

# La computación le da una mano a la medicina y a la biología.

F. García Eijó, E. Costa y D. González Márquez.

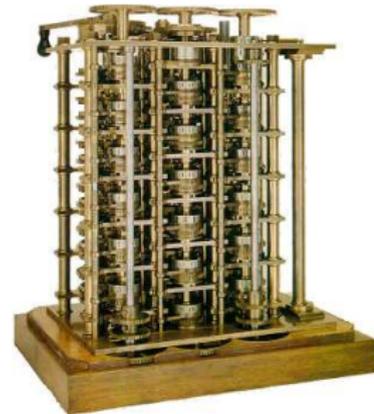
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Semana de la Computación 2009



## 1822: Máquina diferencial de Babbage

- Nació para elaborar tablas matemáticas.
- Requería aproximadamente 25000 partes.
- Pesaba 15 toneladas.
- Fracasó en el intento.



## 1837: Máquina analítica de Babbage

- Primer Computadora Digital (Mecánica).
- Podía almacenar 1000 números de 50 dígitos cada uno.
- Se programaba con tarjetas.
- Debía funcionar con un motor a vapor.
- Fracasó en el intento.



## 1944: Harvard Mark I

- Fue desarrollada por IBM y la Universidad de Harvard.
- Electromecánica, 760.000 ruedas.
- 800 Km de cables.
- Basada en la máquina analítica de Babbage.
- Programable mediante una cinta de papel.

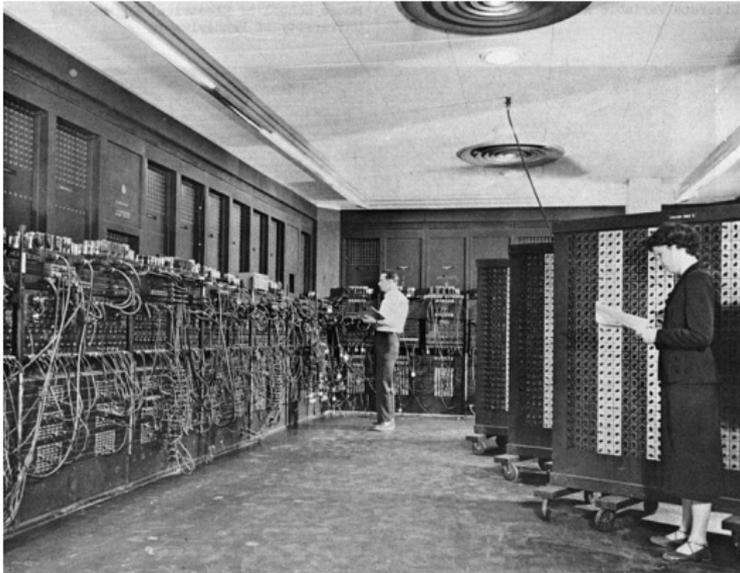


## 1946: ENIAC

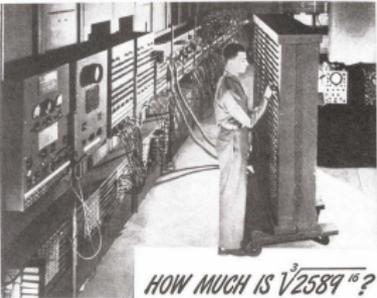
- ENIAC: (Electronical Numerical Integrator and Computer.)
- Primera Computadora de proposito general.
- Construida para calcular la trayectoria de las armas.
- Sus inventores John Presper Eckert y John William Mauchly.
- Se programaba cableando.
- Podía calcular 5000 sumas y 360 multiplicaciones en 1 segundo.
- Pesaba 27 toneladas.
- Medía 2.4m de ancho x 30m de LARGO!
- La temperatura de la habitación una vez encendida se elevaba a 50 grados.
- Consumia 140 KW.



# 1946: ENIAC



# 1946: ENIAC



*HOW MUCH IS  $\sqrt[3]{258916}$ ?*

**The Army's ENIAC can give you the answer in a fraction of a second!**

Think that's a stumper? You should see some of the ENIAC's problems! Brain tests show that if put to paper would run off this page and feet beyond . . . addition, subtraction, multiplication, division—square root, cube root, any root. Solved by an incredibly complex system of circuits operating 10,000 electronic tubes and tipping the scales at 30 tons!

The ENIAC is symbolic of many amazing Army devices with a brilliant future for you! The new Regular Army needs men with aptitude for scientific work, and as one of the first trained in the post-war era, you stand to get in on the ground floor of important jobs

which have never before existed. You'll find that an Army career pays off.

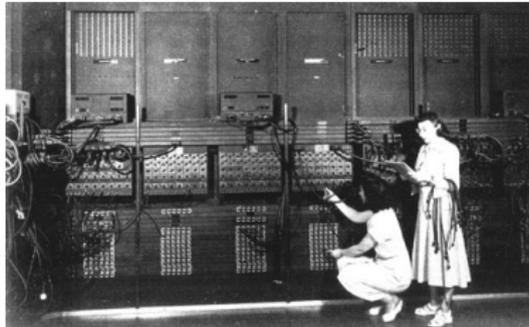
The most attractive fields are filling quickly. Get into the cockpit while the getting's good! 13, 2 and 3 year enlistments are open in the Regular Army to ambitious young men 18 to 34 (17 with parents' consent) who are otherwise qualified. If you enlist for 3 years, you may choose your own branch of the service, of those still open. Get full details at your nearest Army Recruiting Station.

