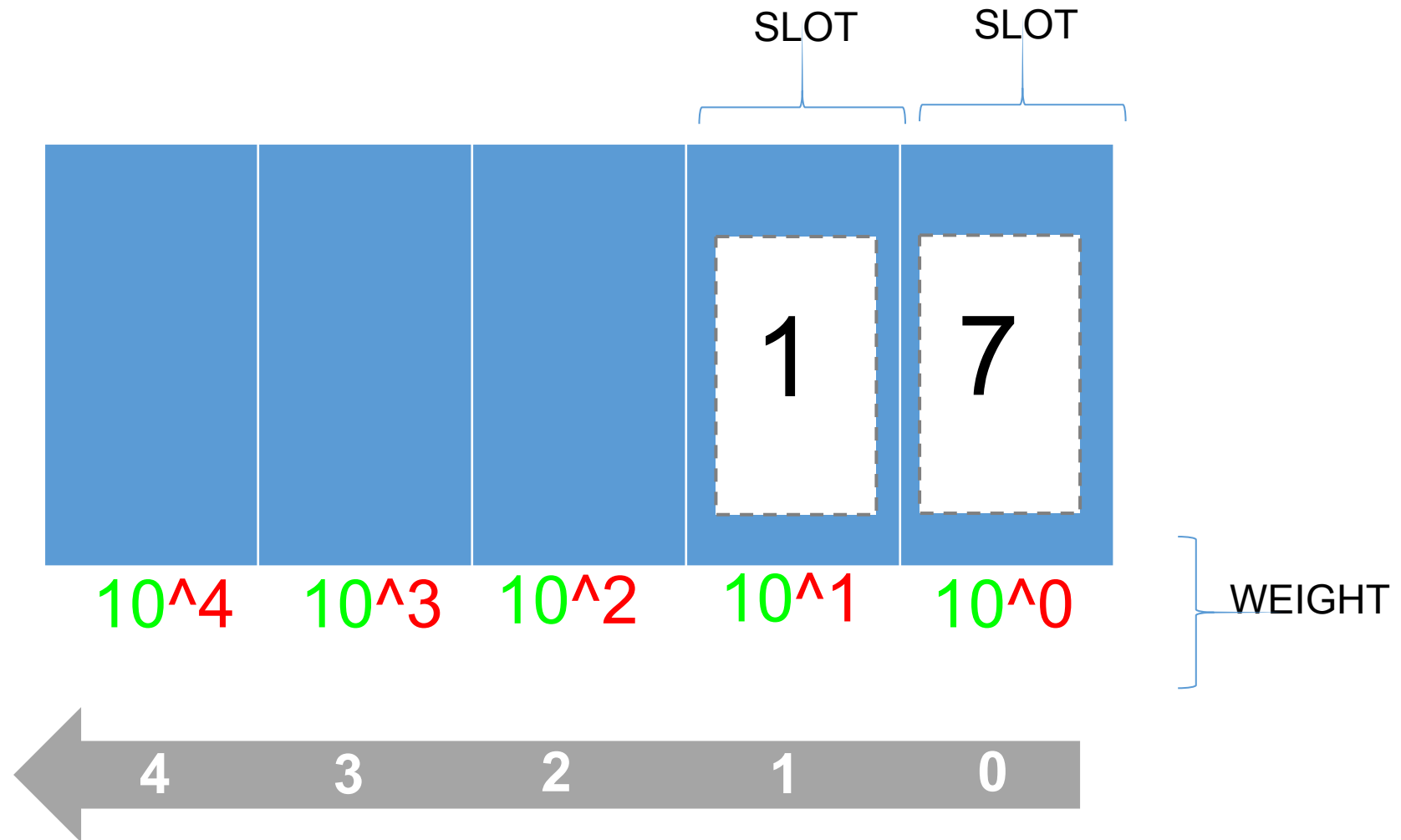


A **decimal** value is expressed with 10 digits



