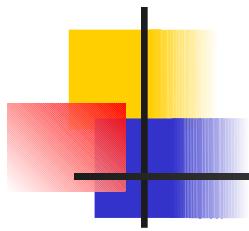


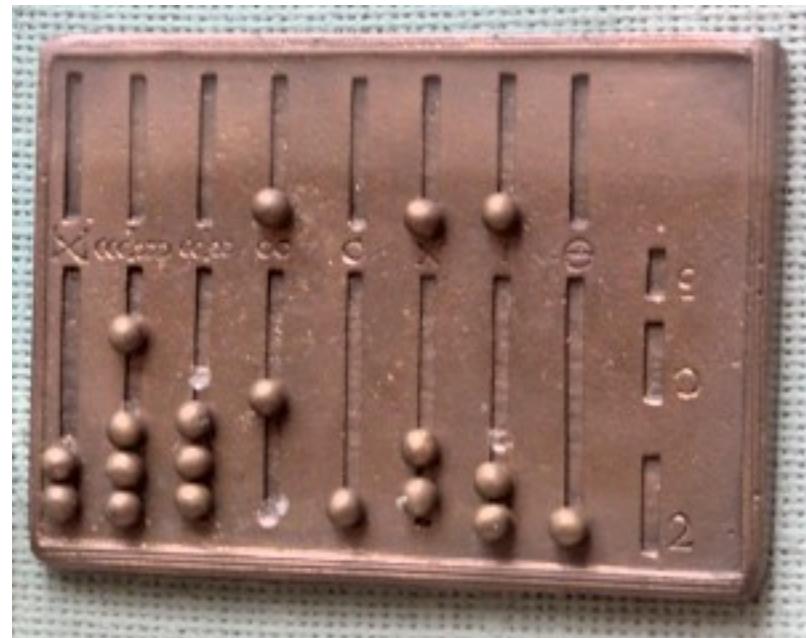
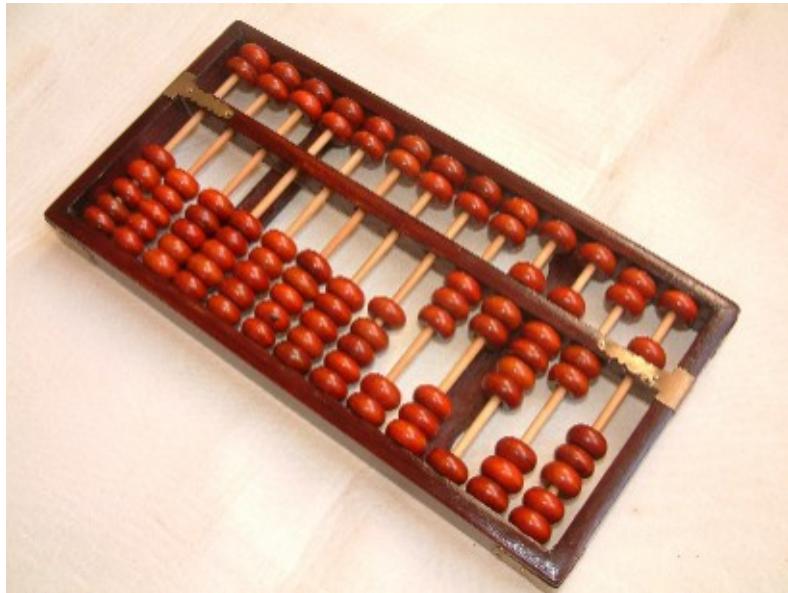
# Conceptos de Arquitectura de Computadoras

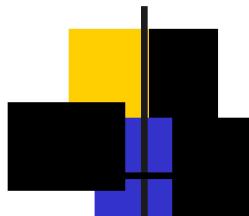
2018

## Evolución Tecnológica



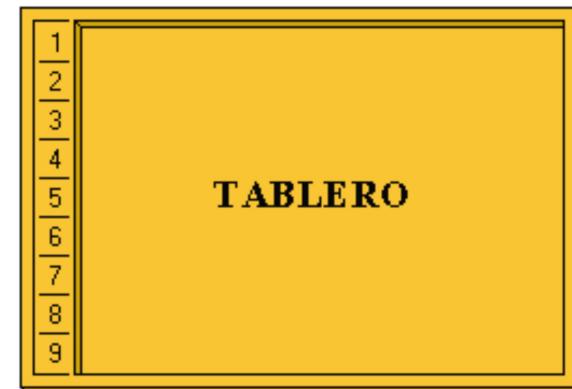
# Ábacos





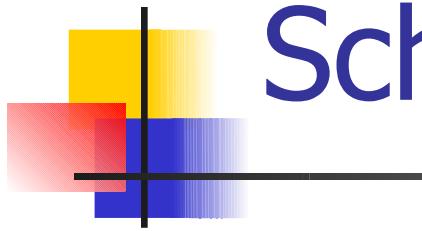
# Varillas de Napier

$$\begin{aligned}7 \times 1 &= 7 \\7 \times 2 &= 1\ 4 \\7 \times 3 &= 2\ 1 \\7 \times 4 &= 2\ 8 \\7 \times 5 &= 3\ 5 \\7 \times 6 &= 4\ 2 \\7 \times 7 &= 4\ 9 \\7 \times 8 &= 5\ 6 \\7 \times 9 &= 6\ 3\end{aligned}$$



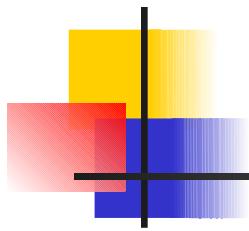
1	2	3	4	5	6	7	8	9	0
0/2	0/4	0/6	0/8	1/0	1/2	1/4	1/6	1/8	0/0
0/3	0/6	0/9	1/2	1/5	1/8	2/1	2/4	2/7	0/0
0/4	0/8	1/2	1/6	2/0	2/5	2/8	3/2	3/6	0/0
0/5	1/0	1/5	2/0	2/5	3/0	3/5	4/0	4/5	0/0
0/6	1/2	1/8	2/4	3/0	3/6	4/2	4/8	5/4	0/0
0/7	1/4	2/1	2/8	3/5	4/2	4/9	5/6	6/3	0/0
0/8	1/6	2/4	3/2	4/0	4/8	5/6	6/4	7/2	0/0
0/9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

