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

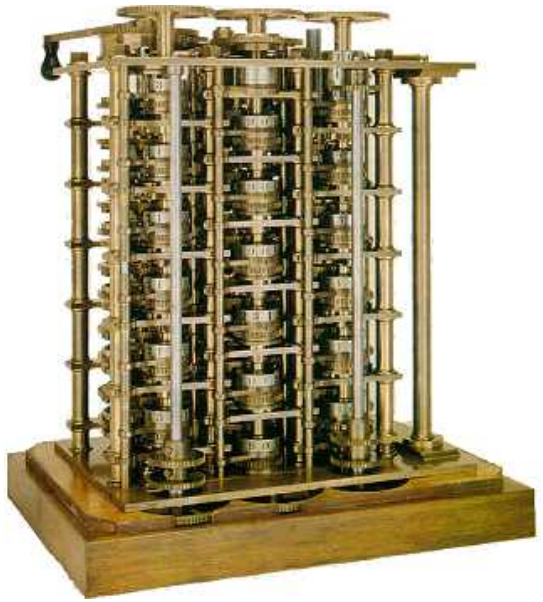
F. García Eijó, E. Costa y D. González Márquez.

Laboratorio de Sistemas Complejos, Departamento de Computación,
Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires

Semana de la Computación 2009

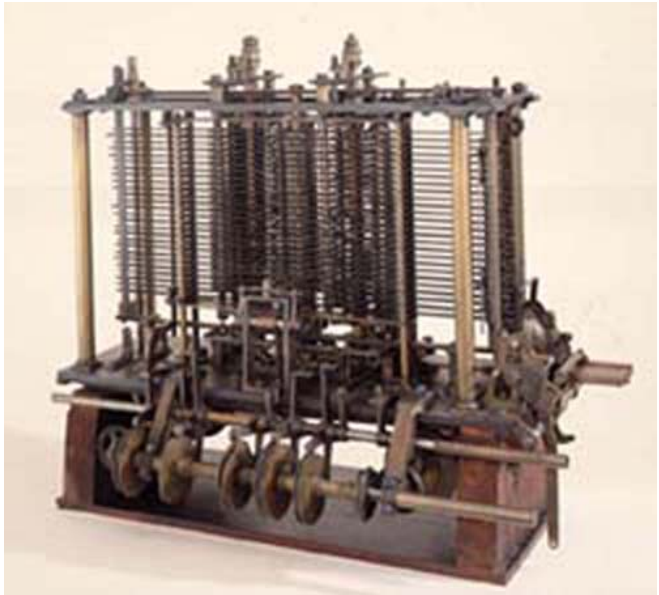
1822: Máquina diferencial de Babbage

- 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).
- Podia almacenar 1000 números de 50 digitos cada uno.
- Se programaba con tarjetas.
- Debía funcionar con un motor a vapor.
- Fracasó en el intento.



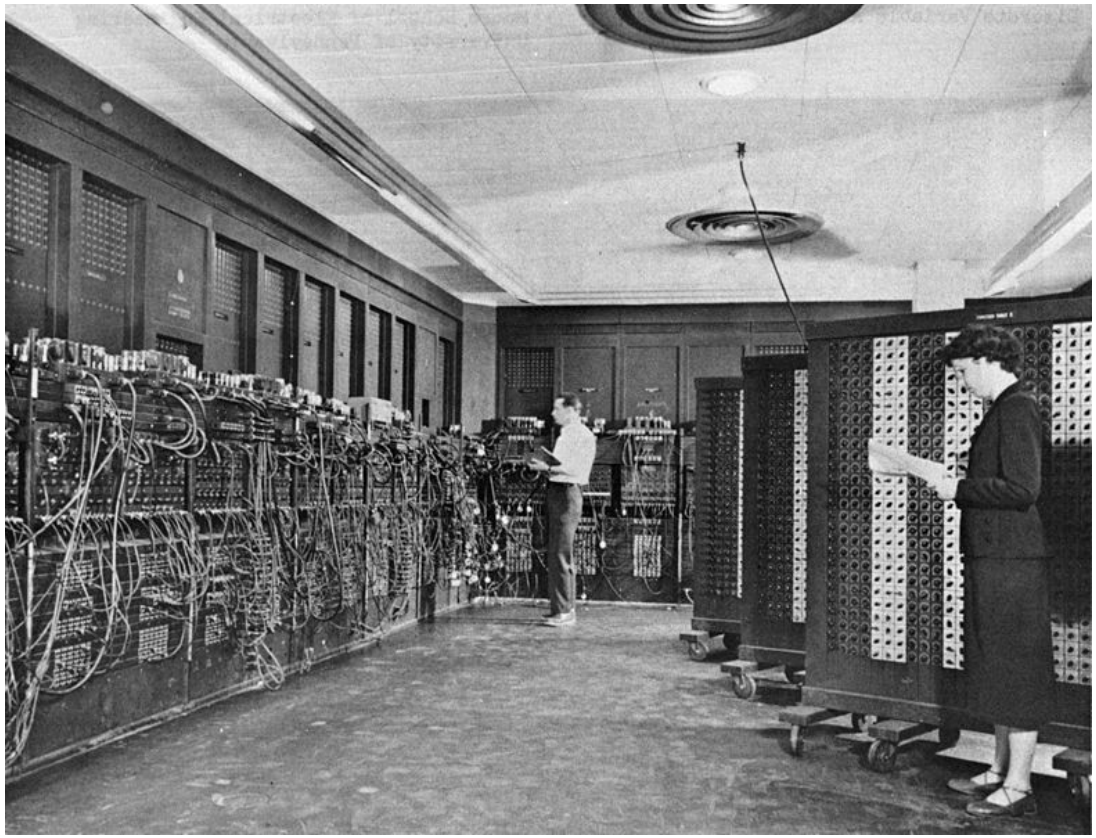
1944: Harvard Mark I

- 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 $\sqrt[3]{2589^{16}}$?

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 twisters 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 18,000 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.

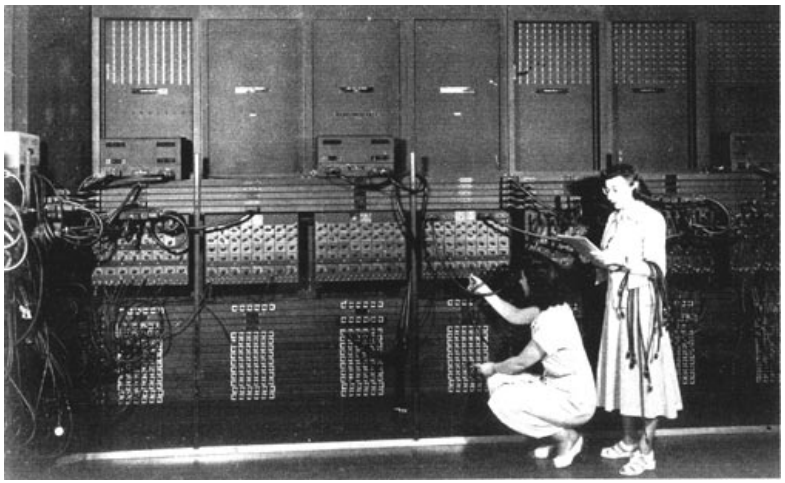
The most attractive fields are filling quickly. Get into the swim while the getting's good! 1½, 2 and 3 year enlistments are open in the Regular Army to ambitious young men 18 to 34 (17 with parents' consent) who are otherwise qualified. If you enlist for 3 years, you may choose your own branch of the service, of those still open. Get full details at your nearest Army Recruiting Station.

YOUR REGULAR ARMY SERVES THE NATION AND MANKIND IN WAR AND PEACE

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

Programar era un placer

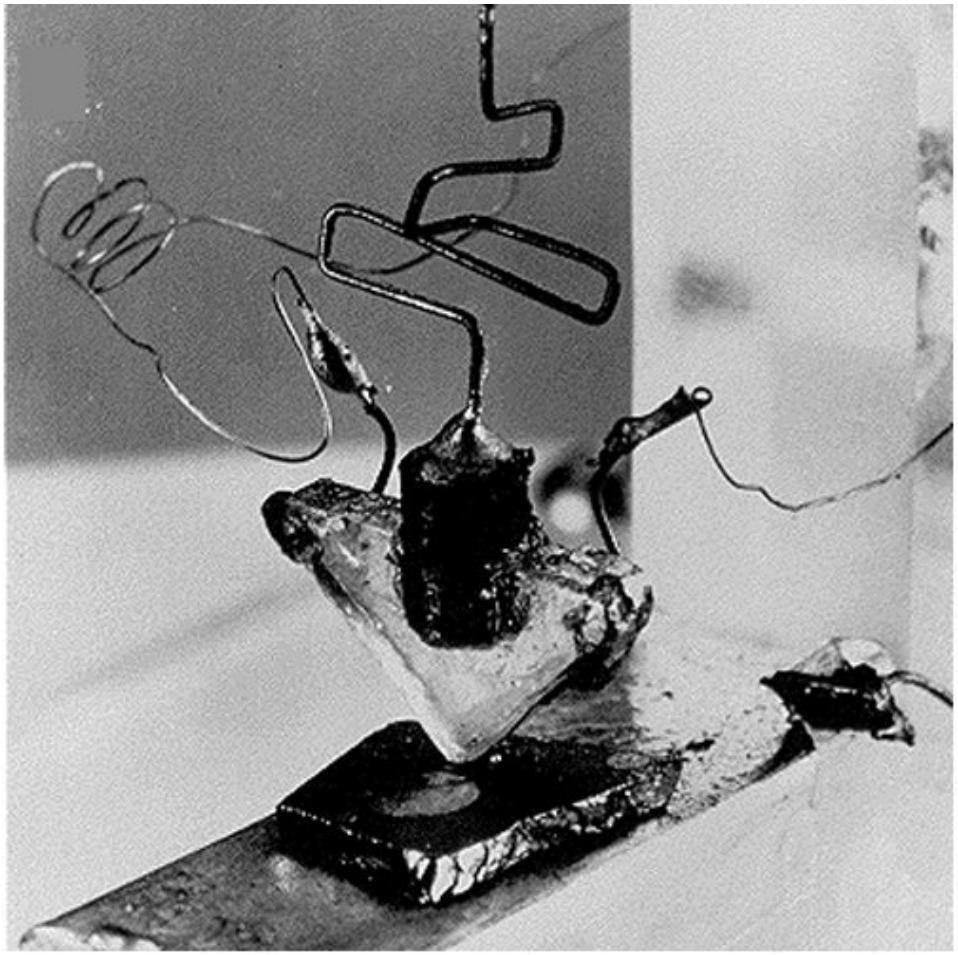
- Antes, programar, era conectar cables...
- Hacer programas era más una cuestión de Ingeniería Electrónica.
- Cada vez que había que calcular algo nuevo se debía reconectar todo.



