Digital Data 1/12 ①

I) Representing natural numbers (including ∅)

$N =$ forty seven

Decimal system

$N = a\,10^2 + b\,10^1 + c\,10^0$

4 7

Binary system.

$N = a\,2^4 + b\,2^3 + c\,2^2 + d\,2^1 + e\,2^0$

	2		
47	23	R	1
23	11	R	1
11	5	R	1
5	2	R	1
2	1	R	0
1	0	R	1

$(1\,0\,1\,1\,1)_2$

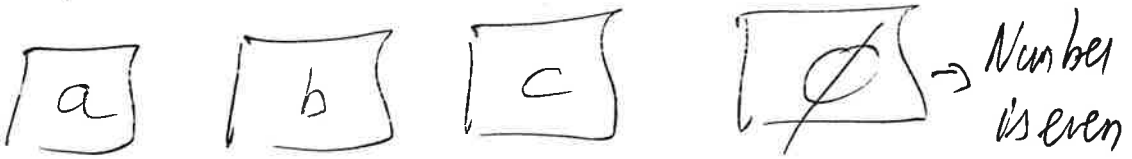
$(101111)_2 = (47)_{10}$

In binary format, a "digit" is called a bit.

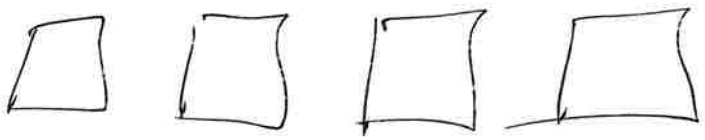
A collection of 8 bits is called a byte.

A number is represented through its bits representation:

Anecdotic:



Consider a number on 4 bits



smaller: 0

largest:

$8 \quad 4 \quad 2 \quad 2^0$

$\rightarrow 15$

On 4 bits, we can represent 16 numbers, but the largest is 15.

On N bits, we can represent 2^N numbers, but the largest is $2^N - 1$

System :

1 bit

8 bits : 1 byte.

1 kilobyte $\underline{\sim}$ 1000 bytes

(1 KB) $=$ 1024 bytes

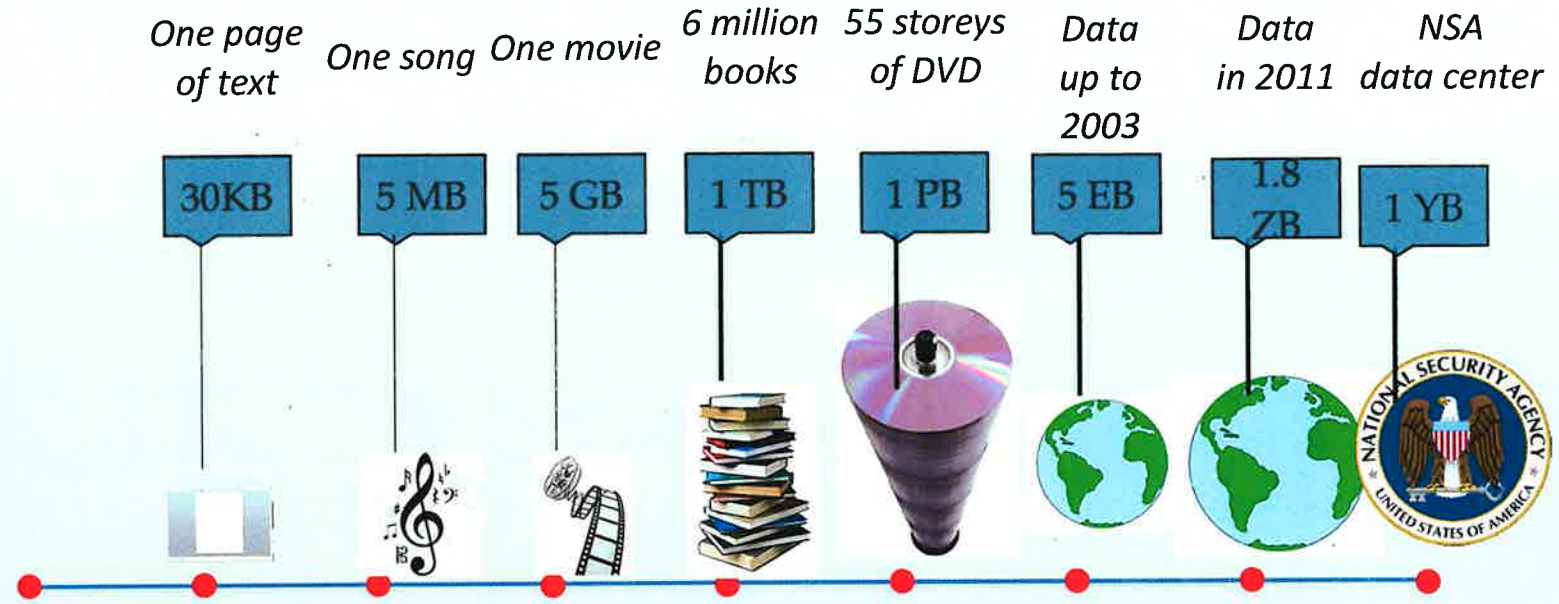
1 Mega byte $\underline{\sim}$ 10^6 bytes

Convention :

1 b $\equiv$ bit

1 B $\equiv$ byte.

Big Data: Volume



Byte	Kilobyte KB	Megabyte MB	Gigabyte GB	Terabyte TB	Petabyte PB	Exabyte EB	Zettabyte ZB	Yottabyte YB
	1000 bytes	1000 KB	1000 MB	1000 GB	1000 TB	1000 PB	1000 ZB	1000YB

Decimal / binary system

powers of 10 powers of 2

Hexa decimal system: powers of 16

a "digit" in the hexa decimal system

can take up to 16 values

F
EDCBA 9 8 7 6 5 4 3 2 1 0