**A GOOD JOB FOR YOU**  
**U. S. Army**  
CHOOSE THIS  
FINE PROFESSION NOW!

**YOUR REGULAR ARMY SERVES THE NATION  
AND HONORS IN WAR AND PEACE**

## Programar era un placer

- Antes, programar, era conectar cables...
- Hacer programas era más una cuestión de Ingeniería Electrónica.
- Cada vez que había que calcular algo nuevo se debía reconectar todo.

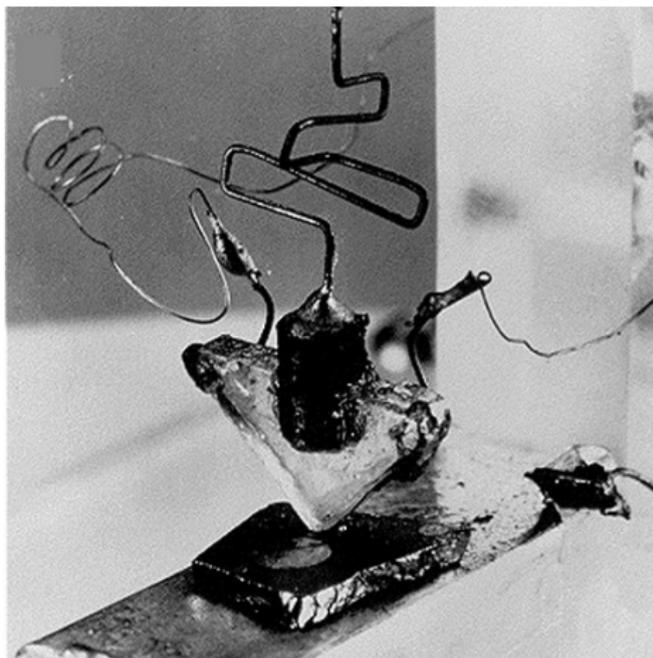


## 1955: IBM 650

- Primera computadora producida en masa.
- Fuera de circulación en 1969.
- 500.000 U\$\$ C/U
- Sistema de memoria secundaria llamada tambor magnético.

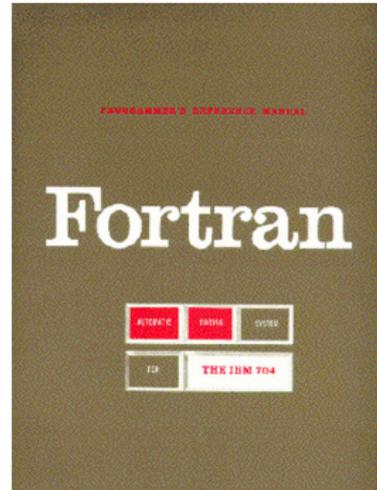


# Transistor



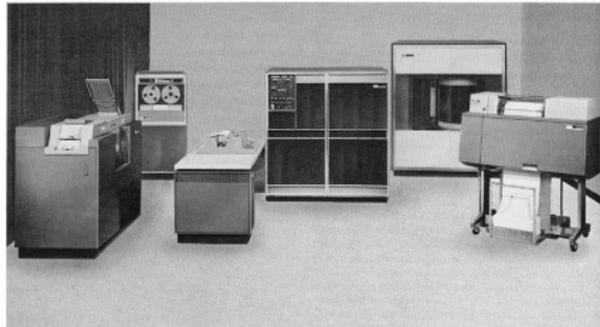
# 1957: FORTRAN

- Primer compilador.
- Utilizado por primera vez en la IBM 704



## 1959: IBM 1401

- 4 KB de memoria expandible a 16 KB.
- Buena para leer tarjetas, copiar cintas e imprimir resultados.
- Mala para cálculos numéricos.
- Se utilizaba con fines comerciales (Bancos, etc.)
- Tenía más de un tercio del mercado mundial.



## 1961: DEC PDP-1

- 4 KB de palabras de 18 bits.
- 120.000 U\$\$



## 1962: Primer Video Juego

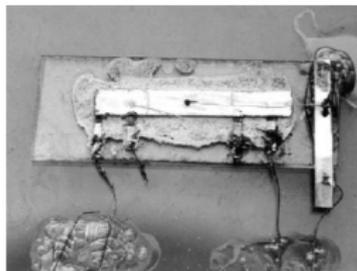
- Desarrollado por estudiantes del MIT.
- Implementado en una PDP-1.



# Circuitos Integrados

## Primer Circuito Integrado

- Jack Kilby (1958)
- 1 transistor, 1 capacitor y 3 resistencias.
- 10 x 15 mm



## Pentium IV

- 55.000.000 de transistores.
- Un pelo = 75 micrones
- Un transistor = 0.3 micrones



## 1964: IBM 360

- Primero en usar microprogramación.
- Creo el concepto de arquitectura de familia. (Mismo software, mismos periféricos.)
- Fue la primera computadora atacada por un virus. "I'm a creeper... catch me if you can!"



## 1965: DEC PDP-8

- Primer minicomputadora.
- No necesitaba una habitación con aire acondicionado.
- Era lo suficientemente pequeña para colocarla en un escritorio.
- 16.000 U\$\$



## 1970: DEC PDP-11

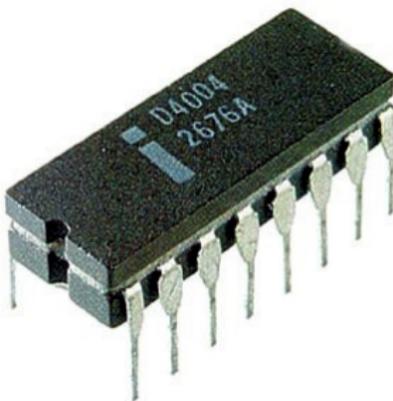
- Utilizaron varios sistemas operativos de la época.
- Una de la primera en correr Unix.