1955: IBM 650

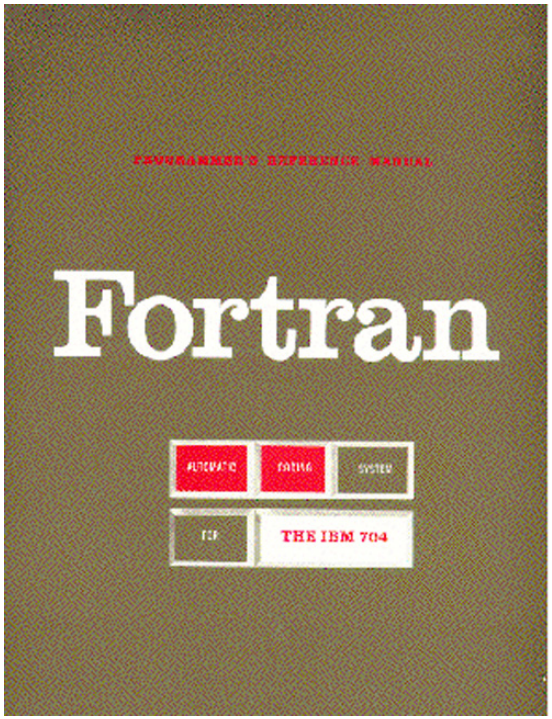
- Primera computadora producida en masa.
- Fuera de circulación en 1969.
- 500.000 U$$ C/U
- Sistema de memoria secundaria llamada tambor magnético.

Transistor



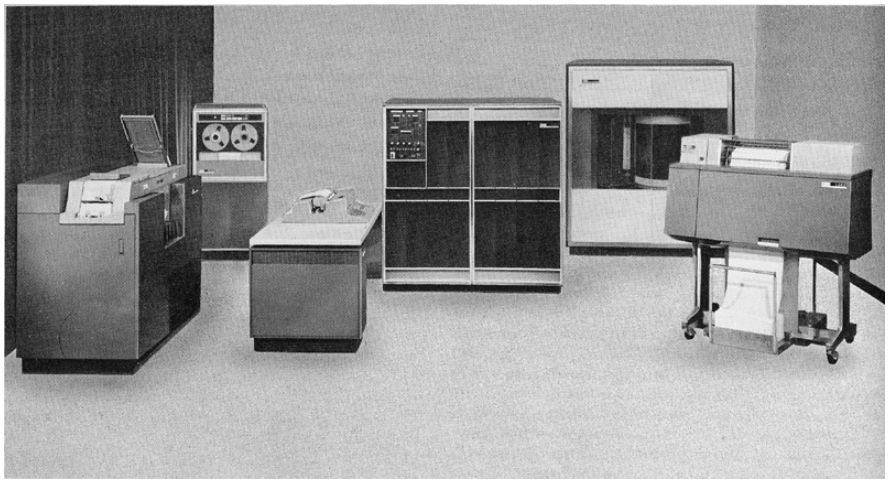
1957: FORTRAN

- 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.

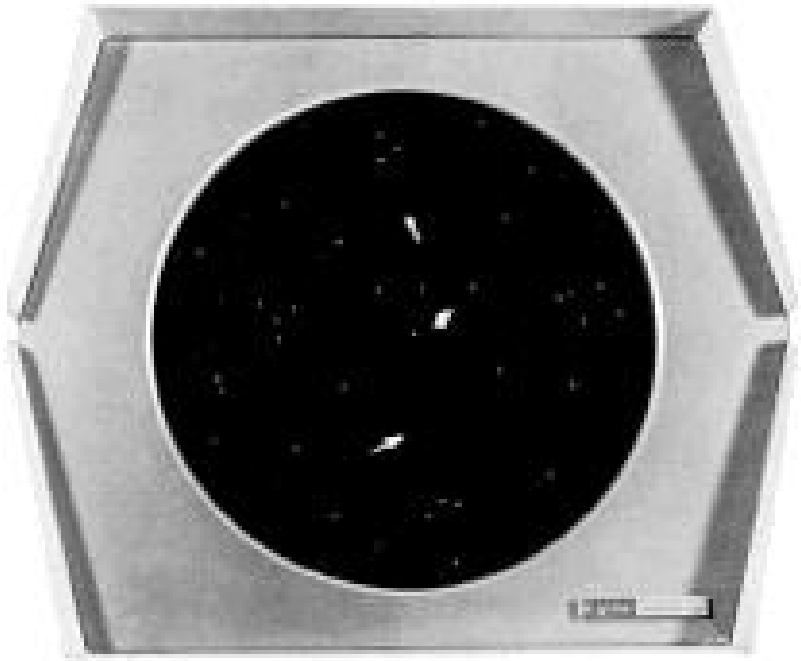


1961: DEC PDP-1

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

1962: Primer Video Juego

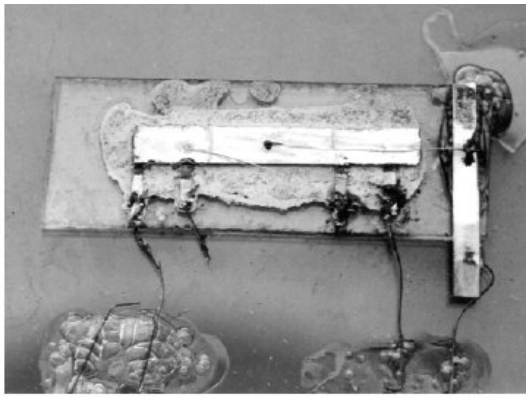
- Desarrollado por estudiantes del MIT.
- Implementado en una PDP-1.



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 perifericos.)
- 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$$

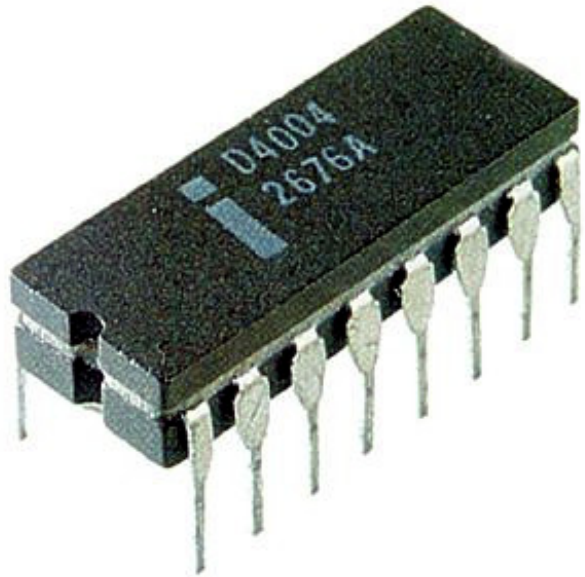
1970: DEC PDP-11

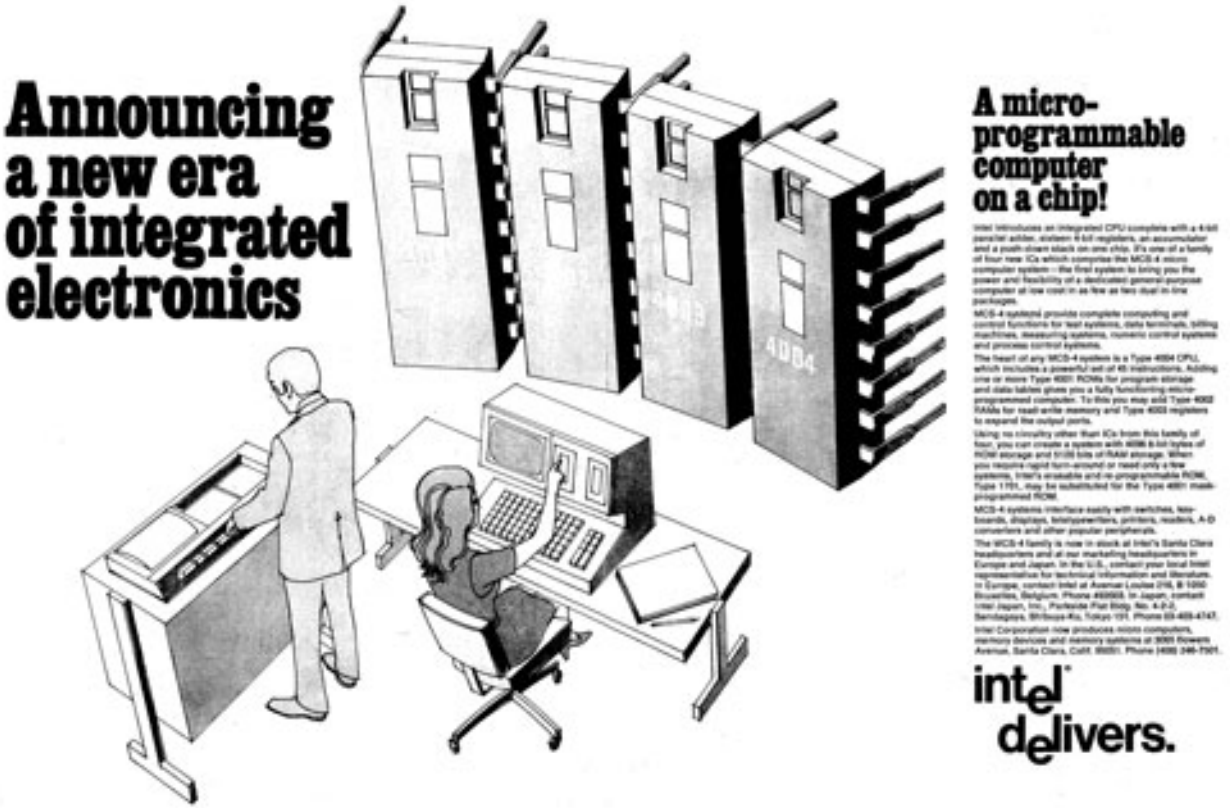
- Utilizaron varios sistemas operativos de la época.
- Una de la primera en correr Unix.