JUEGO DE VARILLAS



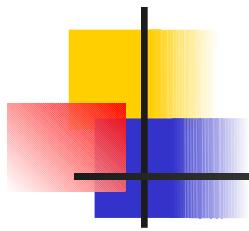
# Schickard



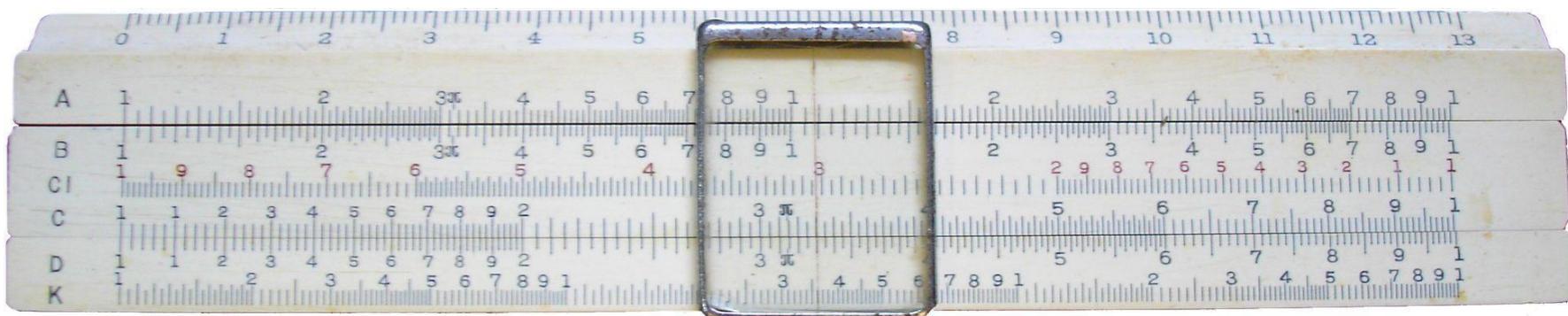


# Pascalina

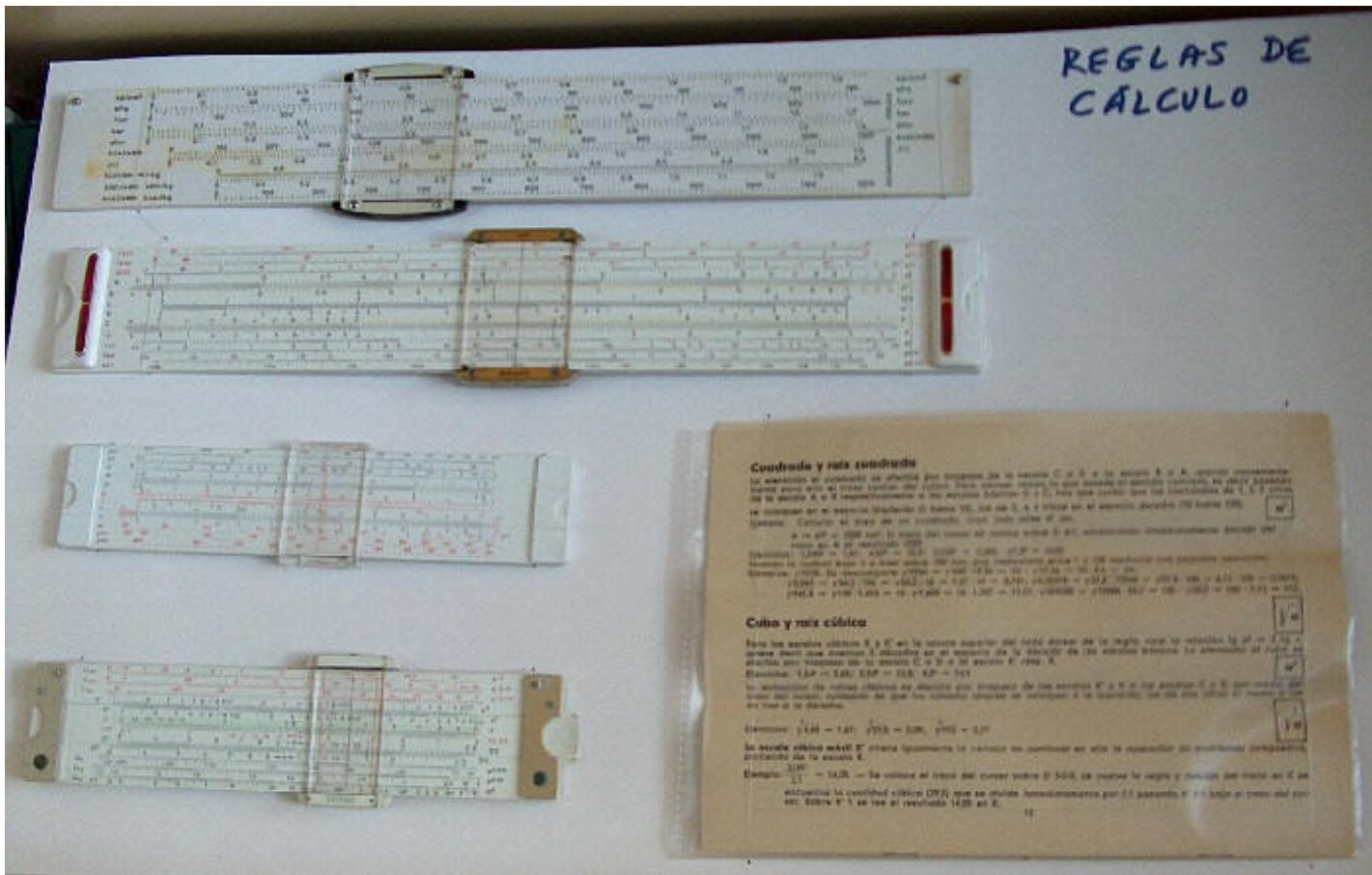


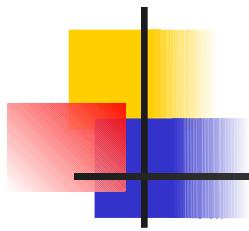


# Regla de Cálculo

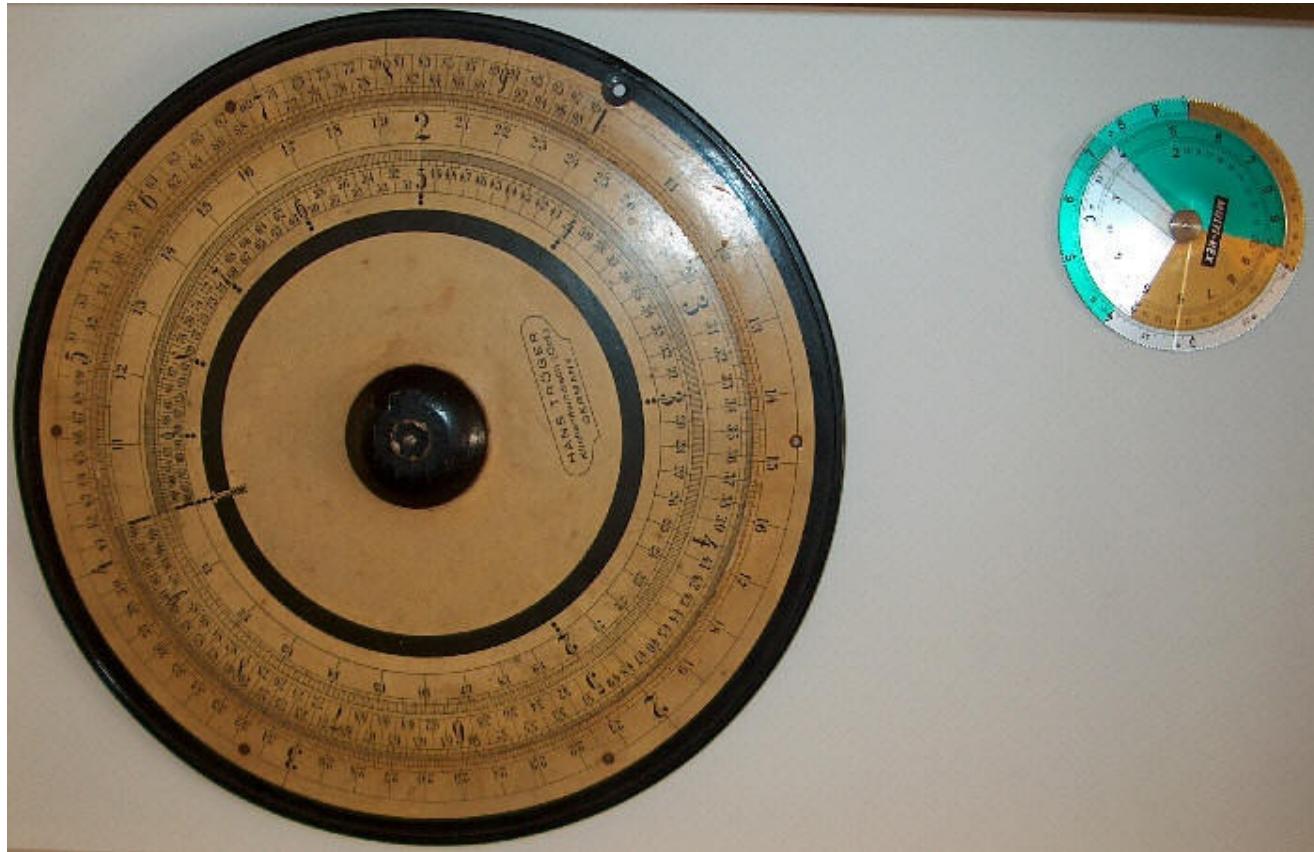


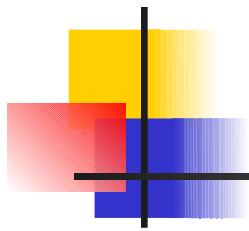