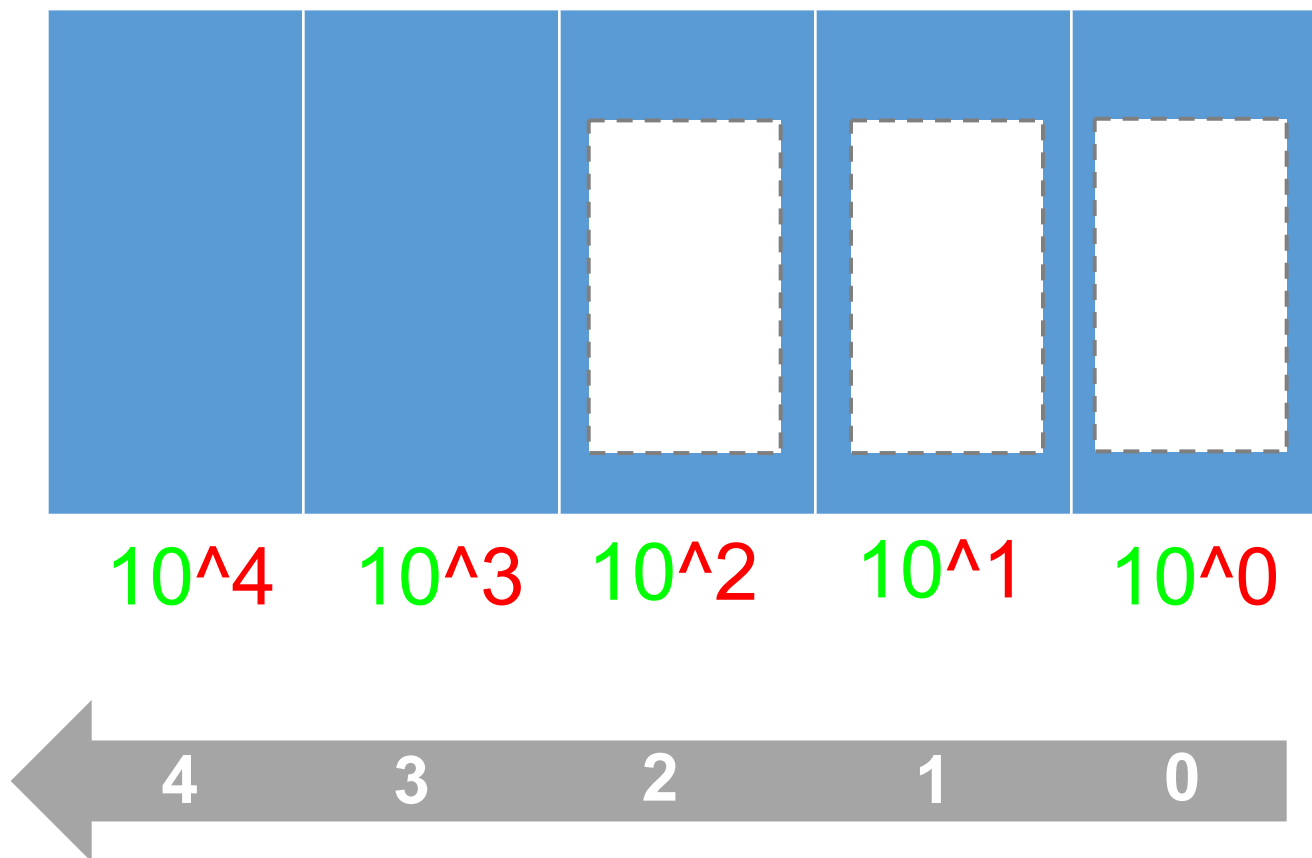
Each slot has a weight (*powers of 10*)