Microprocesadores

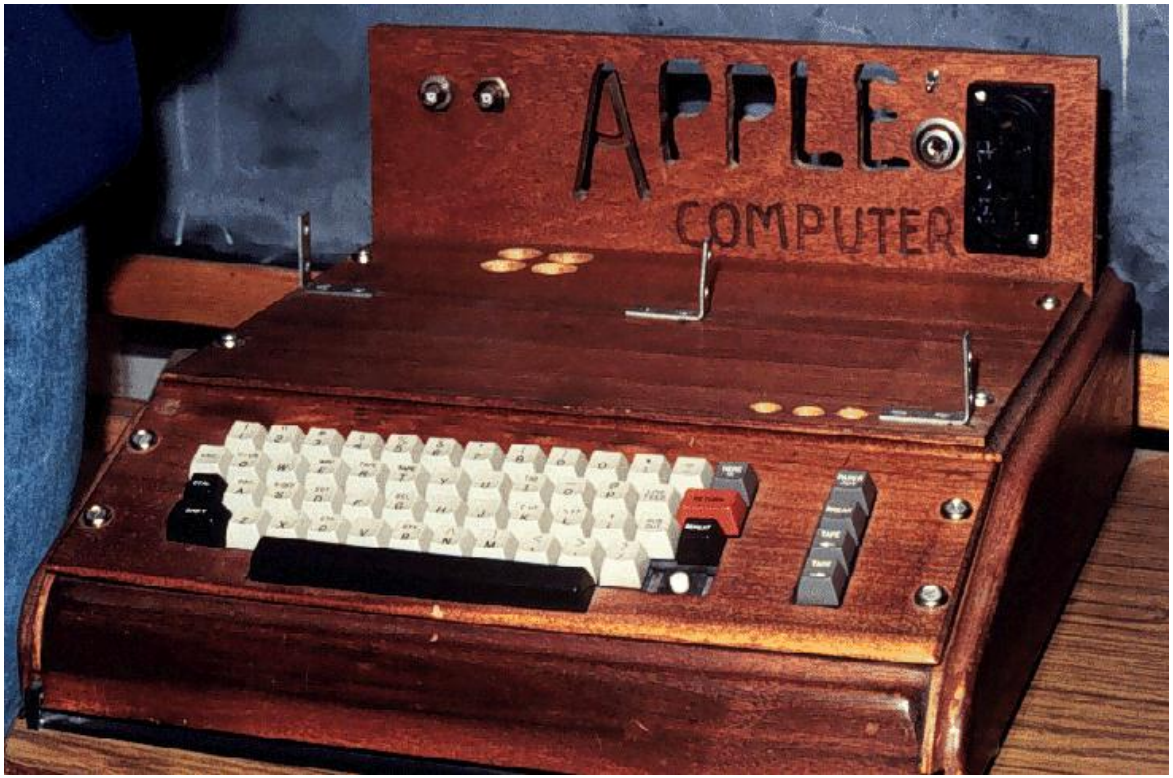
Intel 4004

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

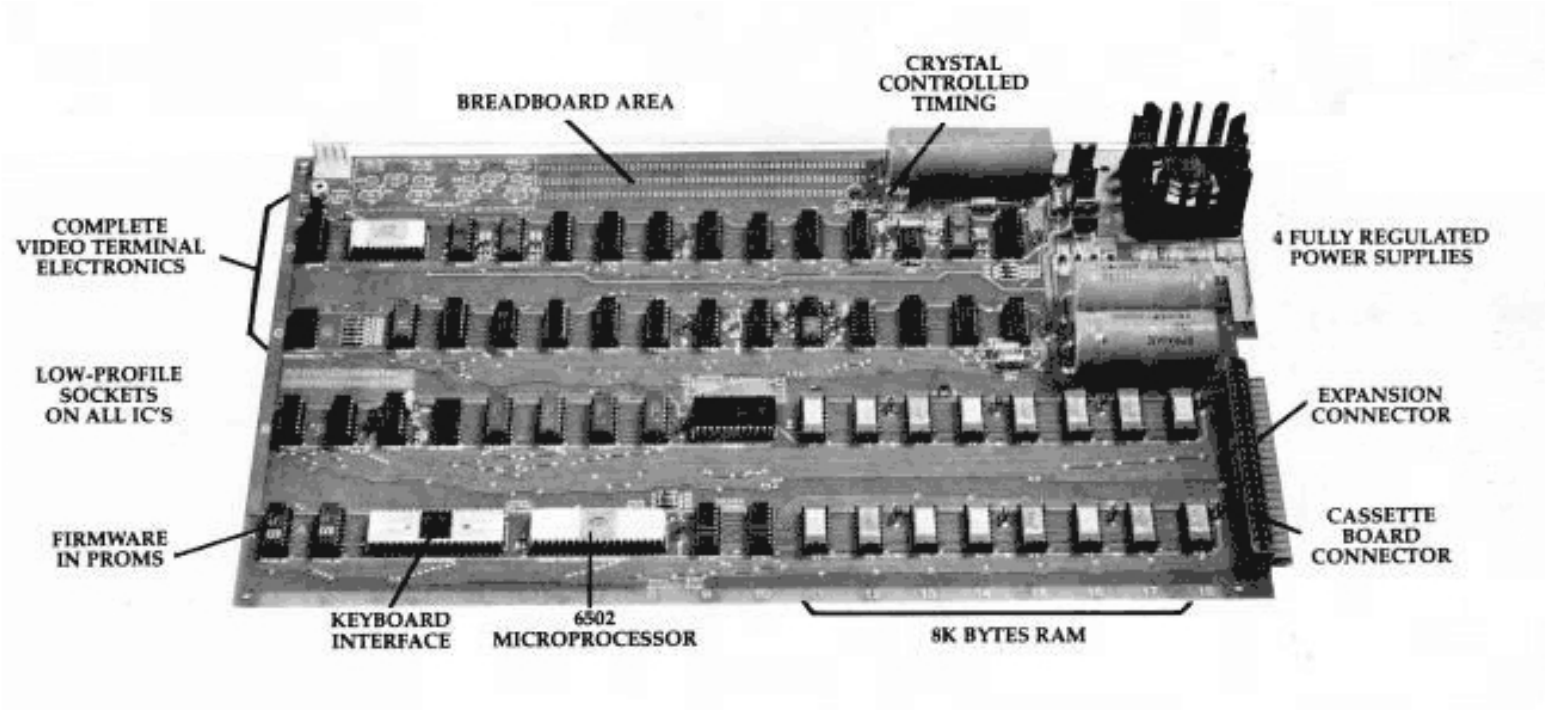



Announcing
a new era
of integrated
electronics
A micro-
programmable
computer
on a chip!
4004
intel
delivers.

1976: Apple I



1976: Apple I

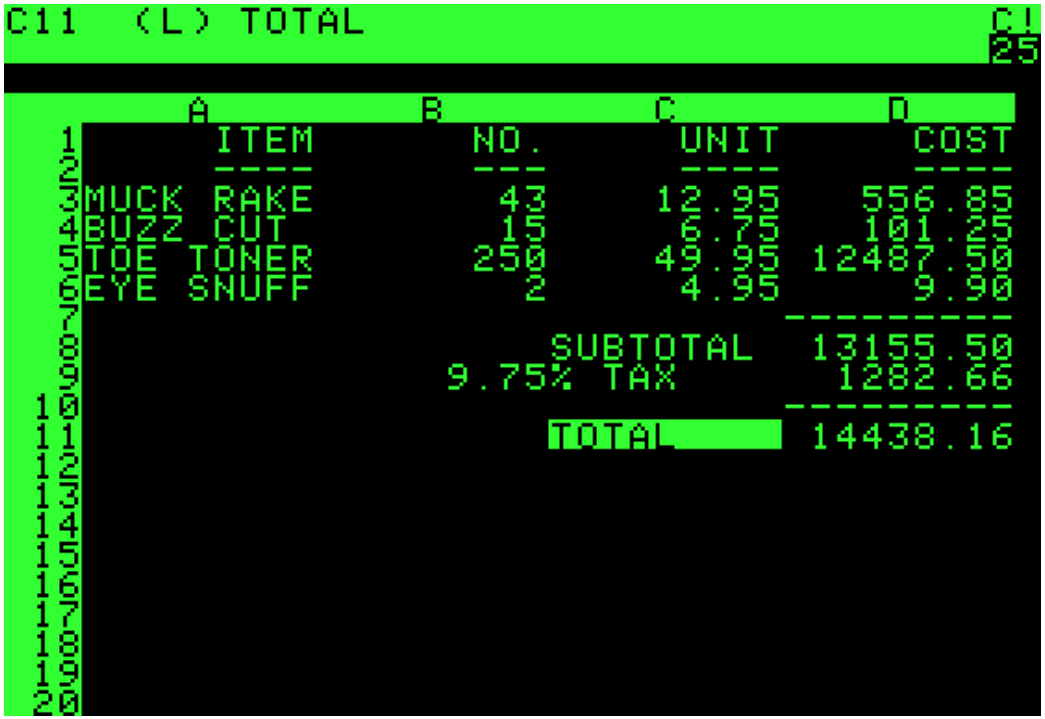

BREADBOARD AREA
CRYSTAL CONTROLLED TIMING
COMPLETE VIDEO TERMINAL ELECTRONICS
4 FULLY REGULATED POWER SUPPLIES
LOW-PROFILE SOCKETS ON ALL IC'S
EXPANSION CONNECTOR
FIRMWARE IN PROMS
CASSETTE BOARD CONNECTOR
KEYBOARD INTERFACE
6502 MICROPROCESSOR
8K BYTES RAM

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.



