
1000 BC \leadsto humans use Tally mark system.
So we start \leftarrow But it fails
counting \leadsto Number System

Base 60: \rightarrow 60 characters \leadsto used in

Egypt

Base 10:

{0, 1, 2, 3, 4, 5, 6, 7, 8, 9}

~~|||||~~ Made in

~~|||||~~ = 5

India
Easier to understand
& adapt

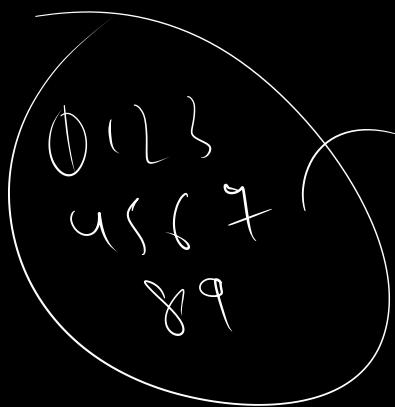
No calc easily & fast we made computer

In 19's computer
are too bigs

To compute
To calculate

and needs humans to operate

Physical Machines

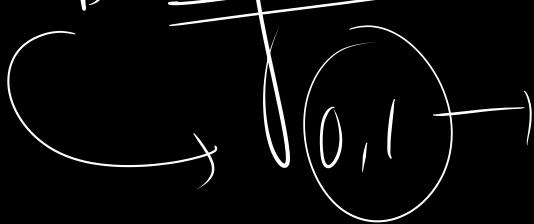


1st computer do not
work binary (0 or 1)
(They work on

Around 1950

base 10, no system

Human developed Transistors &
Binary number System



Base 2 System

$$\begin{array}{r}
 0 \\
 + 0 \\
 \hline
 0
 \end{array}
 \quad
 \begin{array}{r}
 6 \\
 + 1 \\
 \hline
 1
 \end{array}
 \quad
 \begin{array}{r}
 1 \\
 + 0 \\
 \hline
 1
 \end{array}
 \quad
 \begin{array}{r}
 1 \\
 + 1 \\
 \hline
 10
 \end{array}$$

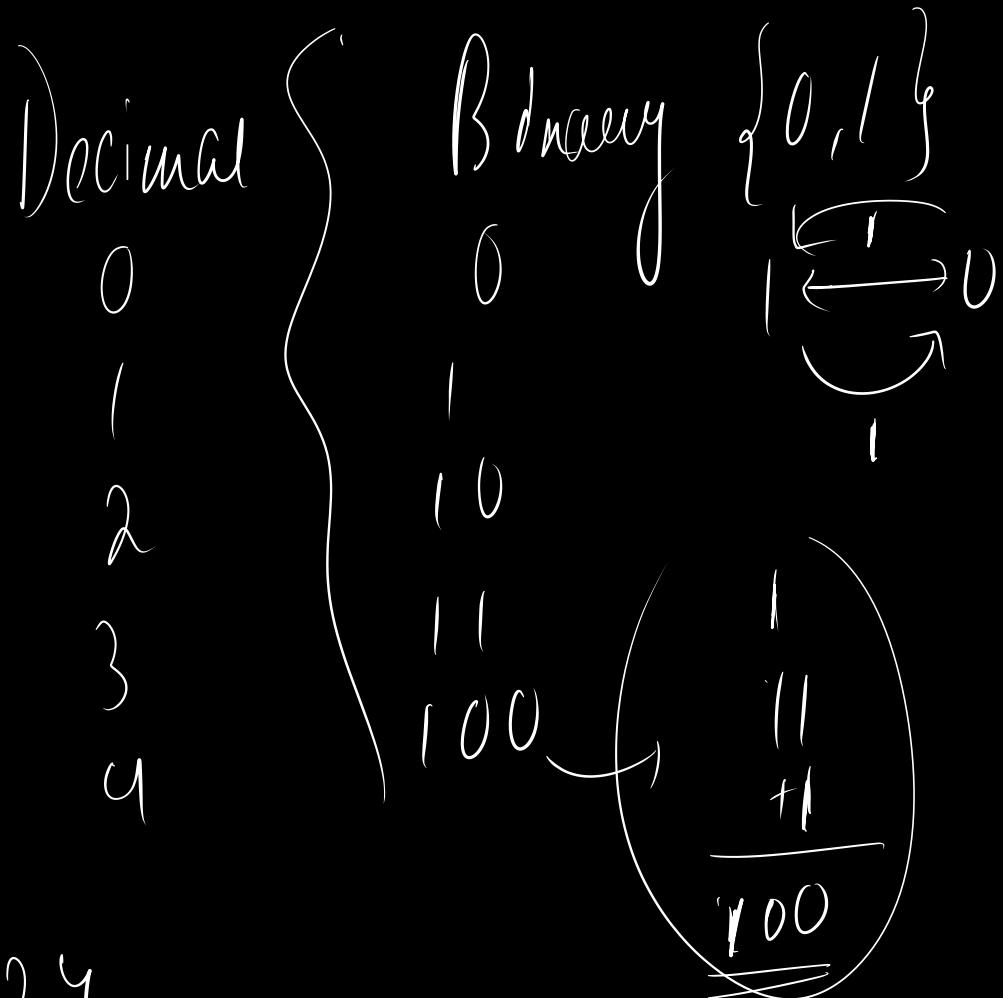
$\left\{ \begin{matrix} 0, 1 \\ -1, 1 \end{matrix} \right\}$ $\left\{ \begin{matrix} 0, 1 \\ -1, 1 \end{matrix} \right\}$ $\left\{ \begin{matrix} 0, 1 \\ -1, 1 \end{matrix} \right\}$ $\left\{ \begin{matrix} 0, 1 \\ -1, 1 \end{matrix} \right\}$
 \curvearrowright_0 \curvearrowright_0 \curvearrowright_0 \curvearrowright_0
 \curvearrowright_0 \curvearrowright_0 \curvearrowright_0 \curvearrowright_0