$$17 = 1 * 10^1 + 7 * 10^0$$



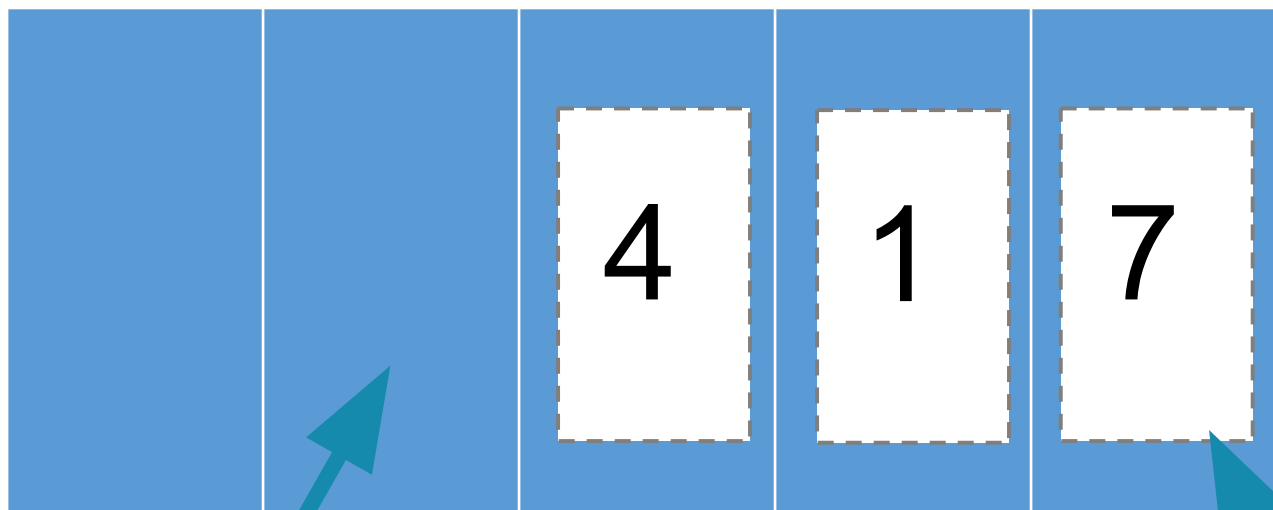


With 3 slots, how many numbers can we express in decimal system?





CLASS



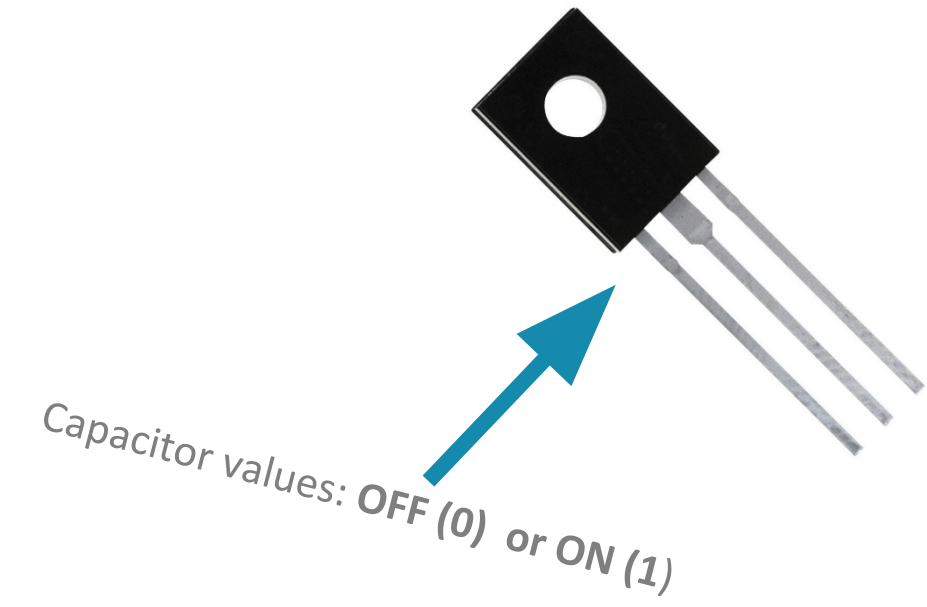
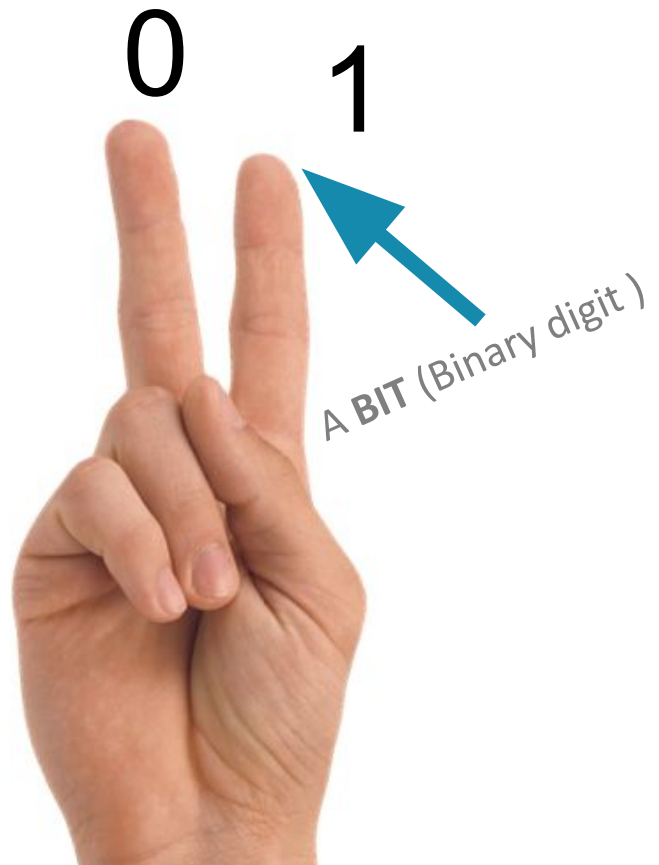
0