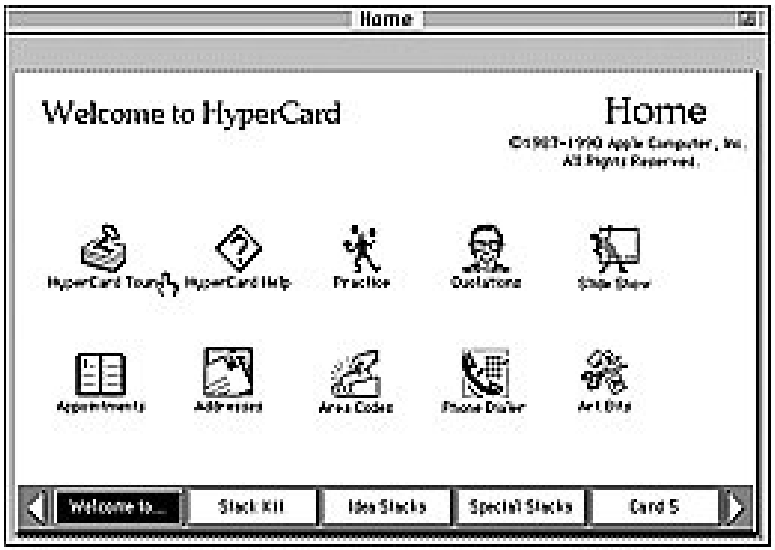
1978: Microsoft

1981: IBM PC

- Sistema DOS (Microsoft)

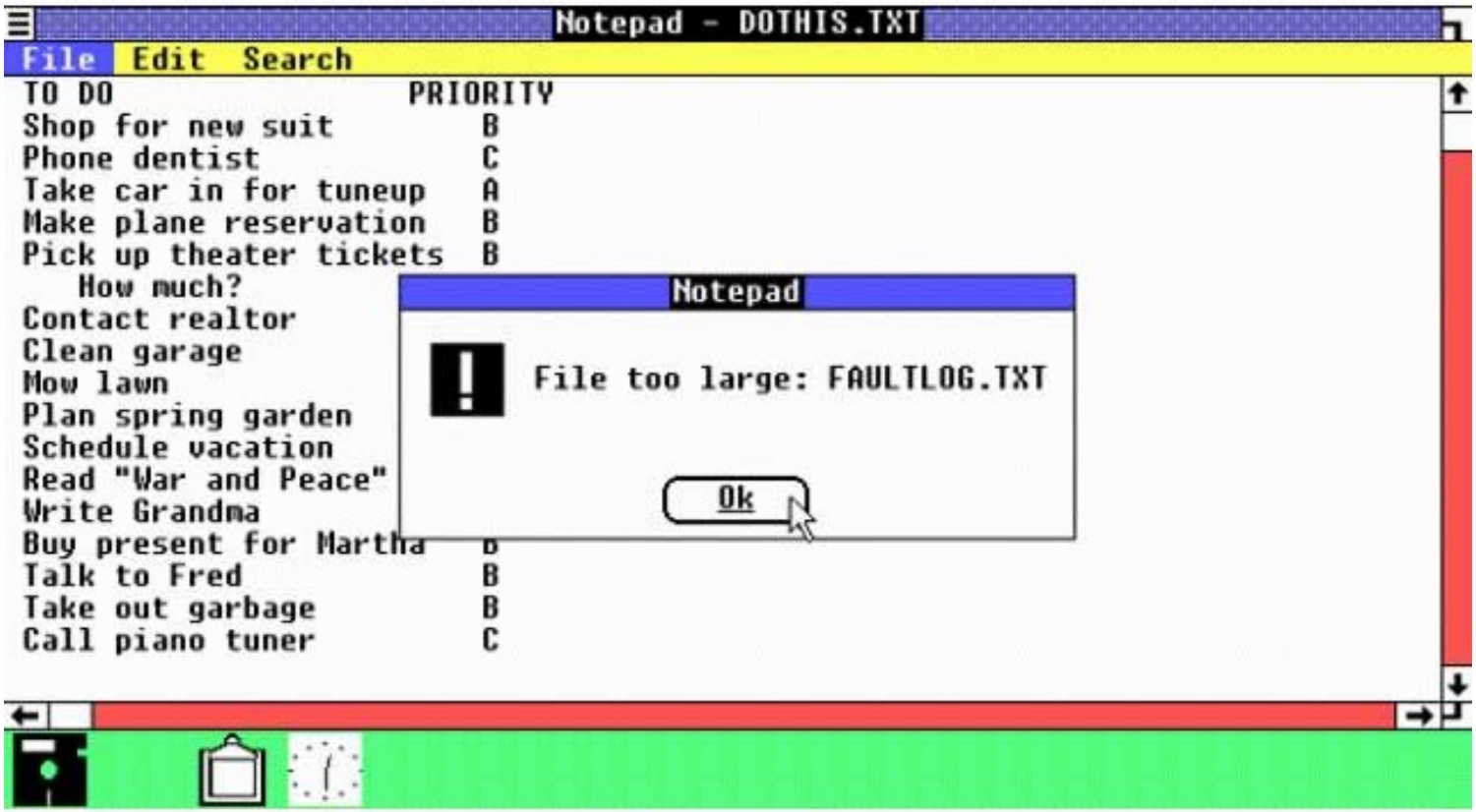
1982: Commodore 64

1984: Macintosh

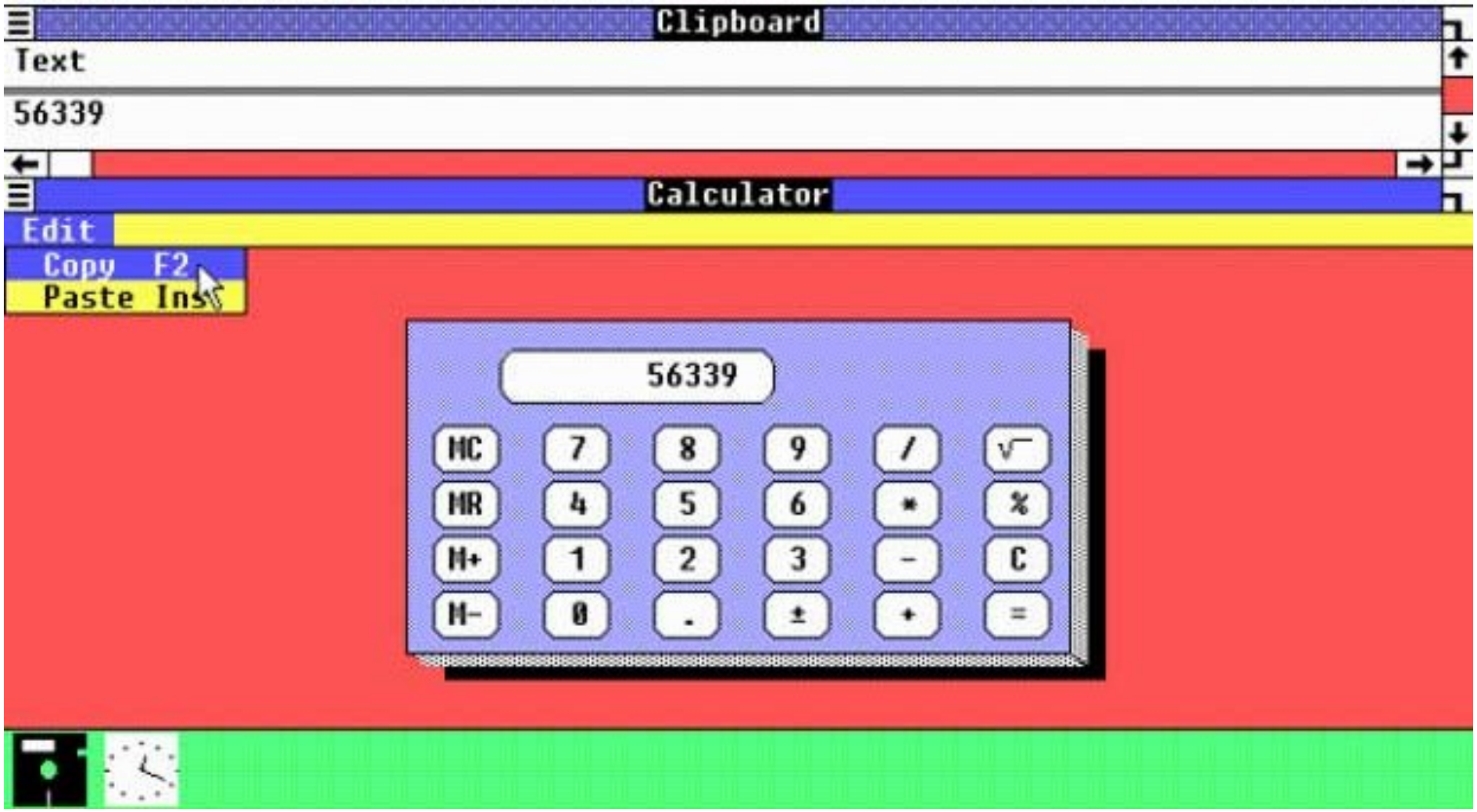


1985: Nace Windows

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).