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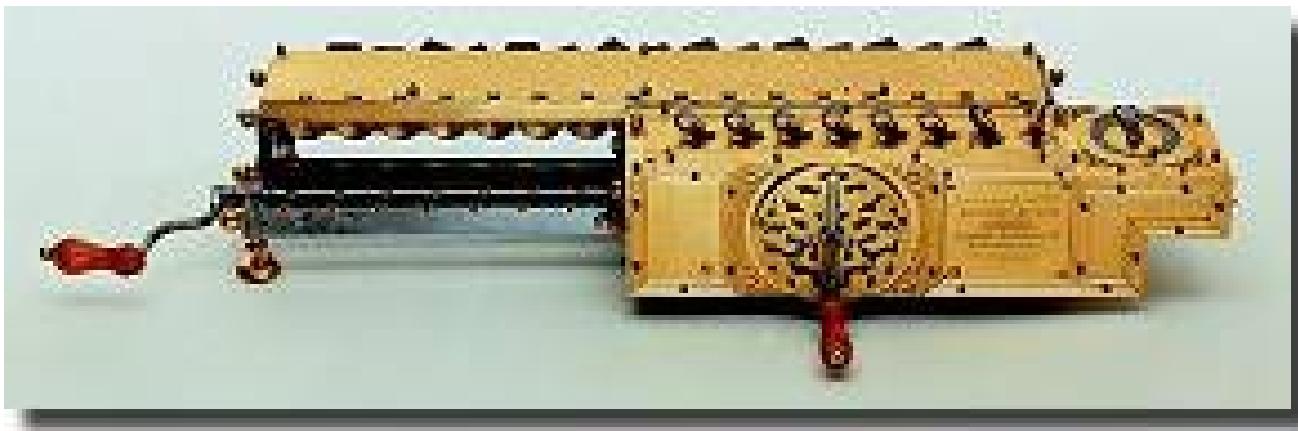


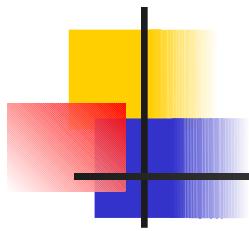
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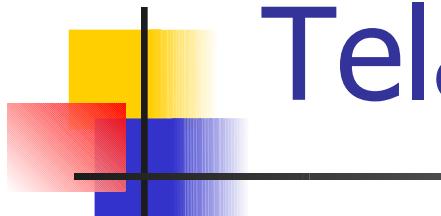
# Von Leibnits





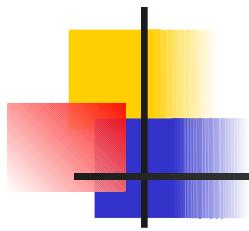
# Artimometro (Thomas)