What happens if I
add a zero here?

0

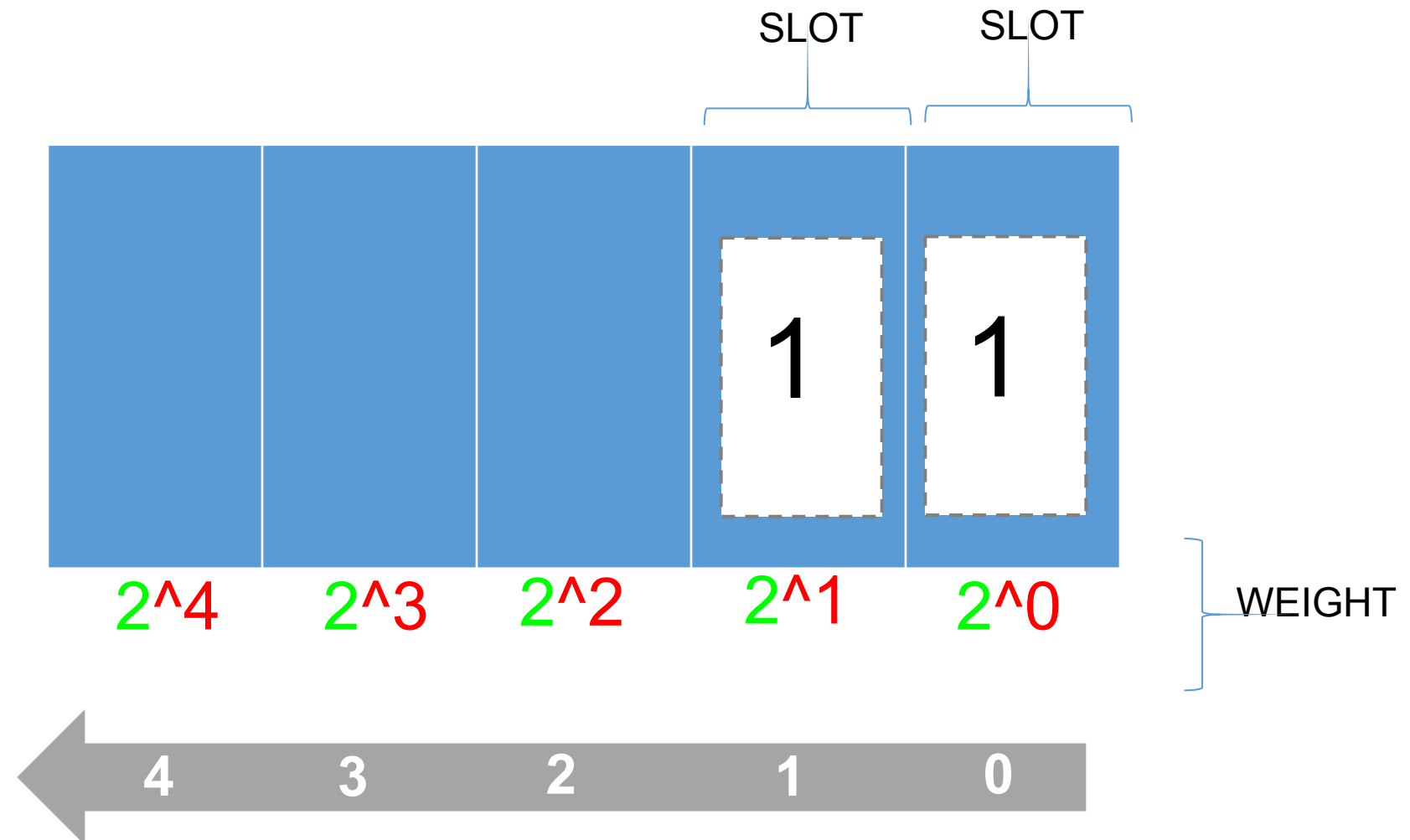
What happens if I
insert a zero here?