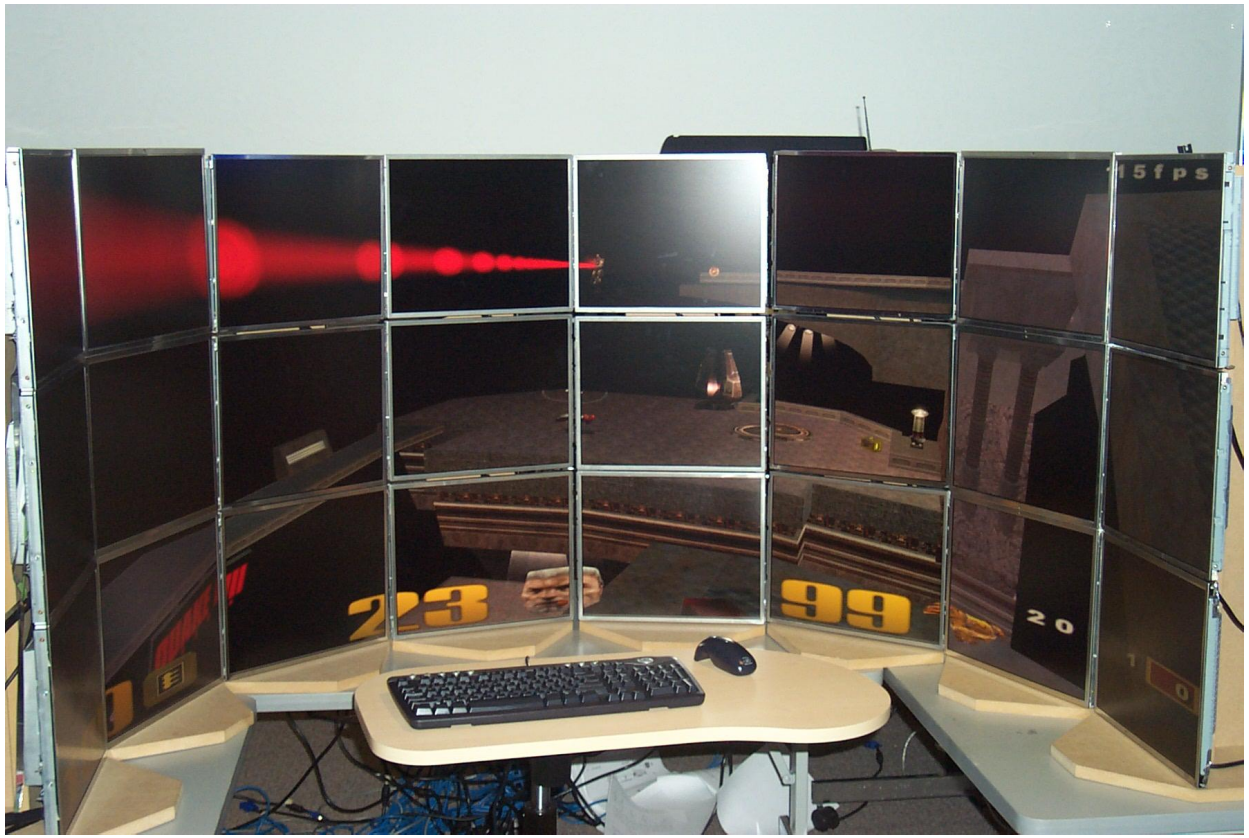
Linus Torvalds, Helsinki, Oct. 91

1993: Pentium

¿Qué es un Cluster?

¿Qué es un Cluster?

O también!



¿Cuántas máquinas tiene un cluster?

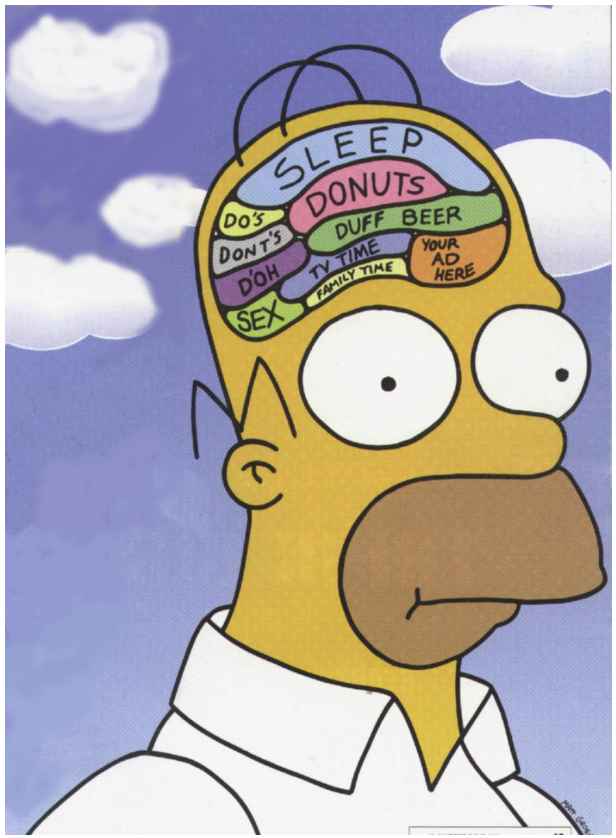
Rank	Site	System	Cores	R_{max}	R_{peak}
1	DOE/NNSA/LANL United States	BladeCenter QS22/LS21 Cluster, PowerXCell 8i 3.2 Ghz / Opteron DC 1.8 GHz, Voltaire Infiniband IBM	129600	1105	1456.7
2	Oak Ridge National Laboratory United States	Cray XT5 QC 2.3 GHz Cray Inc.	150152	1059	1381.4
3	Forschungszentrum 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, Opteron 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

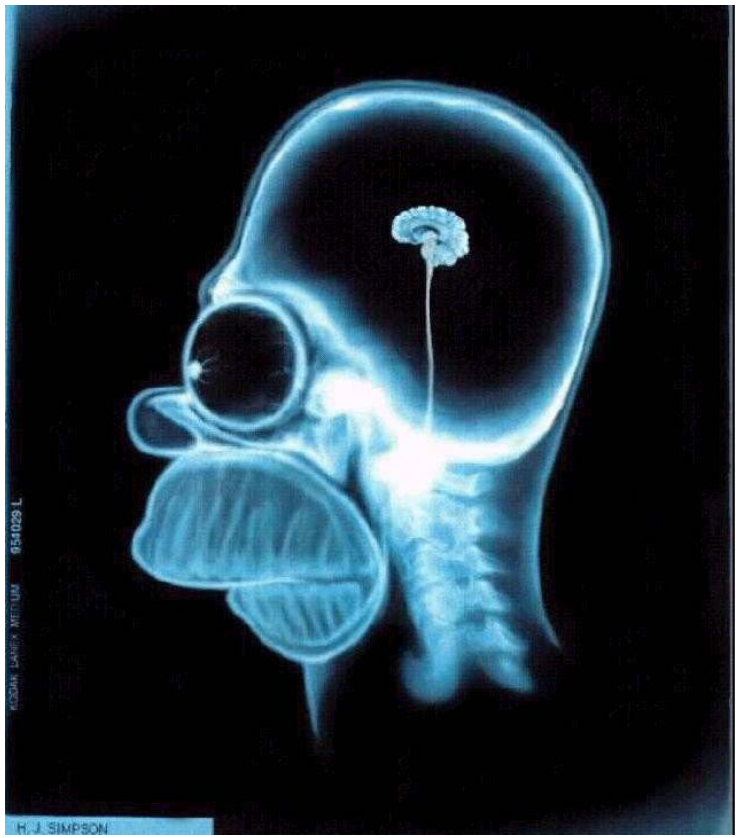
¿Qué es Grid Computing?

¿Cuantás máquinas tiene una Grid?

Project	Users	Hosts	Teams	Countries	Total credit	Recent average credit	Last updated
-BOINC-	1,799,917	4,490,267	84,103	283	134,171,051,749	283,025,278	00:15:20 ago
SETI@home	1,016,996	2,435,603	56,521	253	55,887,629,972	73,334,917	19:47:28 ago
World Community Grid	258,961	794,190	15,963	219	16,688,787,820	31,983,684	01:40:50 ago
Einstein@Home	238,673	1,018,023	8,750	214	14,543,967,855	18,242,218	03:24:42 ago
Rosetta@home	263,692	788,055	8,268	222	8,004,601,560	9,835,673	02:50:28 ago
Climateprediction.net	204,393	395,911	6,695	213	9,377,121,050	17,952,718	04:42:30 ago
LHC@home	76,206	200,108	3,630	179	264,235,581	4,292	13:49:29 ago
Predictor@home	58,805	146,392	3,357	175	486,386,198	1	434 days, 02:09:03 ago
Spinhenge@home	52,161	123,632	1,878	183	916,266,354	1,218,913	09:24:50 ago
Quantum Monte Carlo at Home	38,133	90,029	1,824	170	2,046,159,060	2,223,833	04:34:22 ago
Simap	30,688	89,415	1,792	165	631,604,427	433,774	09:36:39 ago
PrimeGrid	26,908	77,930	1,478	161	1,453,459,030	4,818,854	00:34:36 ago
malariacontrol.net	32,697	73,033	1,452	192	554,749,863	956,023	01:36:51 ago
MilkyWay@Home	34,372	73,892	1,343	164	7,669,972,348	45,563,217	04:29:53 ago
SZTAKI Desktop Grid	30,573	76,563	1,286	172	157,699,856	275,642	01:03:57 ago
uFluids	20,970	50,046	1,275	139	158,808,915	455,483	00:38:31 ago
BBC Climate Change Experiment	120,478	136,613	1,199	103	1,431,154,624	3,132	16 days, 09:59:31 ago
ABC@home	23,307	63,971	1,160	153	2,013,848,904	2,073,244	02:46:34 ago
Tanpaku	16,745	42,752	1,017	142	366,260,294	69	402 days, 21:09:16 ago
Leiden Classical	14,634	39,698	959	140	184,898,374	729,514	01:01:19 ago
Cosmology@Home	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