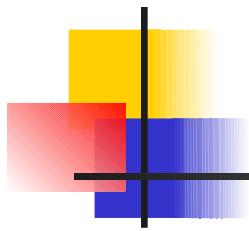
# Telar de Jacquard





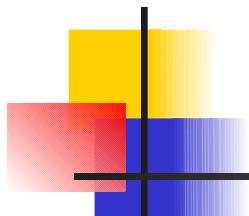
# Telar de Jacquard





# Telar de Jacquard



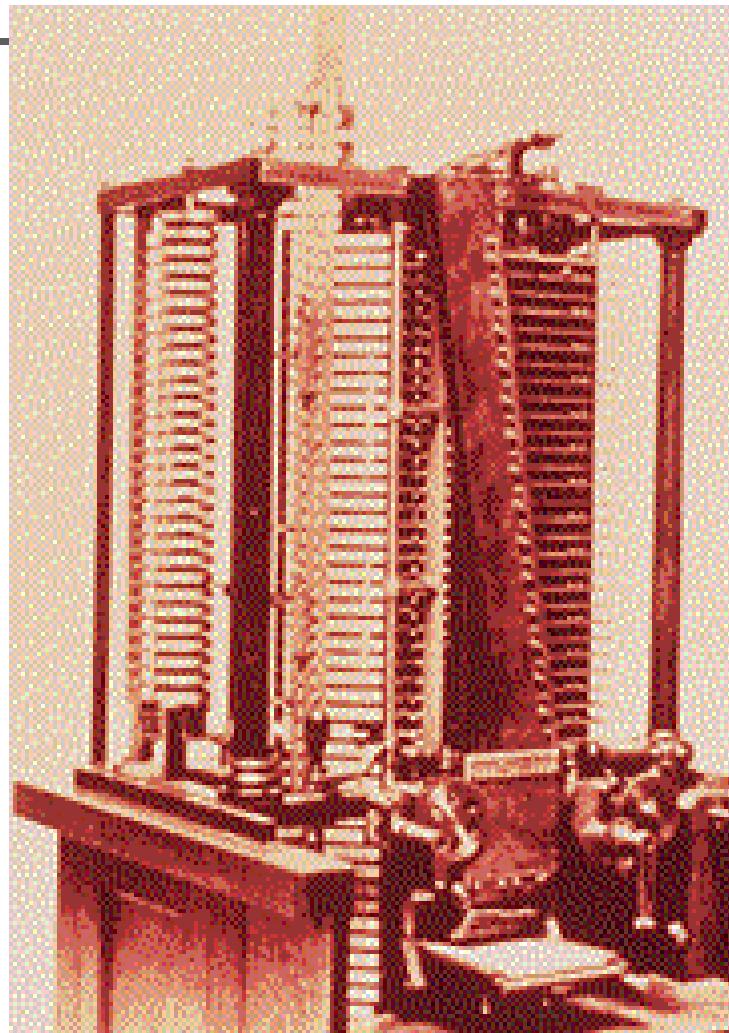


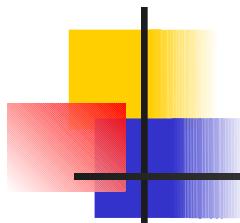
# Máquina de Diferencias



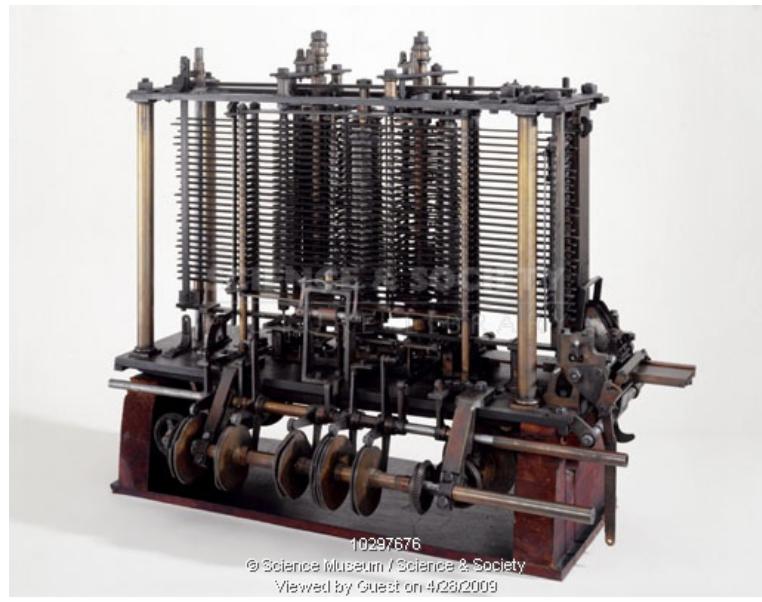
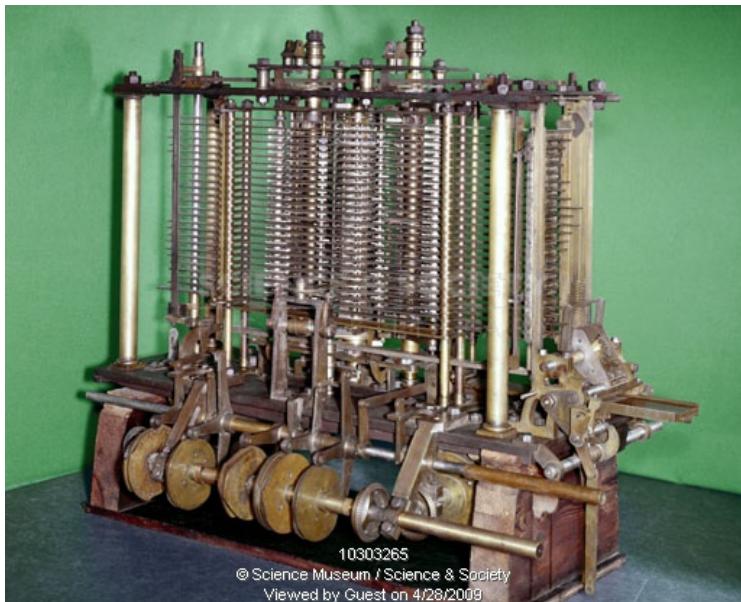