# Microprocesadores

## Intel 4004

- CPU de 4 bits.
- 2300 transistores.
- Usado para calculadoras.



Historia  
High Performance Computing  
Grid Computing  
Simulación

Primeras Computadoras  
Primera Generación  
Segunda Generación  
Tercera Generación  
Cuarta Generación  
Quinta Generación

## Announcing a new era of integrated electronics



### A micro- programmable computer on a chip!

Intel's microprogrammable (MP) computers with a 4-bit parallel architecture and 4 Kbit registers, an accumulator and a push-down stack on one chip. It's one of a family of four new ICs which comprise the MCS-4 micro-computer system. The first system is being put into power and flexibility of a dedicated general-purpose computer of the order to do the job as best as the package.

MCS-4 is a general purpose complete controlling and control functions for test systems, data handling, testing and control, medical diagnosis, machine control systems and general computers.

The heart of any MCS-4 system is a Type 8008 CPU, which handles a maximum of 40 instructions. Adding one or more Type 8080 ICs for program storage and data tables gives you a fully functioning micro-programmable computer. To this you may add Type 8085 ICs for input/output memory and Type 8086 registers to expand the output ports.

Using the circuitry within Intel ICs from this family of four, you can create a system with 40K to 100K bytes of ROM memory and 64K to 128K of RAM storage. When you require high speed control or need work in a few milliseconds, you can use the 8080 or 8085 ICs. For high speed control use the Type 8080 ICs. For high speed control use the Type 8085 ICs. For high speed control use the Type 8086 ICs.

MCS-4 systems include ready-made software, test boards, simulators, microprocessors, printers, readers, A-D converters and other popular peripherals.

The MCS-4 family is now in stock at Intel's Santa Clara headquarters and at our marketing headquarters in Europe and Japan. In the U.S., contact your local Intel representative for technical information and literature. In Europe, contact Intel at Avenue Louise 216, B-1050 Brussels, Belgium. Phone 0032-2-739-3111. In Japan, Intel, Inc., P.O. Box 59, Atsugi-City, Kanagawa-Prefecture, Japan. Phone 0081-476-854-4141. Intel Corporation also provides technical support through its worldwide network of field offices or 800 numbers (toll-free numbers in the U.S.). Please refer to 1981.

intel  
delivers.



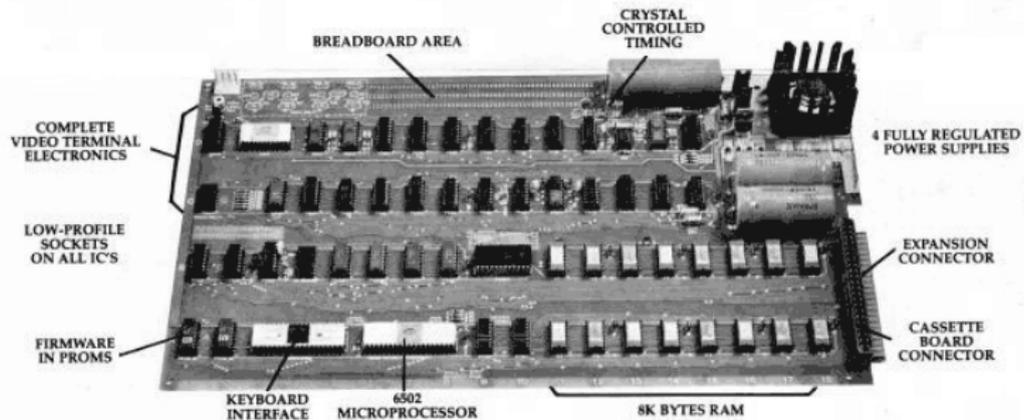
Historia  
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Primeras Computadoras  
Primera Generación  
Segunda Generación  
Tercera Generación  
**Cuarta Generación**  
Quinta Generación

## 1976: Apple I



# 1976: Apple I



## 1978: Apple II

- Se podía aumentar la RAM.
- 8 slots de expansión.



# Visicalc

- Primera aplicación de Hoja de Cálculos
- Se vendieron mas de 700.000 copias en 6 años.

C11 (L) TOTAL C1  
25

	A	B	C	D
1	ITEM	NO.	UNIT	COST
2	---	---	---	---
3	MUCK RAKE	43	12.95	556.85
4	BUZZ CUT	15	6.70	100.50
5	TOE TONER	250	49.95	12487.50
6	EYE SNUFF	2	4.95	9.90
7				
8			SUBTOTAL	13155.50
9			9.75% TAX	1282.66
10			TOTAL	14438.16
11				
12				
13				
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18				
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20				

Historia

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Quinta Generación

# 1978: Microsoft

Would you have invested?