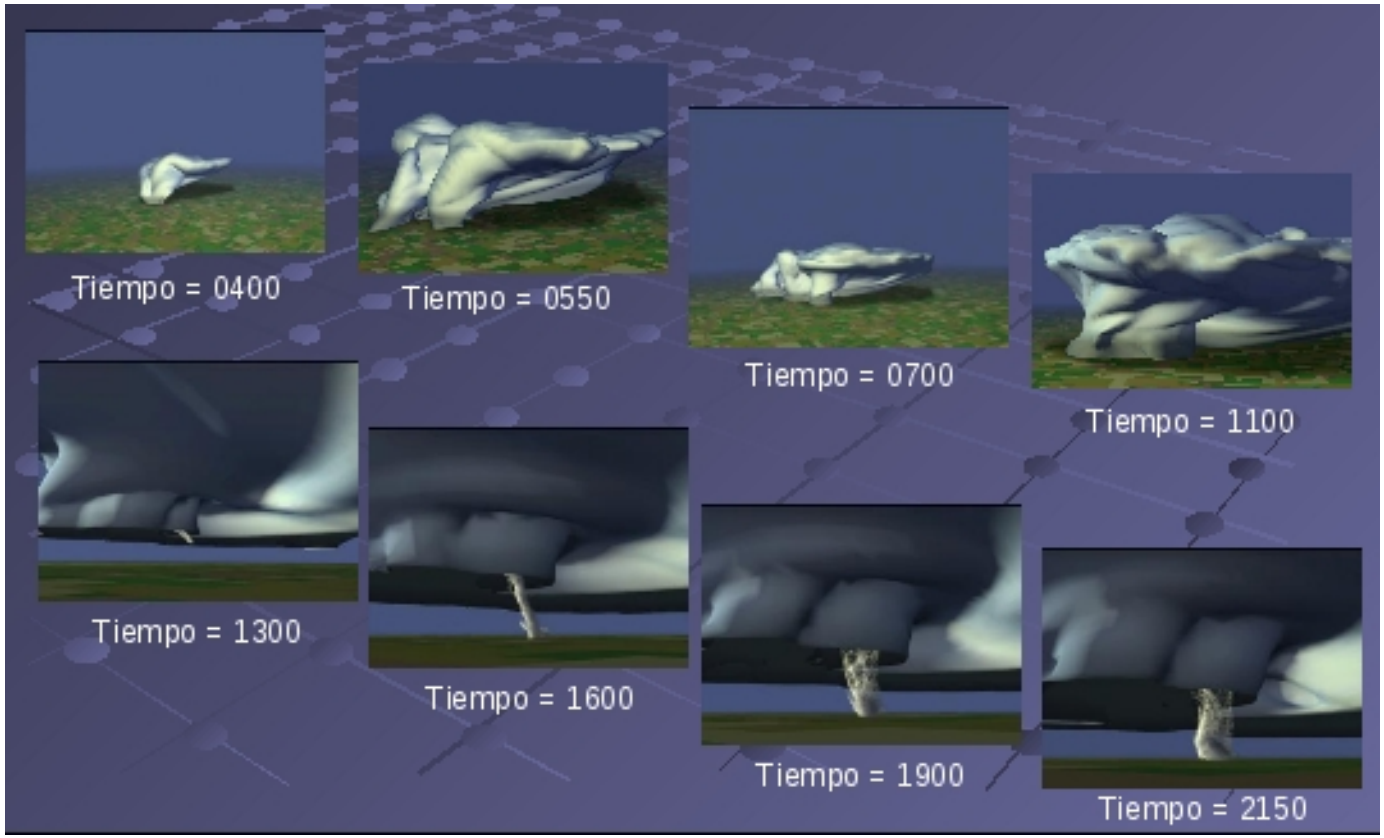
Simulación

Acción de simular.

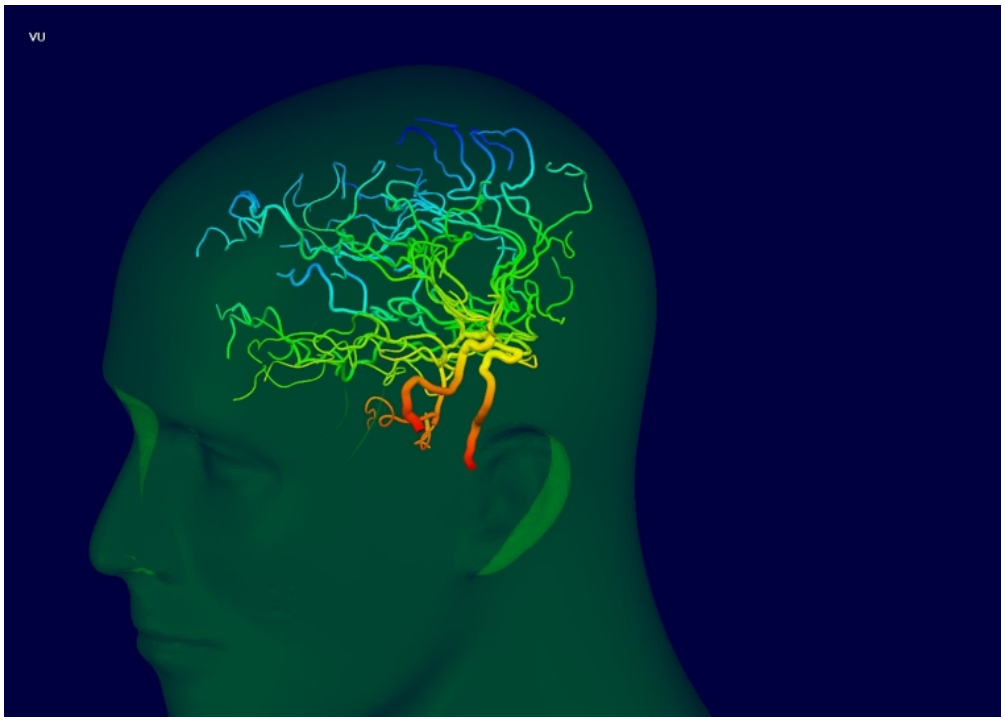
Simular

Representar algo, fingiendo o imitando lo que no es.