“binary” is a number system using **only 2 digits**



Each slot has a weight (*powers of 2*)

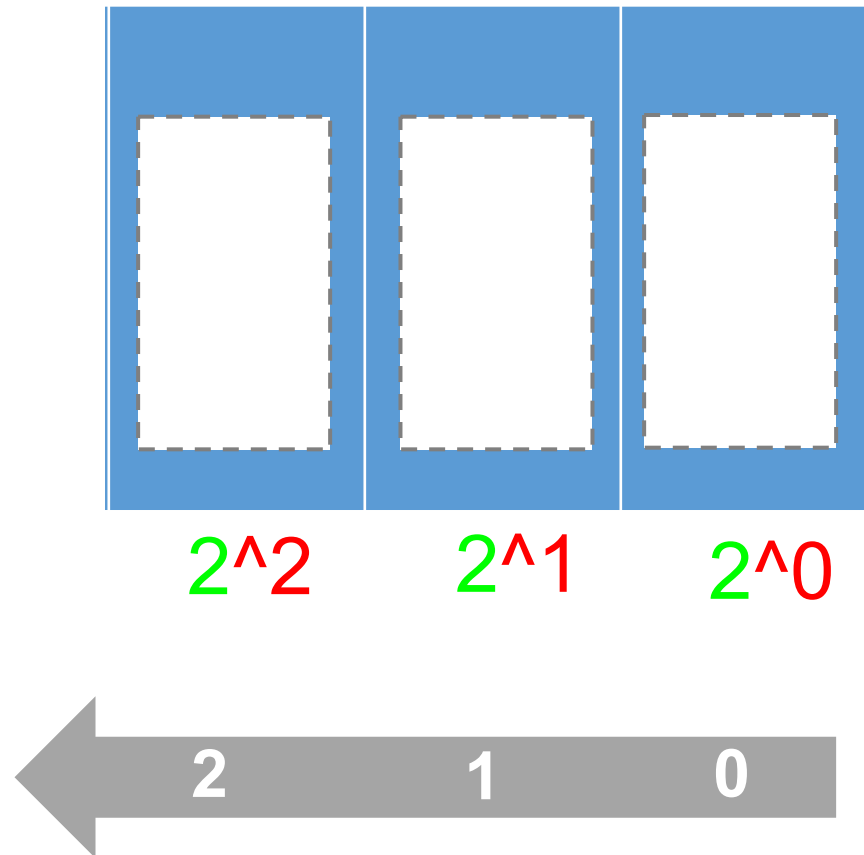
$$3 = 1 * 2^1 + 1 * 2^0$$





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With 3 slots, how many numbers can we express in binary system?