Microsoft Corporation, 1978



# 1981: IBM PC

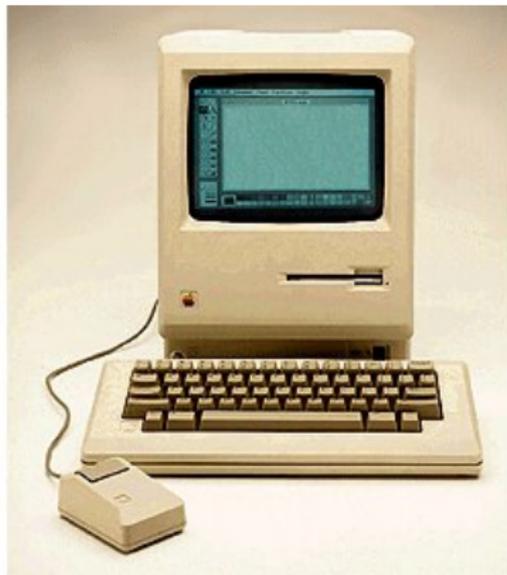
- Sistema DOS (Microsoft)



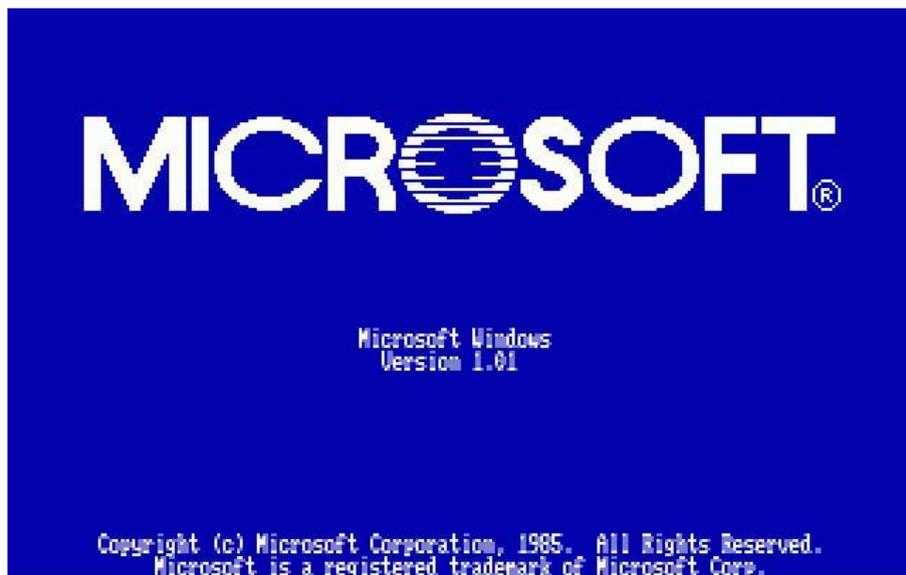
## 1982: Commodore 64



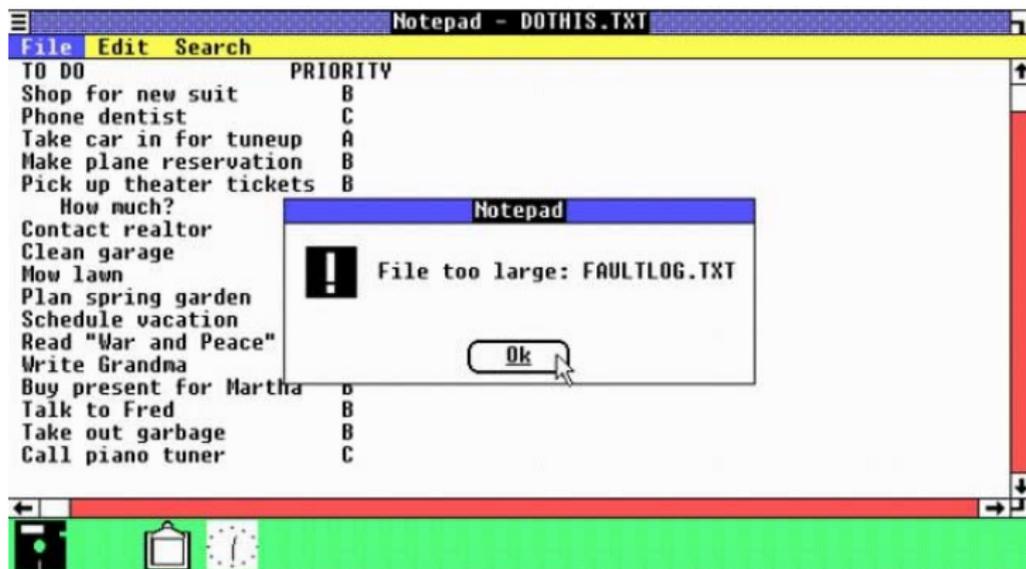
## 1984: Macintosh



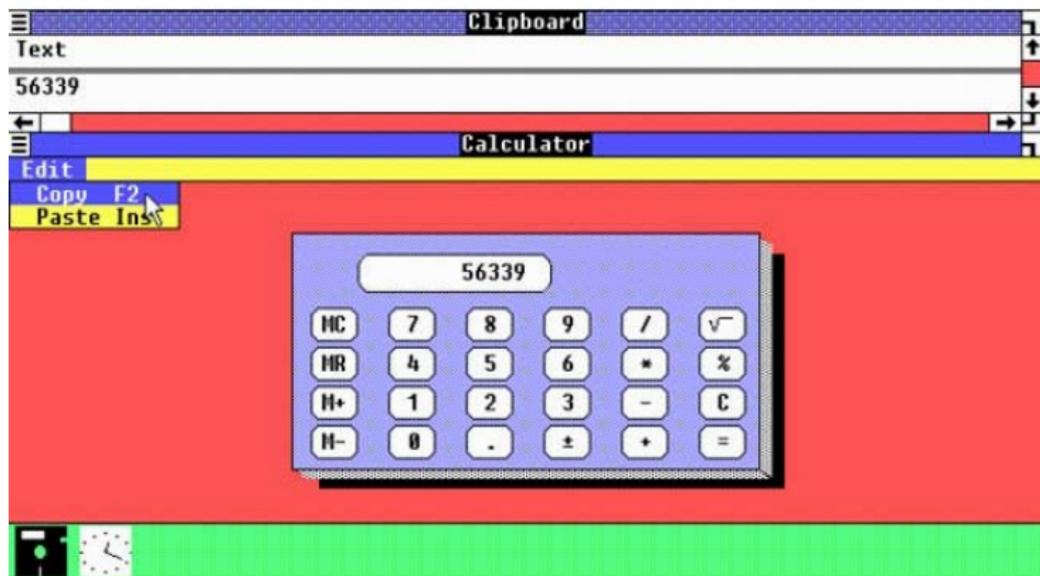
## 1985: Nace Windows



## 1985: Nace Windows



## 1985: Nace Windows



## 1991: Nace Linux