Simulaciones

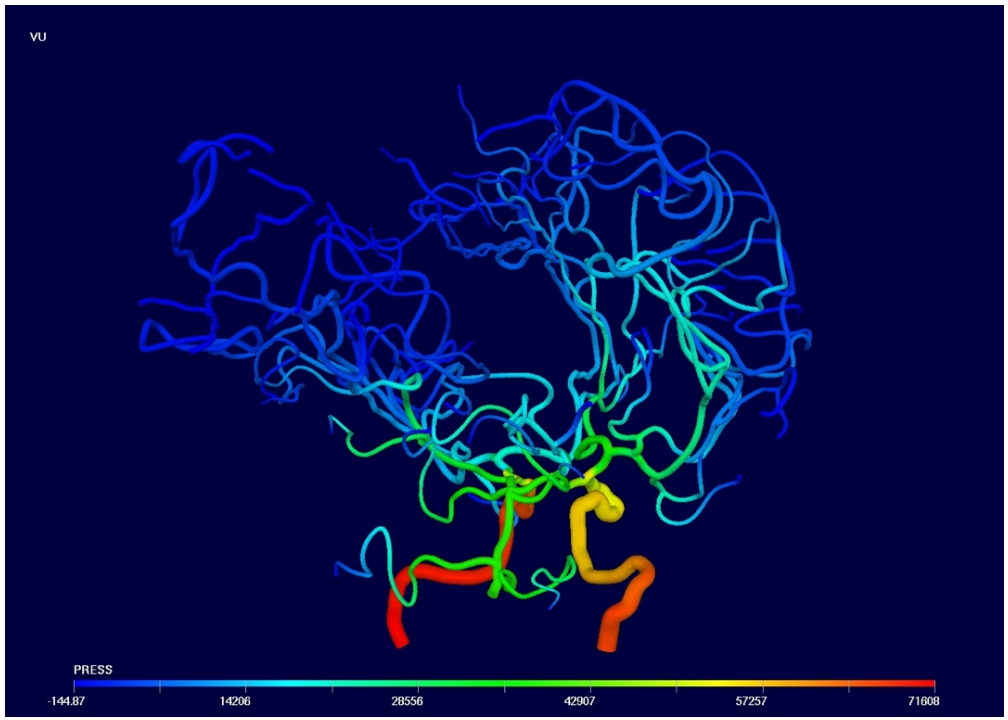


Arterial flow in the brain



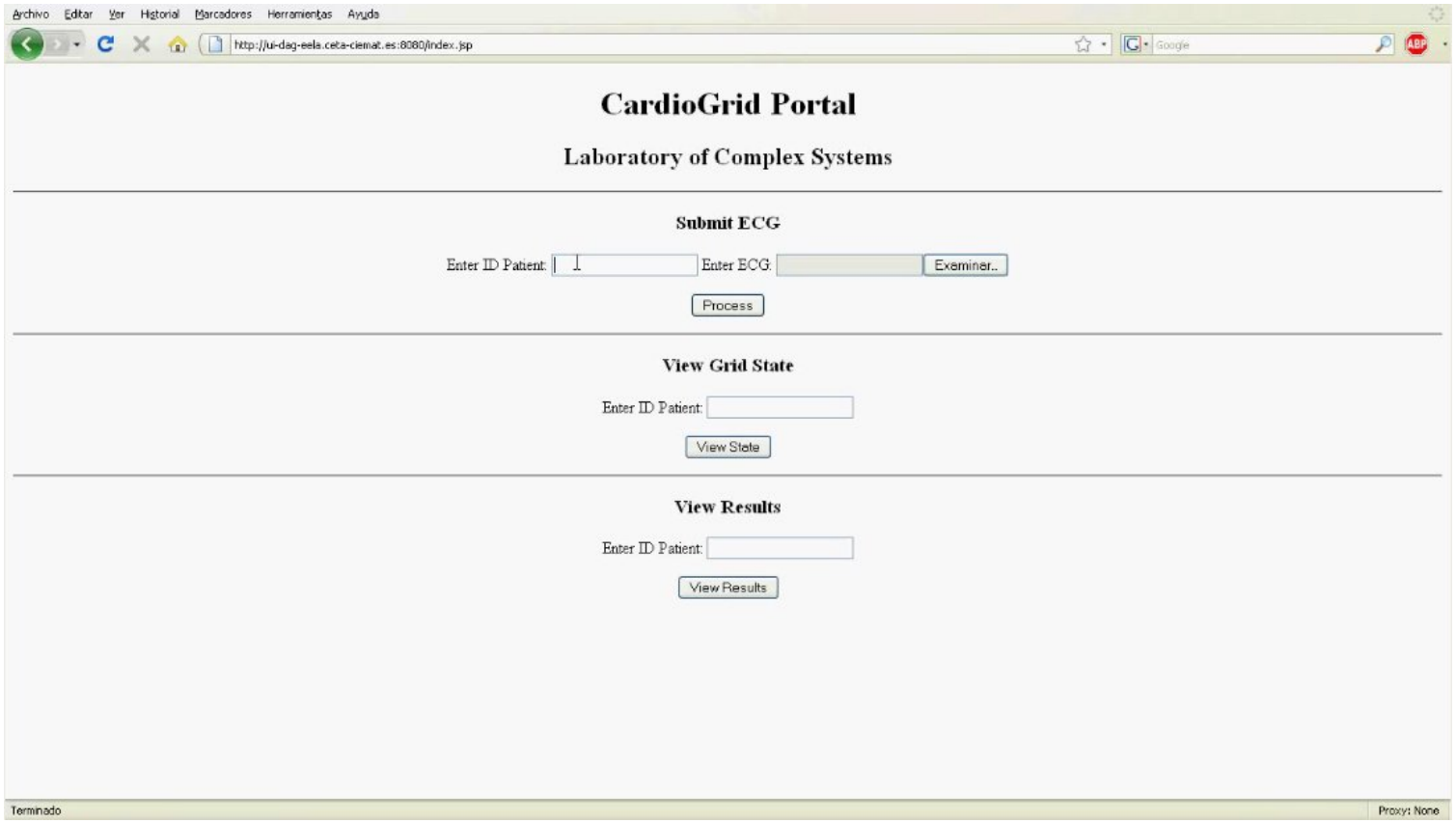
Agradecimiento a Mariano Vázquez
Centro Nacional de Supercomputación, Barcelona, España.

Arterial flow in the brain

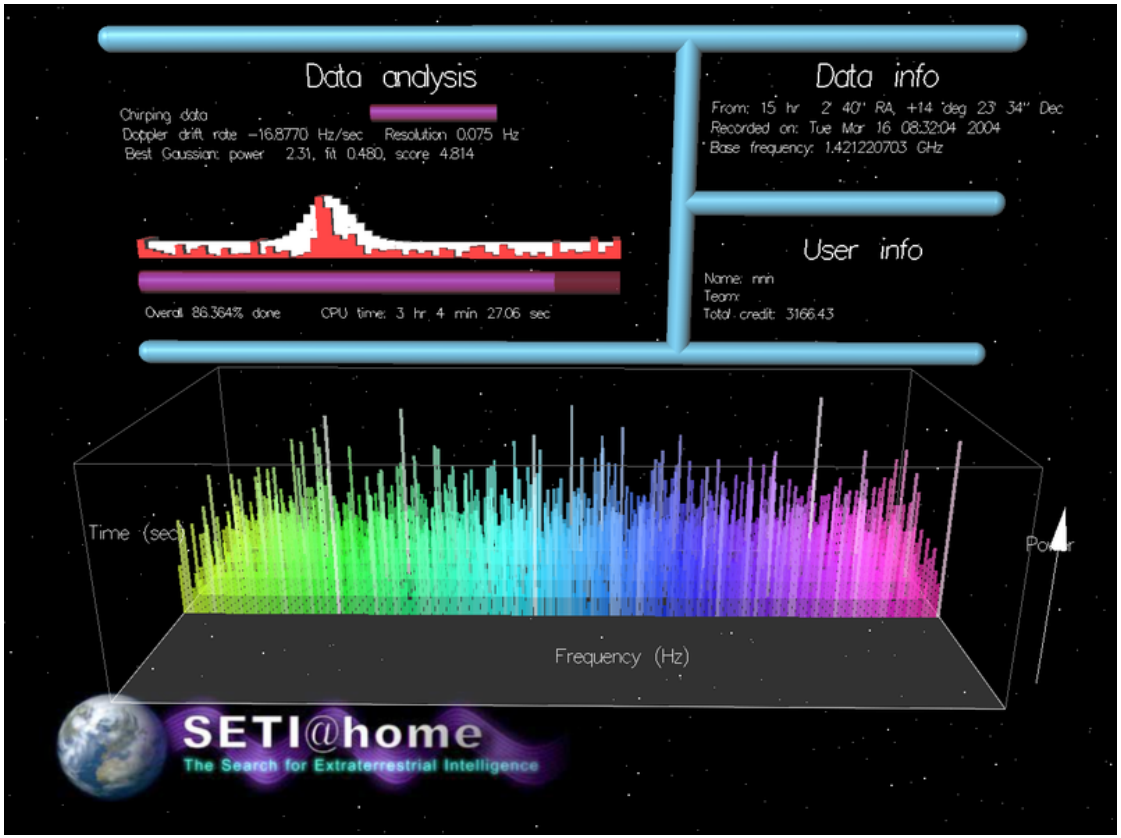


Agradecimiento a Mariano Vázquez
Centro Nacional de Supercomputación, Barcelona, España.