$$\begin{array}{r}
 1 0 \\
 + 1 \\
 \hline
 1 1
 \end{array}
 \quad
 \begin{array}{r}
 1 0 \\
 + 1 0 \\
 \hline
 2 0
 \end{array}
 \Rightarrow 2 \times 1 + 1 \times 0 = \underline{\underline{2}}$$

\curvearrowright_3 \curvearrowright_0 \curvearrowright_0
 Base of
 Decimal — 9

$$\begin{array}{r}
 1 1 \\
 + 1 \\
 \hline
 1 00
 \end{array}
 \quad
 \begin{array}{r}
 100 \\
 + 1 \\
 \hline
 101
 \end{array}$$

\curvearrowright_{100} \curvearrowright_4 \curvearrowright_{101} \curvearrowright_5



base of 2

$$\begin{array}{c|c}
 & 2 \\
 \hline
 2 & 13 \\
 & 6 \\
 & 3 \\
 & 1 \\
 & 0
 \end{array}
 \quad
 \begin{array}{c|c}
 & 1 \\
 \hline
 0 & 0
 \end{array}$$

$$11011 \equiv 24$$

$$\begin{array}{c|c}
 & 2 \\
 \hline
 2 & 57 \\
 & 28 \\
 & 14 \\
 & 7 \\
 & 3 \\
 & 1 \\
 & 0
 \end{array}
 \quad
 57 \equiv (11001)$$

Decimal \rightarrow Binary

Binary \rightarrow Decimal

$$386 = 3 \times 10^2 + 8 \times 10^1 + 6 \times 10^0$$

$$1101 \rightarrow 1 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$8 + 4 + 0 + 1 = (13)$$