Estoy construyendo un sistema operativo gratuito (no es más que un hobby, no será una cosa grande y profesional como GNU) para clones AT (con un 386 o 486).

Linus Torvalds, Helsinki, Oct. 91



## Historia

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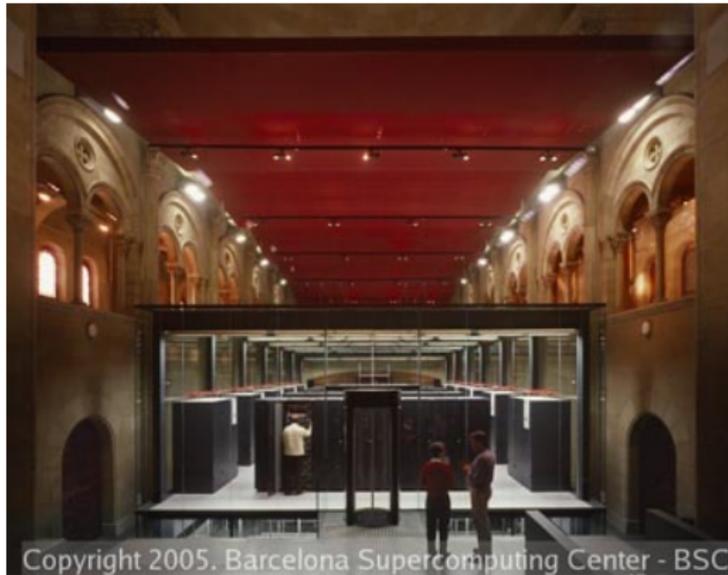
# 1993: Pentium



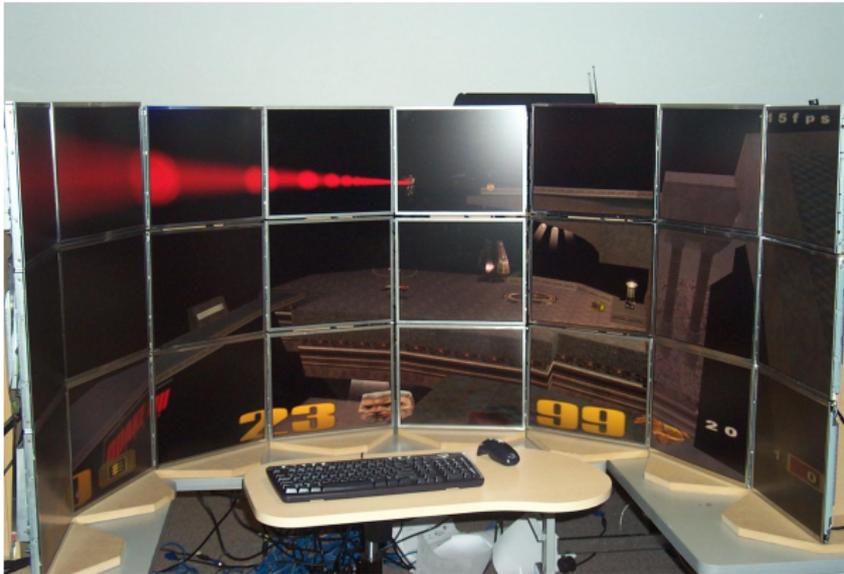
# ¿Qué es un Cluster?