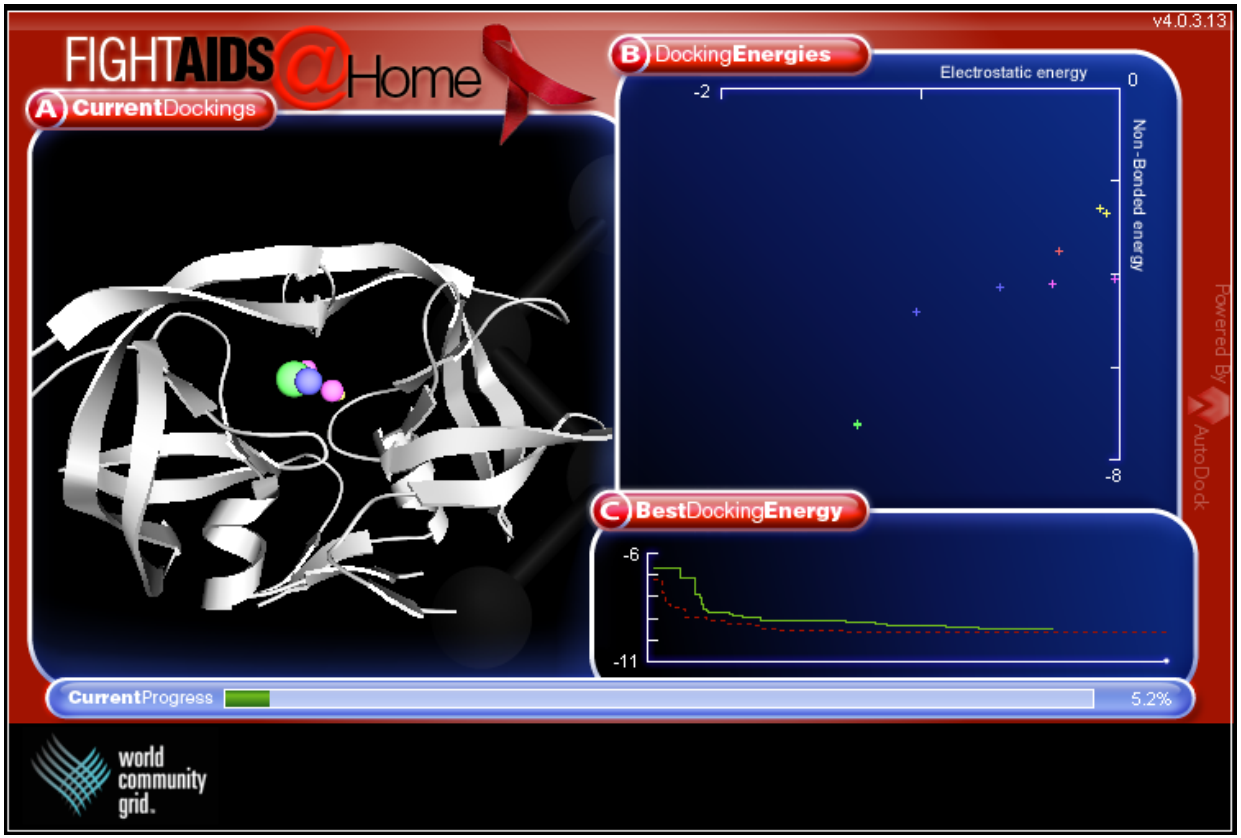
CardioGrid Portal



SETI@Home

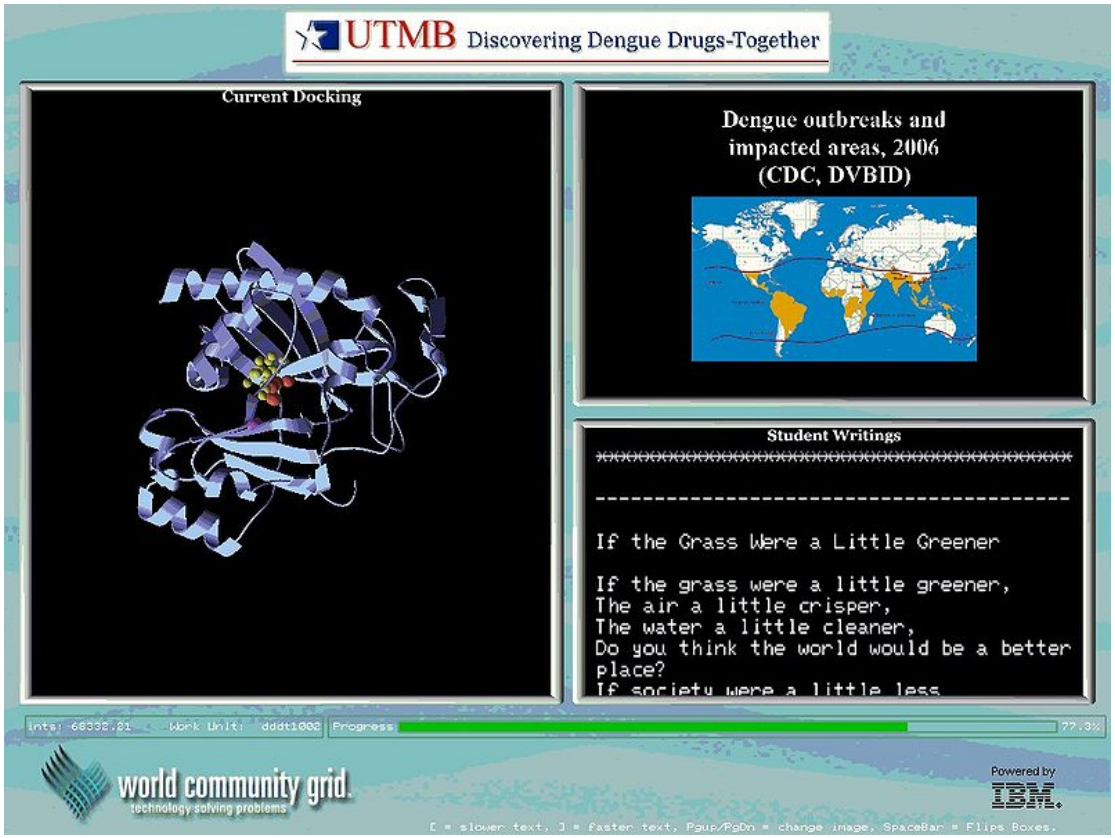

Data analysis
Chirping data
Doppler drift rate −16.8770 Hz/sec Resolution 0.075 Hz
Best Gaussian: power 2.31, fit 0.480, score 4.814
Overall 86.364% done
CPU time: 3 hr, 4 min, 27.06 sec
Data info
From: 15 hr 2' 40" RA, +14 deg 23' 34" Dec
Recorded on: Tue Mar 16 08:32:04 2004
Base frequency: 1.421220703 GHz
User info
Name: mm
Team:
Total credit: 3166.43
Time (sec)
Frequency (Hz)
Power
SETI@home
The Search for Extraterrestrial Intelligence

FightAids@Home

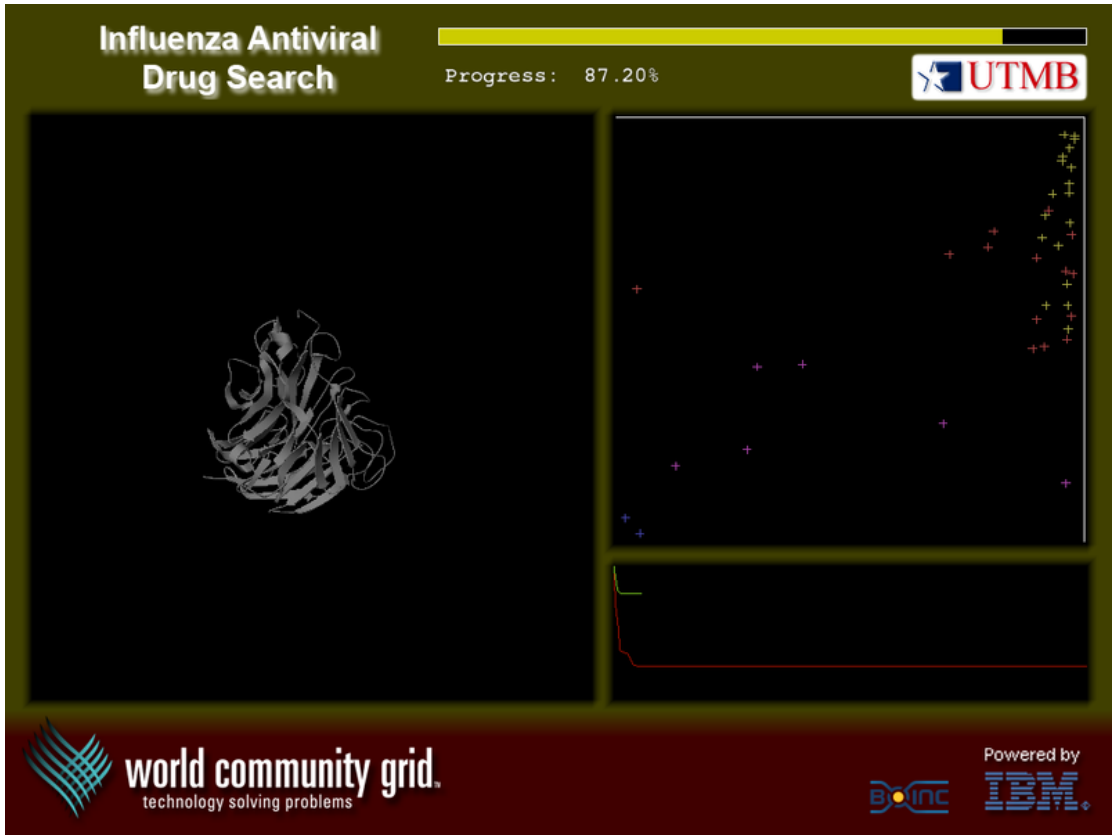


Help Fight Childhood Cancer

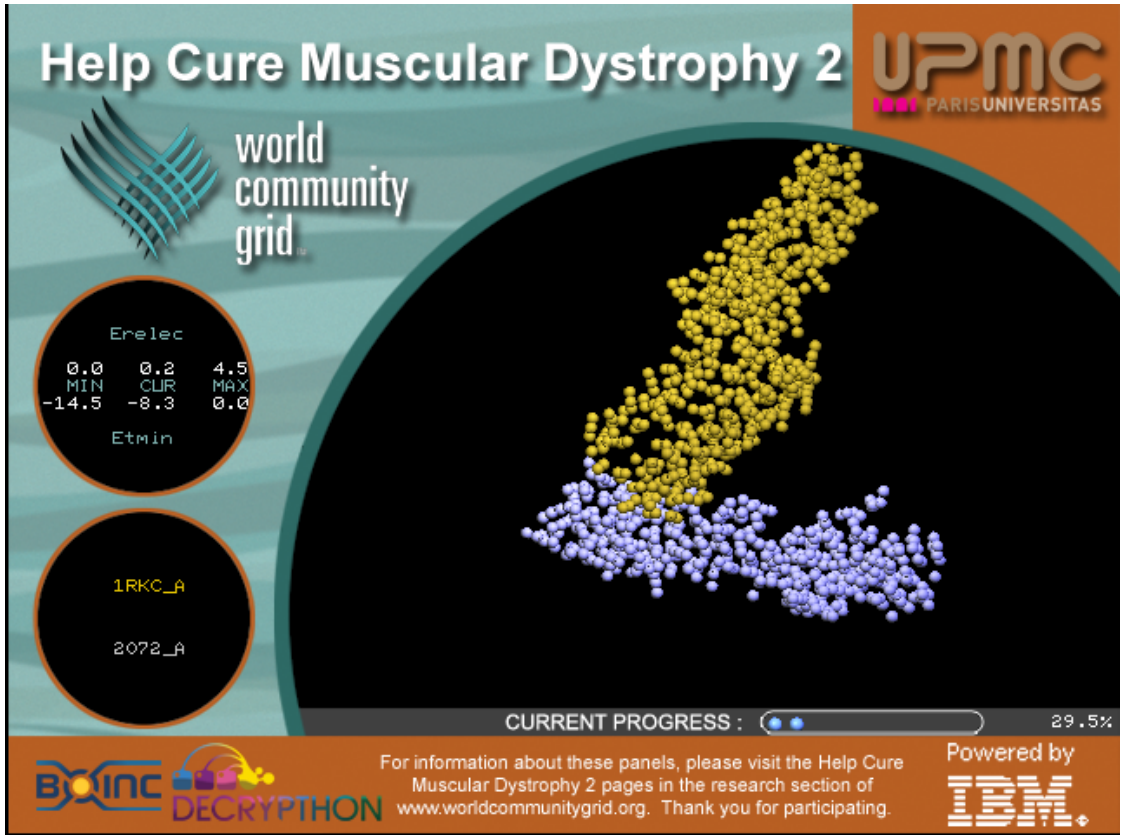
Discovering Dengue Drugs



Influenza Antiviral Drug Search



Help Cure Muscular Dystrophy



¿Preguntas?