$$110110 = (54)_{\text{Binary}}$$

base 2

base 8 \leftarrow Octahedral

base 16 \leftarrow Hexadecimal

$$\begin{array}{c} 8 \\ | \\ 34 \\ | \\ 8 \\ | \\ 4 \\ | \\ 0 \end{array}$$

(45), Octa $\rightarrow 4 \times 8^1 + 5 \times 8^0$
 $\Rightarrow (57)$

Decimal

Hexadecimal \rightarrow Base₁₆

$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F\}$

$\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$ unique character

It made (10) not unique

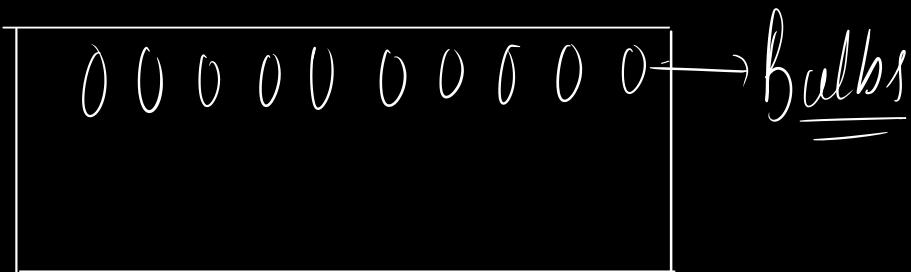
by (10)

We can make our own
Number System

base n

$n \times 2$

But must have
unique system



Bulb on → 1

Bulb off → 0

base₁₀

we can

be read

but to read

30

3 & 0 bulb will

on but

this is why we
don't use

base₁₀ ← then what about

* Transistor Bulbs

0	→	0
1	→	0
2	→	0
3	→	0
4	→	0
5	→	0
6	→	0
7	→	0
8	→	0
9	→	0

the → 83

Computer → uses Binary → to store the number

$$\begin{array}{r} 100110 = 38 \\ 2^5 \quad 2^4 \quad 2^3 \quad 2^2 \quad 2^1 \quad 2^0 \\ \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ 32 + 16 + 8 + 4 + 2 + 0 \end{array}$$

Why the system use binary No.
as its memory
Because of Transistor in the
RAM in Secondary Memory

Every 2 years → Memory Increases

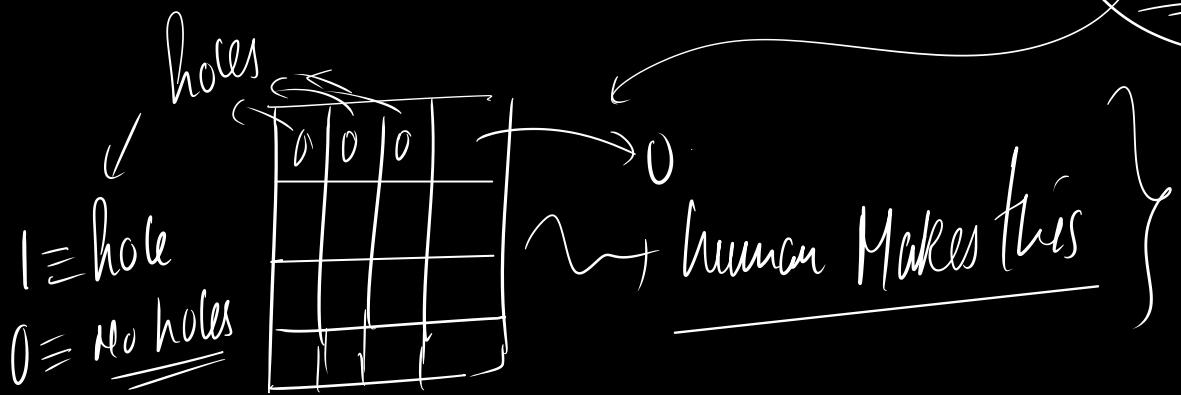
64 Mb 128 Mb 256 Mb 512 Mb 1024 Mb
↓ ↓ ↓ ↓ ↓

Due to Transistor

Embedded help

1950 → Computer Comes into the market!