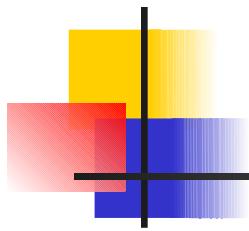
# Máquina analítica de Babbage



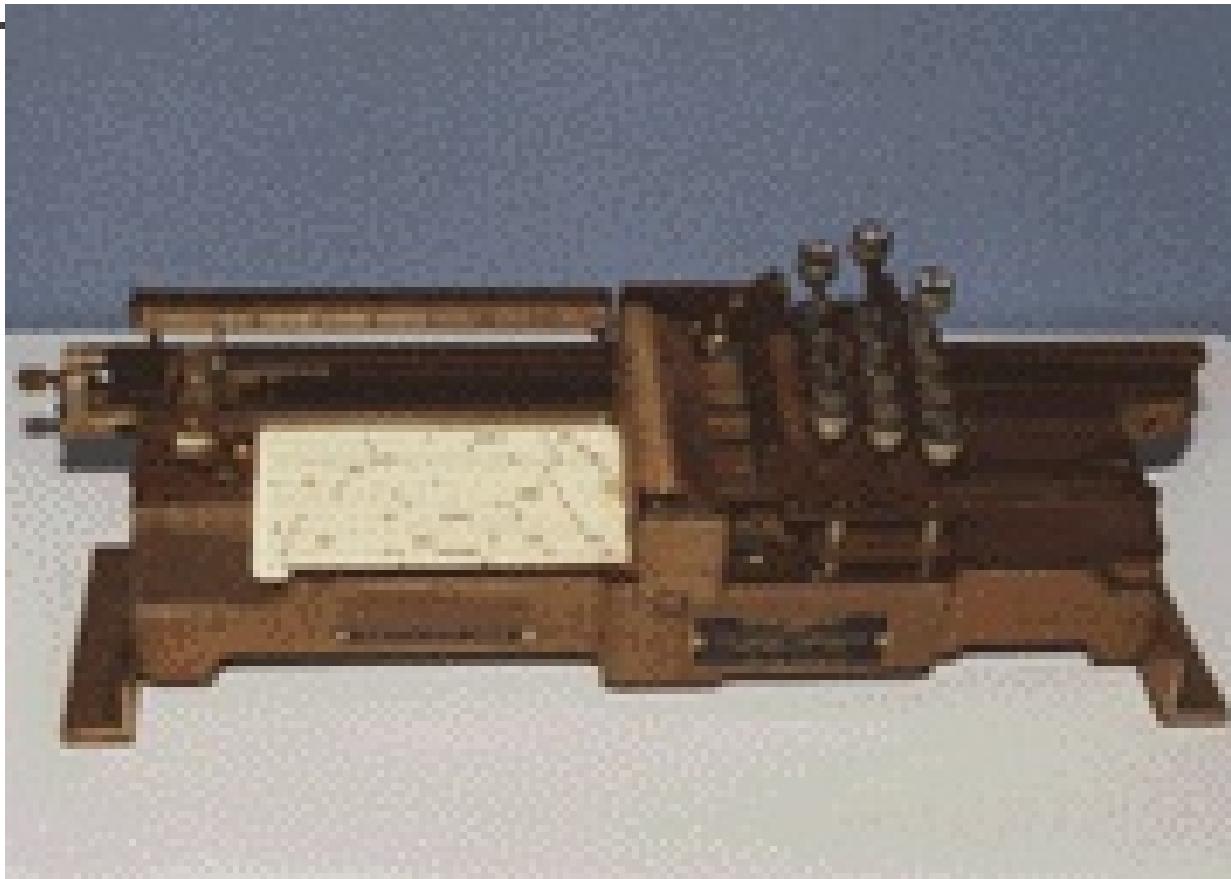


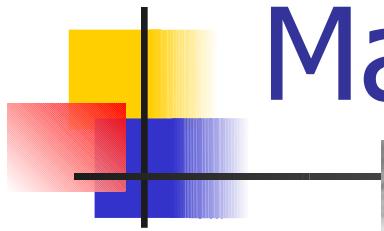
# Máquina analítica de Babbage





# Hollerith

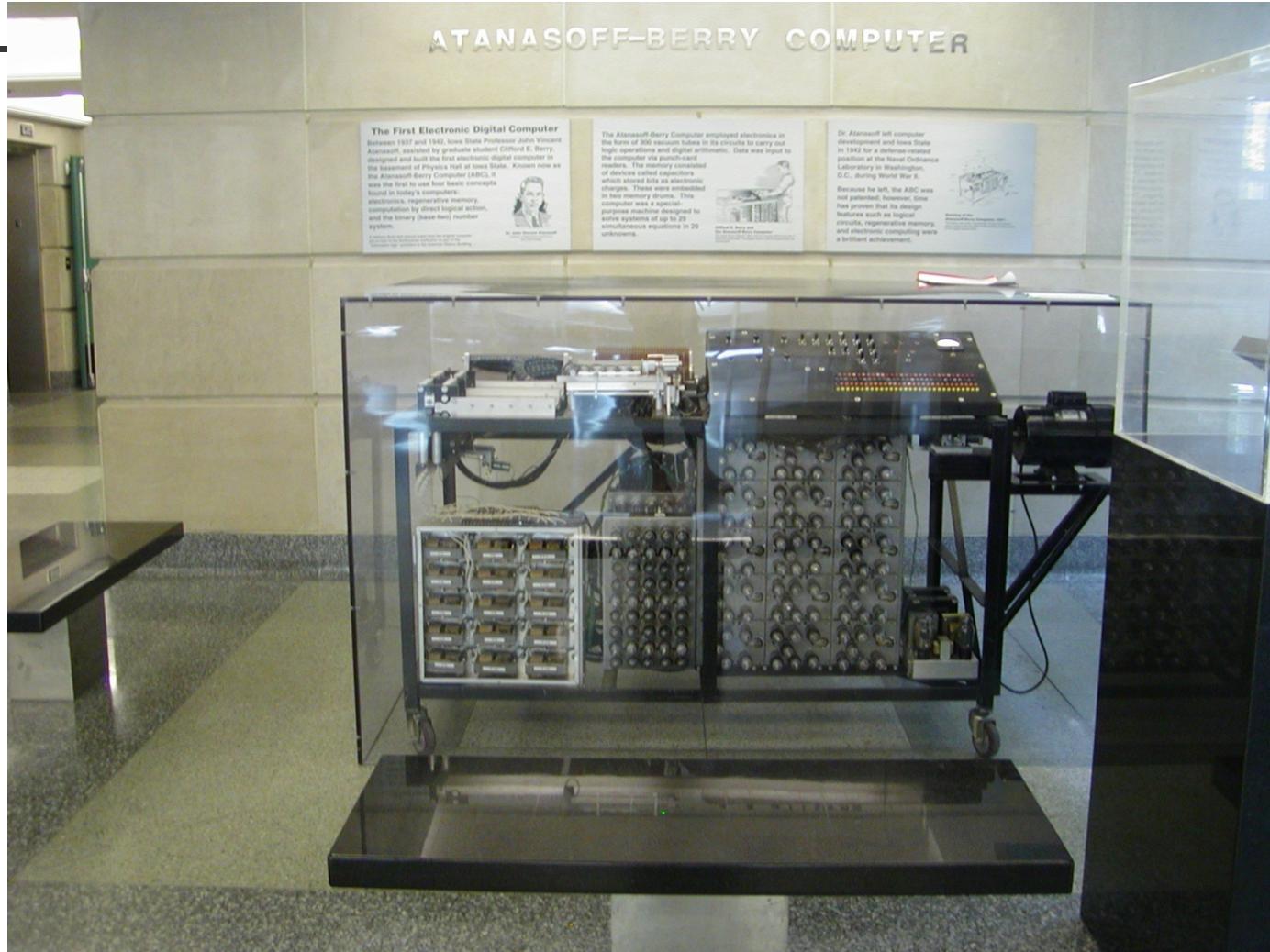




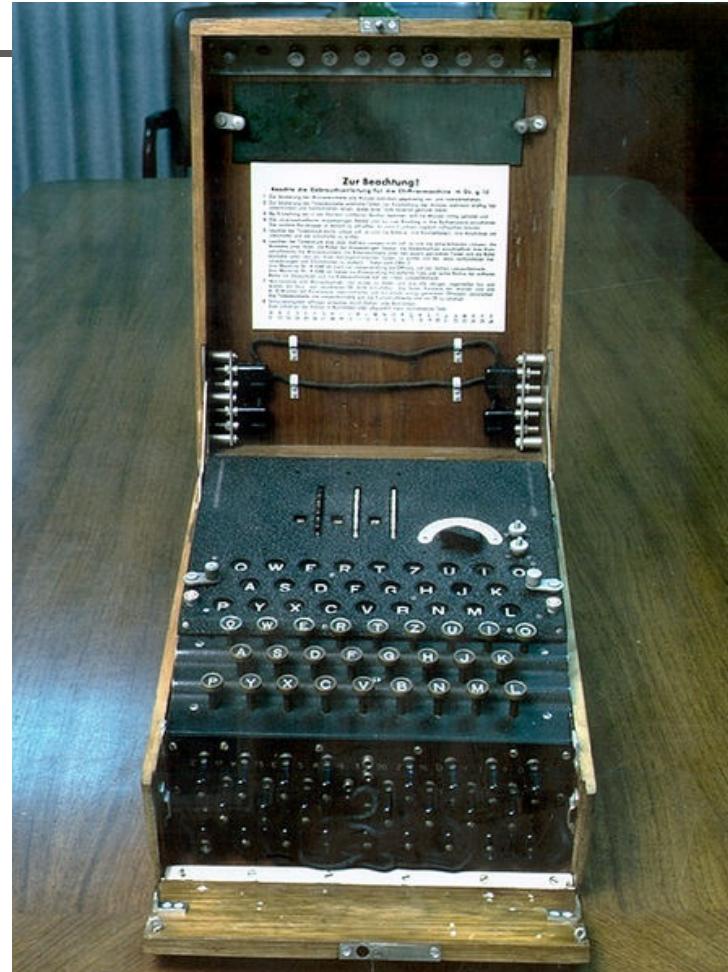
# Mark-I



# ABC

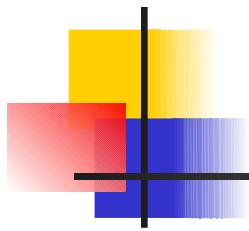


# Enigma

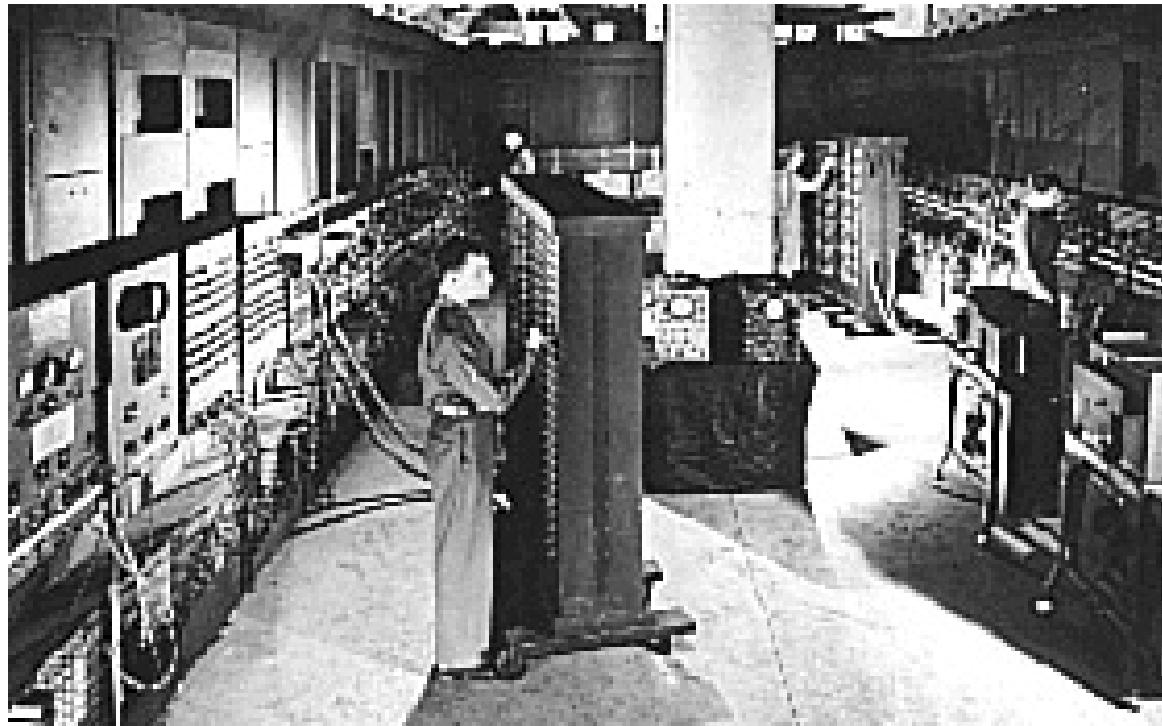