# ¿Qué es un Cluster?



# O también!



# ¿Cuántas máquinas tiene un cluster?

Rank	Site	System	Cores	R <sub>max</sub>	R <sub>peak</sub>
1	DOE/NNSA/LANL United States	BladeCenter QS22/LS21 Cluster, PowerXCell 8i 3.2 Ghz / Opleron DC 1.8 GHz, Voltaire Infiniband IBM	129600	1105	1456.7
2	Oak Ridge National Laboratory United States	Cray XT5 QC 2.3 GHz Cray Inc.	150152	1059	1381.4
3	Forschungszentrum Juelich (FZJ) Germany	Blue Gene/P Solution IBM	294912	825.5	1002.7
4	NASA/Ames Research Center/NAS United States	SGI Altix ICE 8200EX, Xeon QC 3.0/2.66 GHz SGI	51200	487.01	608.83
5	DOE/NNSA/LLNL United States	eServer Blue Gene Solution IBM	212992	478.2	596.38
6	National Institute for Computational Sciences/University of Tennessee United States	Cray XT5 QC 2.3 GHz Cray Inc.	66000	463.3	607.2
7	Argonne National Laboratory United States	Blue Gene/P Solution IBM	163840	458.61	557.06
8	Texas Advanced Computing Center/Univ. of Texas United States	SunBlade x6420, Opleron QC 2.3 Ghz, Infiniband Sun Microsystems	62976	433.2	579.38
9	DOE/NNSA/LLNL United States	Blue Gene/P Solution IBM	147456	415.7	501.35
10	Forschungszentrum Juelich (FZJ) Germany	Sun Constellation, NovaScale R422-E2, Intel Xeon X5570, 2.93 GHz, Sun M9/Mellanox QDR Infiniband/Partec Parastation Bull SA	26304	274.8	308.28

# ¿Qué es Grid Computing?

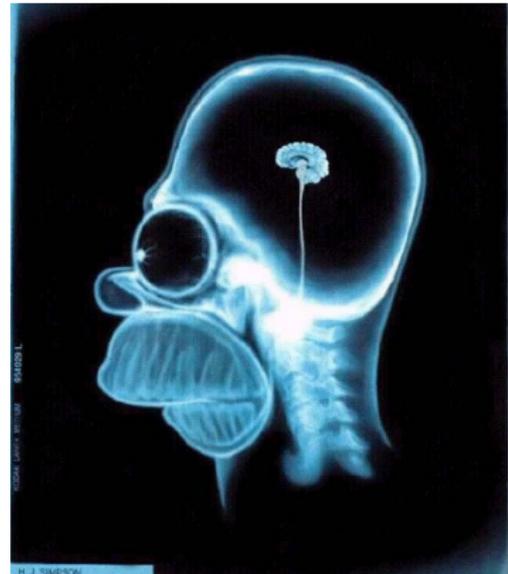
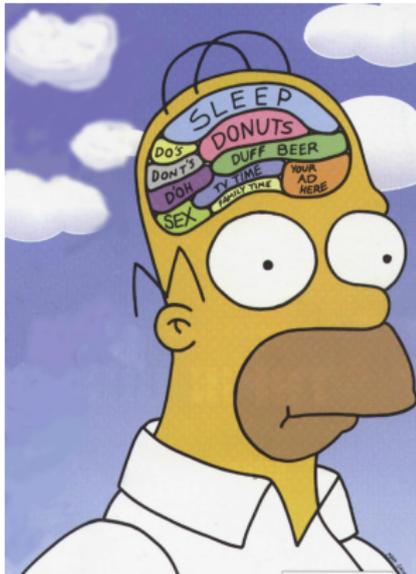


# ¿Cuántas máquinas tiene una Grid?

Project	Users	Hosts	Teams	Countries	Total credit	Recent average credit	Last updated
<a href="#">BOINC</a>	1,799,917	4,490,267	84,108	283	134,171,051,749	283,025,278	00:15:20 ago
<a href="#">SETI@home</a>	1,016,996	2,435,603	56,521	253	55,887,629,972	73,334,917	19:47:28 ago
<a href="#">World Community Grid</a>	258,961	794,190	15,968	219	16,688,787,820	31,983,684	01:40:50 ago
<a href="#">Einstein@Home</a>	238,673	1,018,023	8,750	214	14,543,967,865	18,242,218	03:24:42 ago
<a href="#">Rosetta@home</a>	263,692	788,055	8,268	222	8,004,601,560	9,835,673	02:50:28 ago
<a href="#">Climateprediction.net</a>	204,393	395,911	6,698	213	9,377,121,060	17,962,718	04:42:30 ago
<a href="#">LHC@home</a>	76,206	200,108	3,630	179	264,235,581	4,292	13:49:29 ago
<a href="#">Predictor@home</a>	58,805	146,392	3,357	175	486,386,198	1	434 days, 02:09:03 ago
<a href="#">SpinHenge@home</a>	52,161	123,632	1,878	163	916,266,354	1,218,913	09:24:50 ago
<a href="#">Quantum Monte Carlo at Home</a>	38,133	90,029	1,824	170	2,046,159,060	2,223,833	04:34:22 ago
<a href="#">Simap</a>	30,688	89,415	1,792	165	631,604,427	433,774	09:36:39 ago
<a href="#">PrimeGrid</a>	26,908	77,930	1,478	161	1,453,459,030	4,818,854	00:34:36 ago
<a href="#">malariacontrol.net</a>	32,697	73,033	1,452	192	554,749,863	956,023	01:36:51 ago
<a href="#">MilkyWay@Home</a>	34,372	73,892	1,343	164	7,669,972,348	45,563,217	04:29:53 ago
<a href="#">SZTAKI Desktop Grid</a>	30,573	75,563	1,286	172	157,699,866	275,642	01:03:57 ago
<a href="#">uFluids</a>	20,970	50,046	1,275	139	158,808,915	455,483	00:38:31 ago
<a href="#">BBC Climate Change Experiment</a>	120,478	136,613	1,199	103	1,431,154,624	3,132	16 days, 09:59:31 ago
<a href="#">ABC@home</a>	23,307	63,971	1,160	153	2,013,848,904	2,073,244	02:46:34 ago
<a href="#">Tanpaku</a>	16,745	42,752	1,017	142	366,260,294	69	402 days, 21:09:16 ago
<a href="#">Leiden Classical</a>	14,634	39,698	959	140	164,896,374	729,514	01:01:19 ago
<a href="#">Cosmology@Home</a>	20,626	37,392	957	165	991,240,742	1,408,355	09:33:06 ago