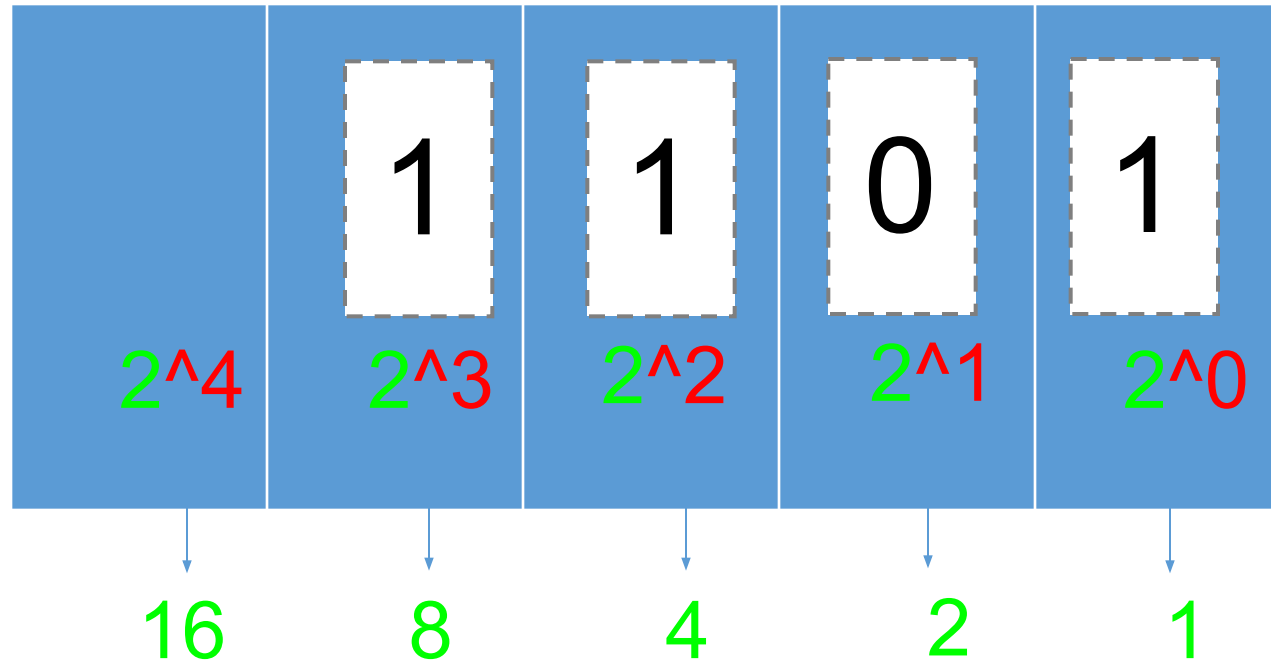


What is the value of this number ?

	1	1	0	1
2^4	2^3	2^2	2^1	2^0

SOLUTION

What is the value of this number ?



$$8 * 1 + 4 * 1 + 2 * 0 + 1 * 1 = 13$$



10 MIN



GROUPS OF 5

Game !!!