# Colossus (Turing)

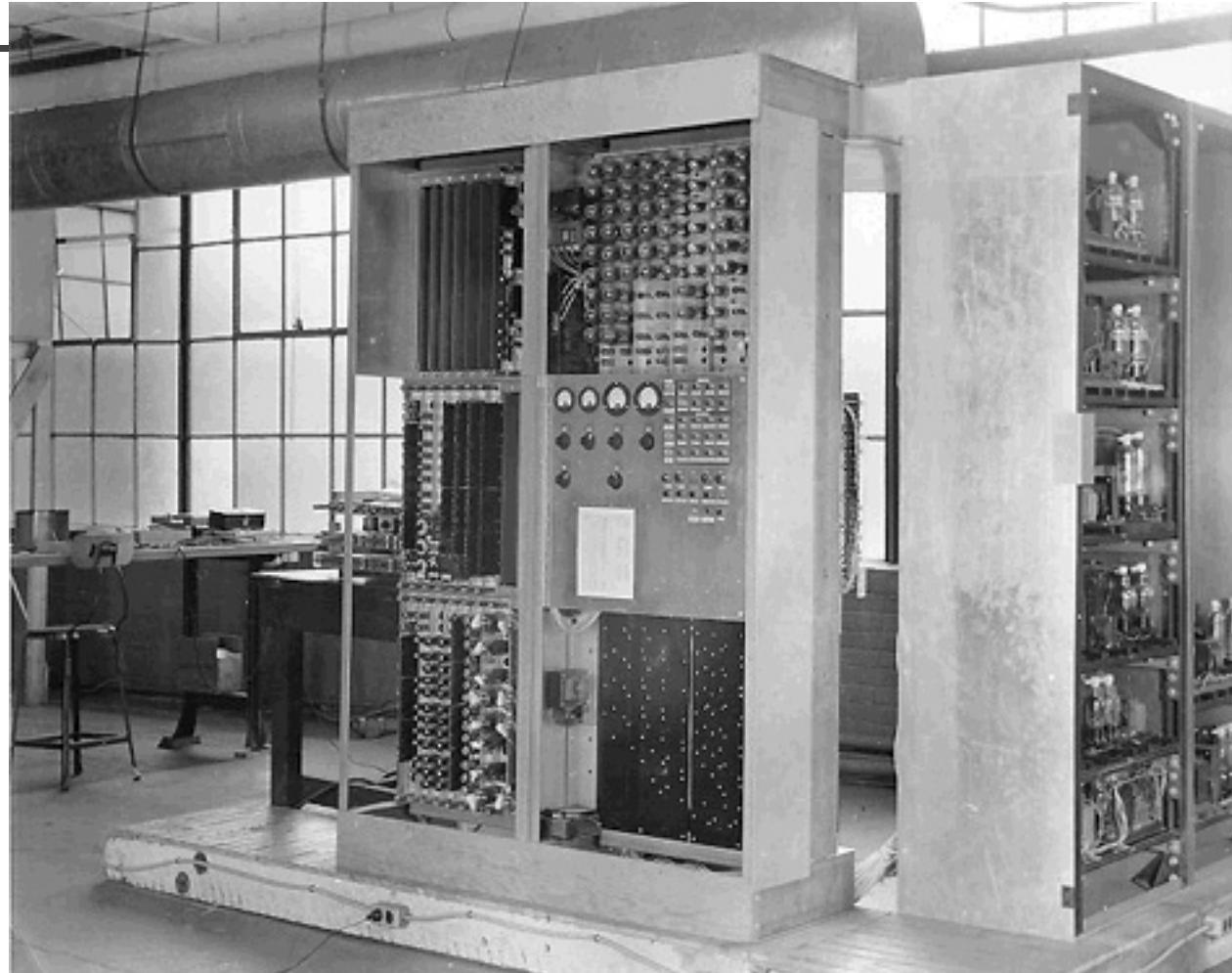




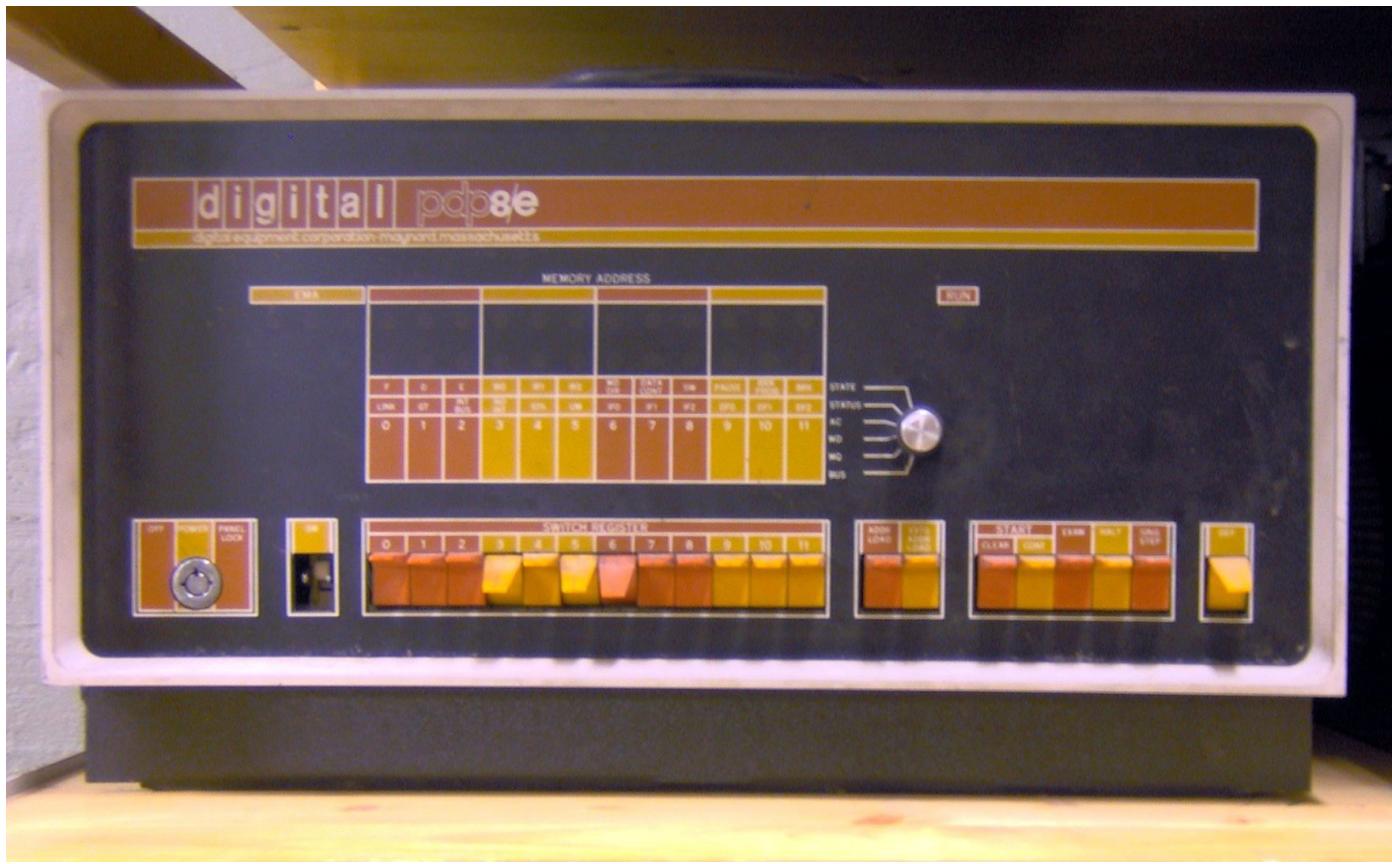
# ENIAC



# EDVAC



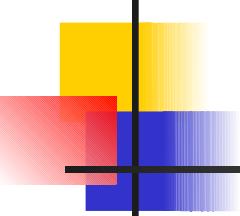
# PDP-8



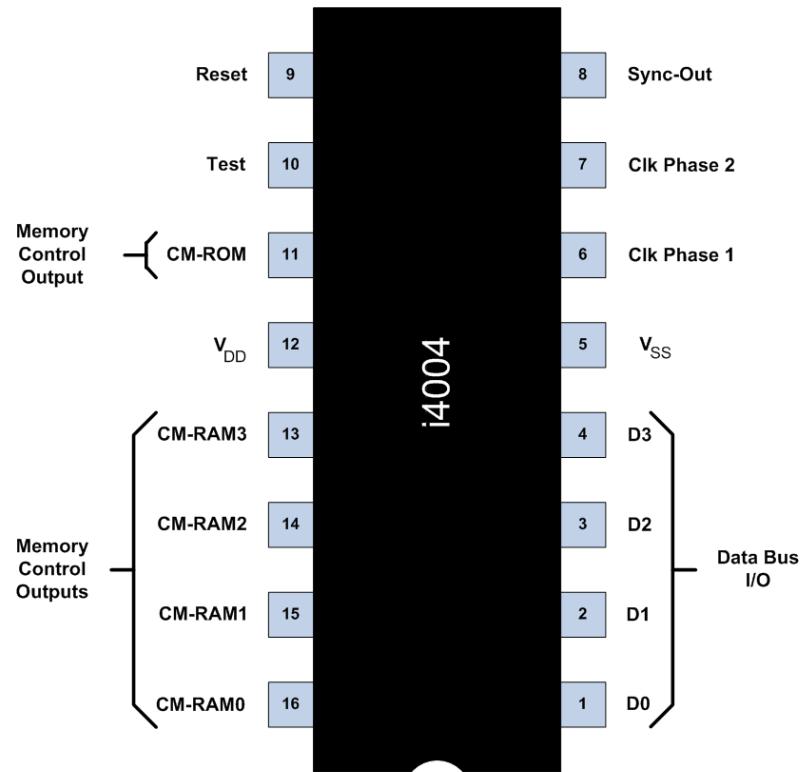
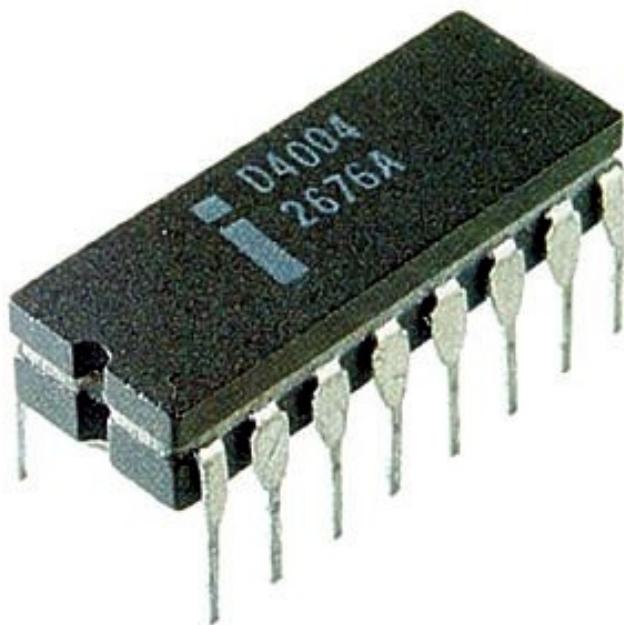
Model	First Shipped	Cost of Processor + 4K 12-bit Words of Memory (\$1000s)	Data Rate from Memory (words/μsec)	Volume (cubic feet)	Innovations and Improvements
PDP-8	4/65	16.2	1.26	8.0	Automatic wire-wrapping production
PDP-8/5	9/66	8.79	0.08	3.2	Serial instruction implementation
PDP-8/1	4/68	11.6	1.34	8.0	Medium scale integrated circuits
PDP-8/L	11/68	7.0	1.26	2.0	Smaller cabinet
PDP-8/E	3/71	4.99	1.52	2.2	Omnibus
PDP-8/M	6/72	3.69	1.52	1.8	Half-size cabinet with fewer slots than 8/E
PDP-8/A	1/75	2.6	1.34	1.2	Semiconductor memory; floating-point processor