# ¿Qué se nos viene a la mente cuando hablamos de Simulación?



# Definamos Simular

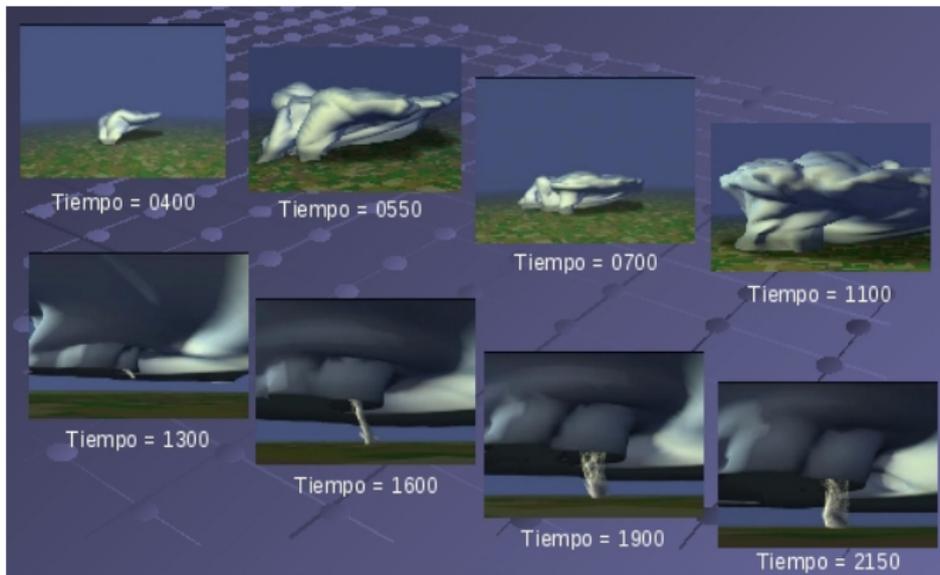
## Simulación

Acción de simular.

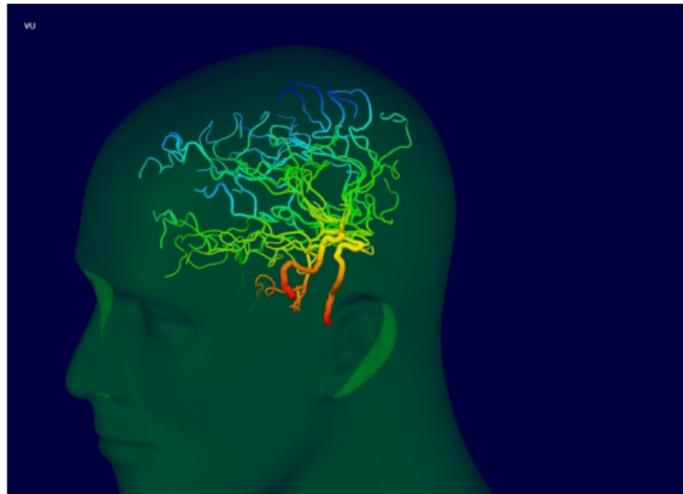
## Simular

Representar algo, fingiendo o imitando lo que no es.

# Simulaciones



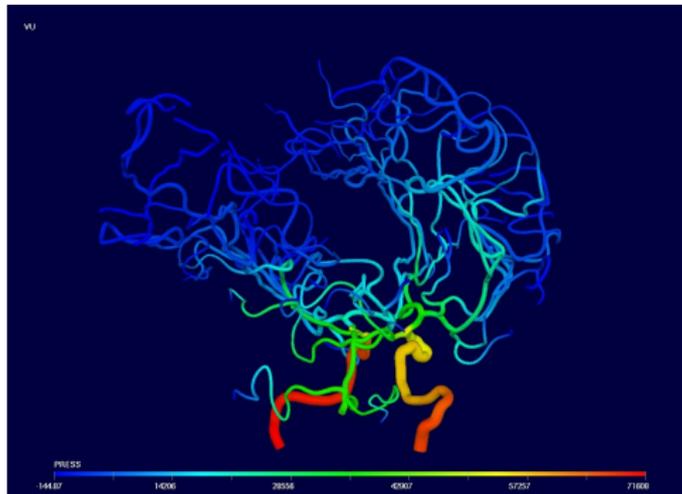
# Arterial flow in the brain



Agradecimiento a Mariano Vázquez  
Centro Nacional de Supercomputación, Barcelona, España.



# Arterial flow in the brain



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Centro Nacional de Supercomputación, Barcelona, España.