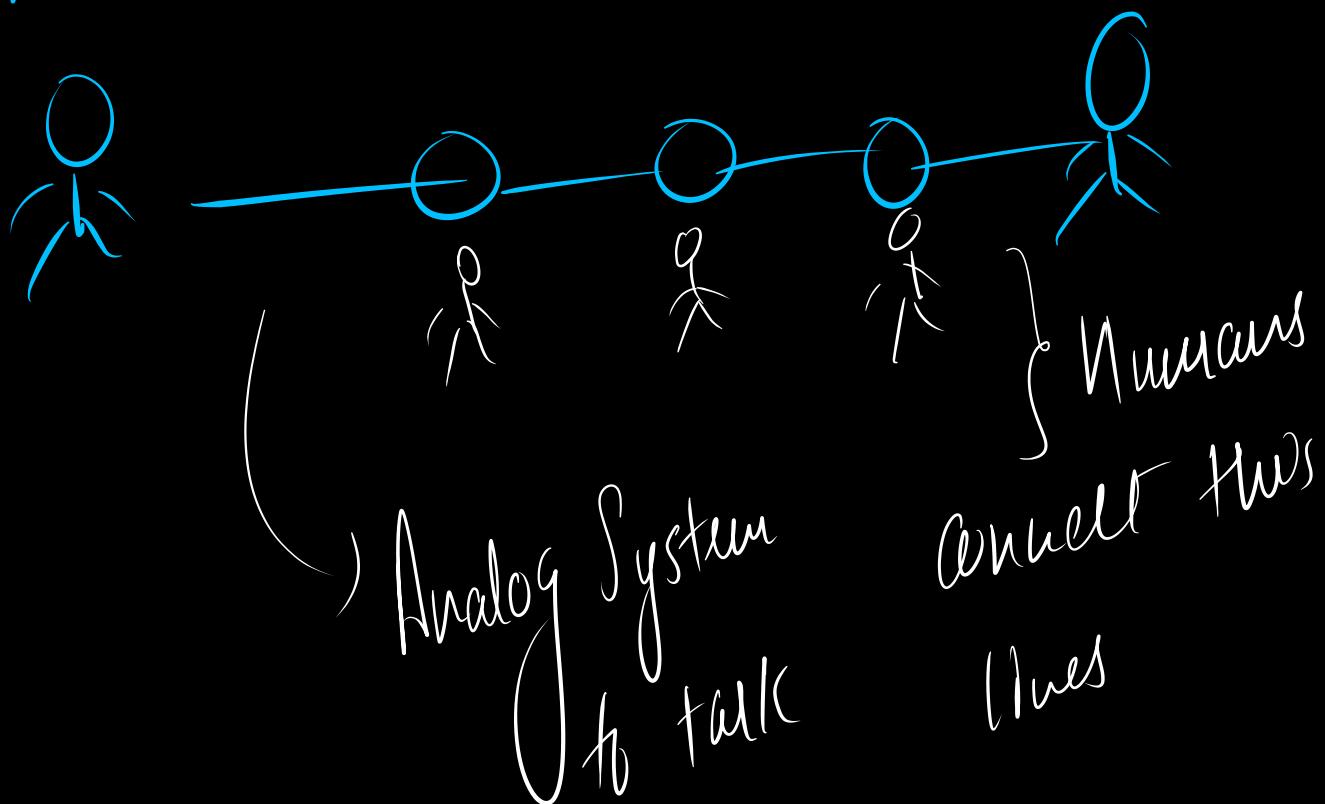
() w format () we use sheet



Internet to format for Data

{ from one
line to other
US & Social → evolve the
Internet

Telephone Companies Open up Internet



USSR vs USA

↓
Cold War

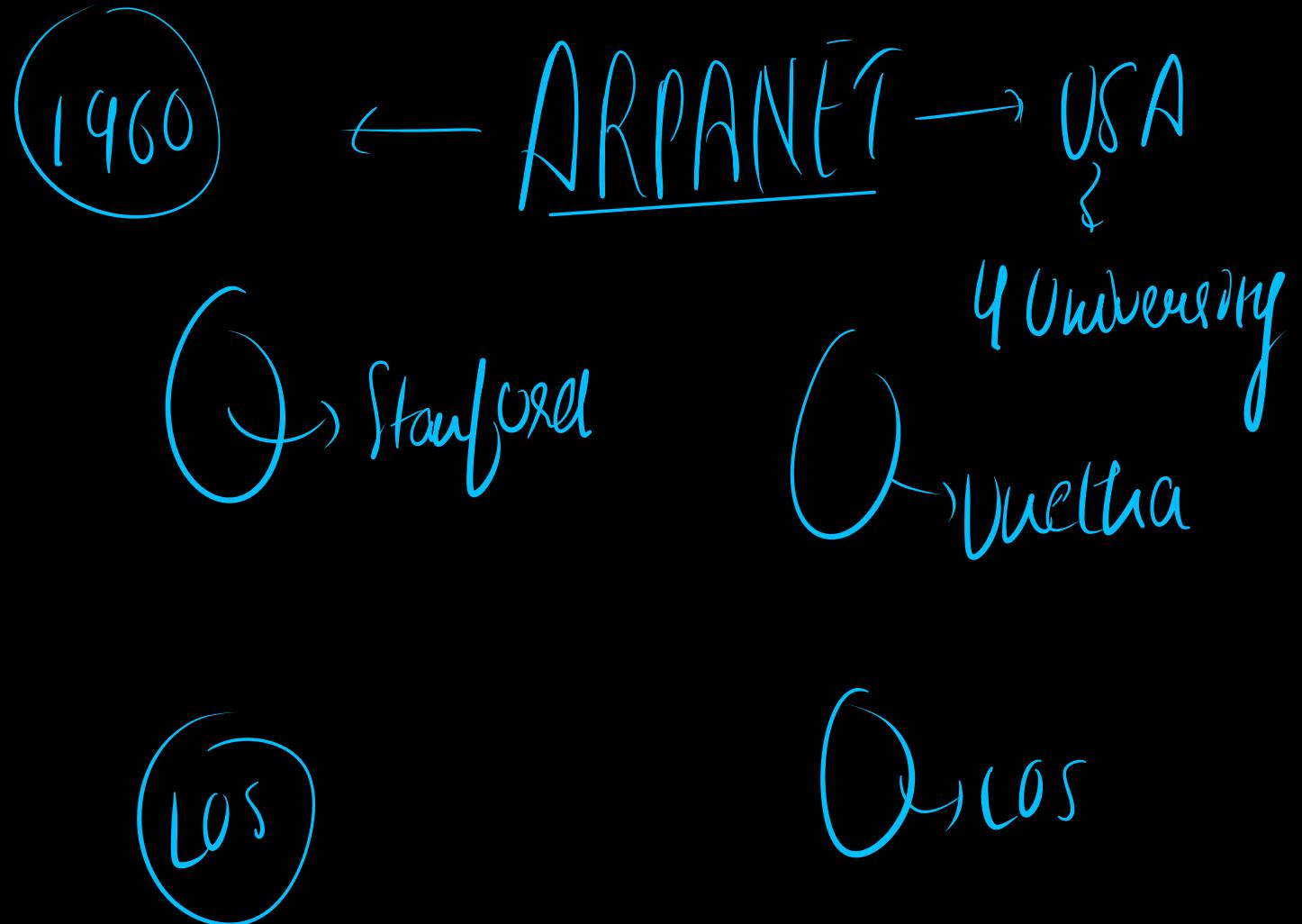
Communism (Russia)

first dog
1st man
get
into
space

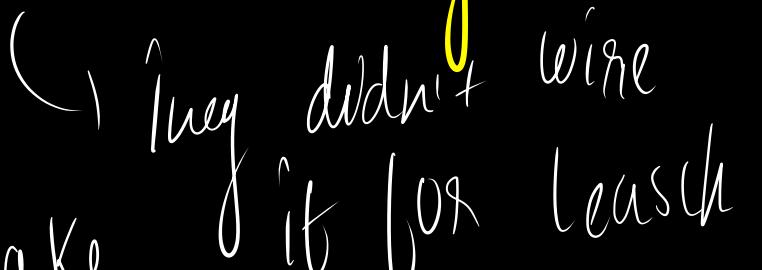
Capitalism {USA}

First Man
to get into the

Moon.



Ske phelle khi Internet.
But usue PwohCen Iw.

① Circuit Switching  Using Telephone system
↳ They didn't wire their own instead
take it for lease