# PDP-11



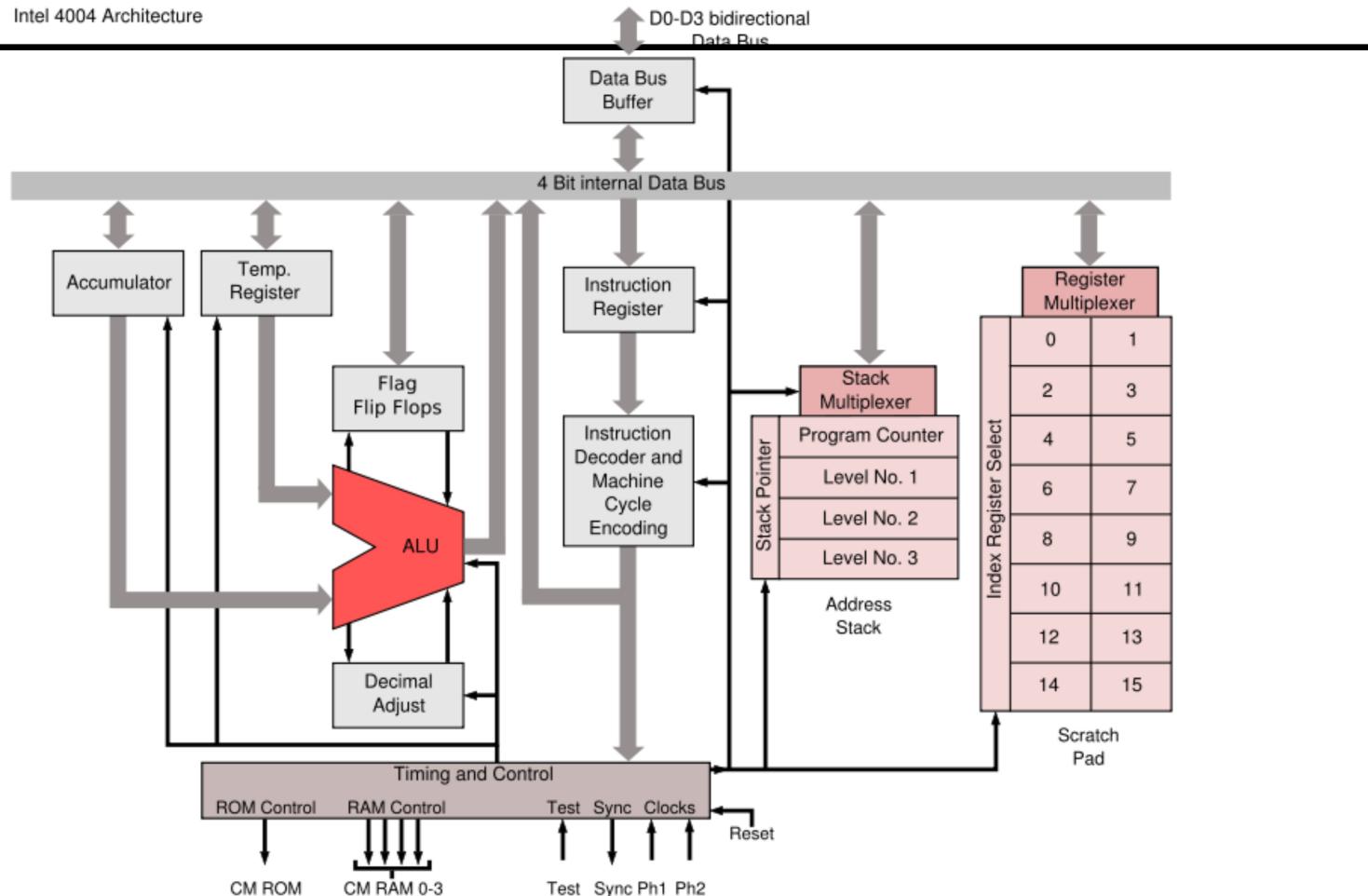


# Intel





Intel 4004 Architecture



Año	Nombre	Hecho por	Comentario
1834	Máquina analítica	Babbage	Primer intento de construir una computadora digital
1936	Z1	Zuse	Primera máquina calculadora de selecciones fijas
1943	COLLOSSUS	Gobierno inglés	Primera computadora electrónica
1944	Mark I	Aiken	Primeria computadora estadounidense de propósito general
1946	ENIAC 1	Eckert/Mauchly	Inicia la historia moderna de la computación
1949	EDSAC	Wilkes	Primera computadora de programa almacenado
1951	Whirlwind I	M.I.T.	Primera computadora de tiempo real
1952	IAS	Von Neumann	Casi todas las máquinas actuales emplean este diseño
1960	PDP-1	DEC	Primera minicomputadora (50 vendidas)
1961	1401	IBM	Máquina pequeña para negocios de enorme popularidad
1962	7094	IBM	Dominió la computación científica a principios de los años sesenta
1963	9500	Burroughs	Primera máquina diseñada para un lenguaje de alto nivel
1964	360	IBM	Primera linea de productos diseñada como familia
1964	6600	CDC	Primera supercomputadora científica
1965	PDP-8	DEC	Primera minicomputadora con mercado masivo (50,000 vendidas)
1970	PDP-11	DEC	Dominió las minicomputadoras en los años setenta
1974	8080	Intel	Primera computadora de propósito general de 8 bits en un chip
1974	CRAY-1	Cray	Primera supercomputadora vectorial
1978	VAX	DEC	Primera superminicomputadora de 32 bits
1981	IBM PC	IBM	Inició la era de la computadora personal moderna
1985	MIPS	MIPS	Primera máquina RISC comercial
1997	SPARC	Sun	Primera estación de trabajo RISC basada en SPARC
1990	RSC6000	IBM	Primera máquina superescalar

(a) 1970s Processors

	<b>4004</b>	<b>8008</b>	<b>8080</b>	<b>8086</b>	<b>8088</b>
Introduced	1971	1972	1974	1978	1979
Clock speeds	108 kHz	108 kHz	2 MHz	5 MHz, 8 MHz, 10 MHz	5 MHz, 8 MHz
Bus width	4 bits	8 bits	8 bits	16 bits	8 bits
Number of transistors	2,300	3,500	6,000	29,000	29,000
Feature size ( $\mu\text{m}$ )	10		6	3	6
Addressable memory	640 Bytes	16 KBytes	64 KBytes	1 MB	1 MB
Virtual memory	—	—	—	—	—

(b) 1980s Processors

	<b>80286</b>	<b>386TM DX</b>	<b>386TM SX</b>	<b>486TM DX CPU</b>
Introduced	1982	1985	1988	1989
Clock speeds	6 MHz - 12.5 MHz	16 MHz - 33 MHz	16 MHz - 33 MHz	25 MHz - 50 MHz
Bus width	16 bits	32 bits	16 bits	32 bits
Number of transistors	134,000	275,000	275,000	1.2 million
Feature size ( $\mu\text{m}$ )	1.5	1	1	0.8 - 1
Addressable memory	16 megabytes	4 gigabytes	16 megabytes	4 gigabytes
Virtual memory	1 gigabyte	64 terabytes	64 terabytes	64 terabytes

# PC-1981

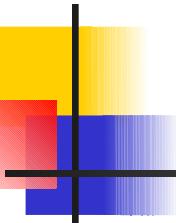


### (c) 1990s Processors

	<b>486™ SX</b>	<b>Pentium</b>	<b>Pentium Pro</b>	<b>Pentium II</b>
Introduced	1991	1993	1995	1997
Clock speeds	16 MHz - 33 MHz	60 MHz - 166 MHz	150 MHz - 200 MHz	200 MHz - 300 MHz
Bus width	32 bits	32 bits	64 bits	64 bits
Number of transistors	1.185 million	3.1 million	5.5 million	7.5 million
Feature size ( $\mu\text{m}$ )	1	0.8	0.6	0.35
Addressable memory	4 gigabytes	4 gigabytes	64 gigabytes	64 gigabytes
Virtual memory	64 terabytes	64 terabytes	64 terabytes	64 terabytes

### (d) Recent Processors

	<b>Pentium III</b>	<b>Pentium 4</b>	<b>Itanium</b>	<b>Itanium 2</b>
Introduced	1999	2000	2001	2002
Clock Speeds	450 - 660 MHz	1.3 - 1.8 GHz	733 - 800 MHz	900 MHz - 1 GHz
Bus Width	64 bits	64 bits	64 bits	64 bits
Number of Transistors	9.5 million	42 million	25 million	220 million
Feature size ( $\mu\text{m}$ )	0.25	0.18	0.18	0.18
Addressable Memory	64 gigaBytes	64 gigaBytes	64 gigaBytes	64 gigaBytes
Virtual Memory	64 terabytes	64 terabytes	64 terabytes	64 terabytes



Generation	Approximate Dates	Technology	Typical Speed (operations per second)
1	1946–1957	Vacuum tube	40,000
2	1958–1964	Transistor	200,000
3	1965–1971	Small and medium scale integration	1,000,000
4	1972–1977	Large scale integration	10,000,000
5	1978–1991	Very large scale integration	100,000,000
6	1991–	Ultra large scale integration	1,000,000,000