# CardioGrid Portal

Archivo Editar Ver Historial Marcadores Herramientas Ayuda

http://u-dag-evls.cita-icmat.es:8080/index.jsp

## CardioGrid Portal

Laboratory of Complex Systems

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### Submit ECG

Enter ID Patient:  Enter ECG:  Examiner:

---

### View Grid State

Enter ID Patient:

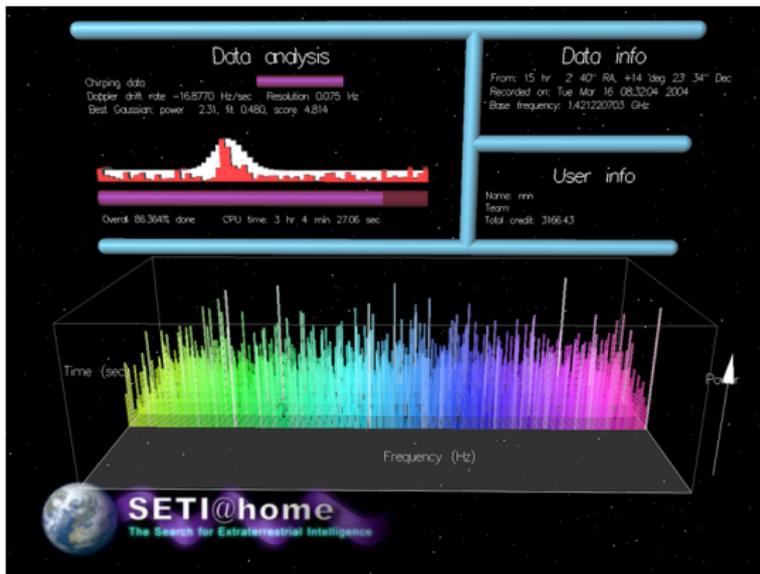
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### View Results

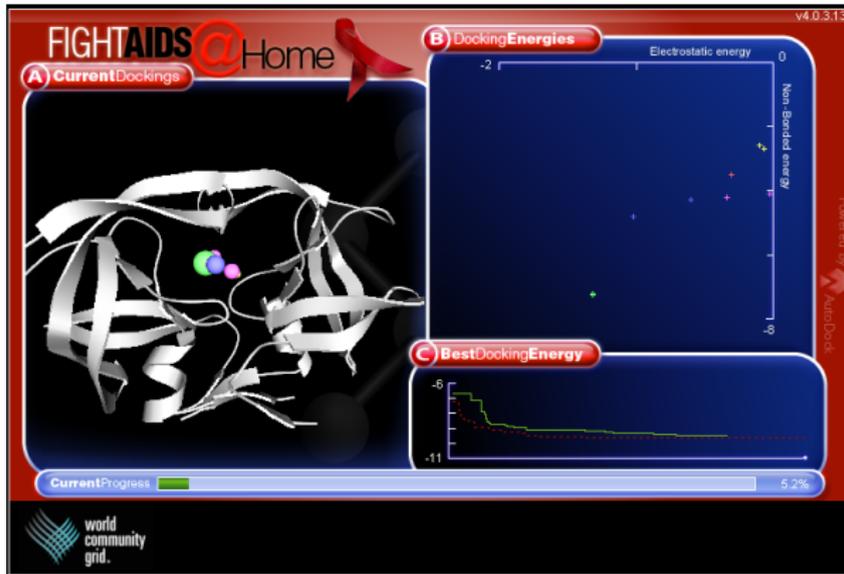
Enter ID Patient:

Terminado Proces: None

# SETI@Home



# FightAids@Home



# Help Fight Childhood Cancer



# Discovering Dengue Drugs

UTMB Discovering Dengue Drugs-Together

Current Docking

Dengue outbreaks and impacted areas, 2006 (CDC, DVVID)

Student Writings

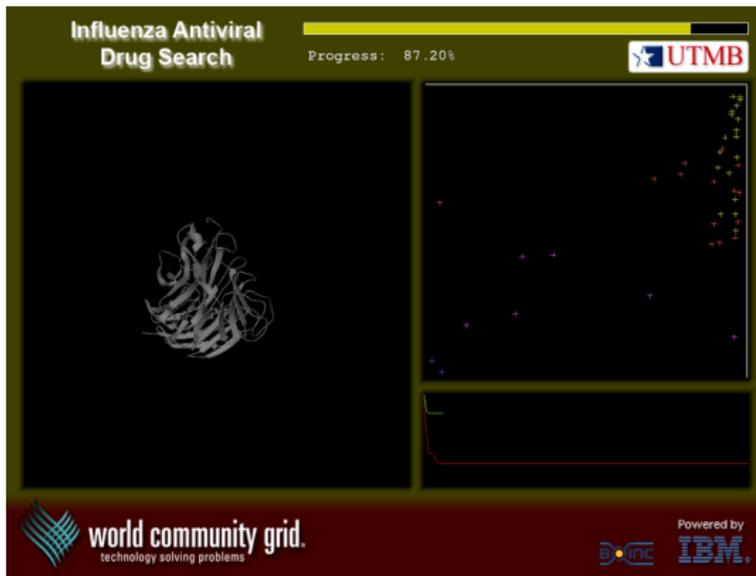
-----  
If the Grass Were a Little Greener  
If the grass were a little greener,  
The air a little crisper,  
The water a little cleaner,  
Do you think the world would be a better  
place?  
If society were a little less

world community grid. technology solving problems.

Powered by IBM.



# Influenza Antiviral Drug Search



# Help Cure Muscular Dystrophy

Help Cure Muscular Dystrophy 2

UPMC PARIS UNIVERSITAS

world community grid

Erelec

0.0	0.2	4.5
MIN	CUR	MAX
-14.5	-8.3	0.0

Ethin

1RKC\_A

2072\_A

CURRENT PROGRESS : 29.5%

BOINC DECRYPTION

Powered by IBM

For information about these panels, please visit the Help Cure Muscular Dystrophy 2 pages in the research section of [www.worldcommunitygrid.org](http://www.worldcommunitygrid.org). Thank you for participating.



# ¿Preguntas?