1	0	1	0	1
*16	*8	*4	*2	*1



1. Write in the powers of 2

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
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2. Write in the whole number equivalents

128	64	32	16	8	4	2	1
-----	----	----	----	---	---	---	---

3. Write a row of 0s

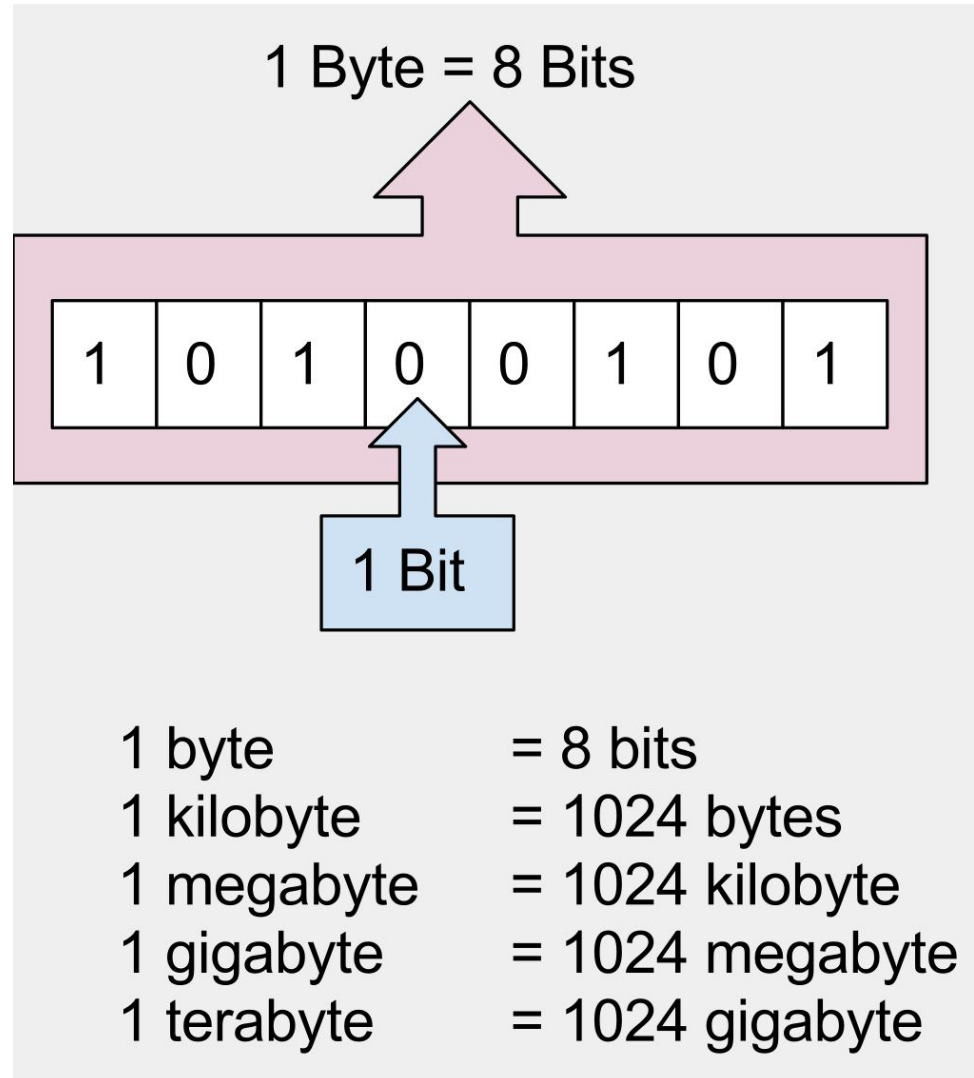
0	0	0	0	0	0	0	0
---	---	---	---	---	---	---	---

4. Write a "1" on the back of each flap.
(Careful about upside-down)

5. Cut on dotted lines

Flip it up!

More than a bit, a **BYTE** !



What did we learn today?

Decimal number: a base 10 number with ten possible different digits

0 1 2 3 4 5 6 7 8 9

10^1	10^0
10	1
2	3

Same number represented two different ways.

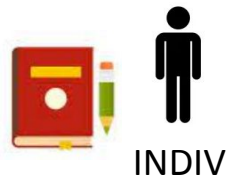
← Decimal

Binary →

Binary number: a base 2 number with two possible different digits

0 1

2^4	2^3	2^2	2^1	2^0
16	8	4	2	1
1	0	1	1	1



Count in **base 11** !!

