A Short History of Computing

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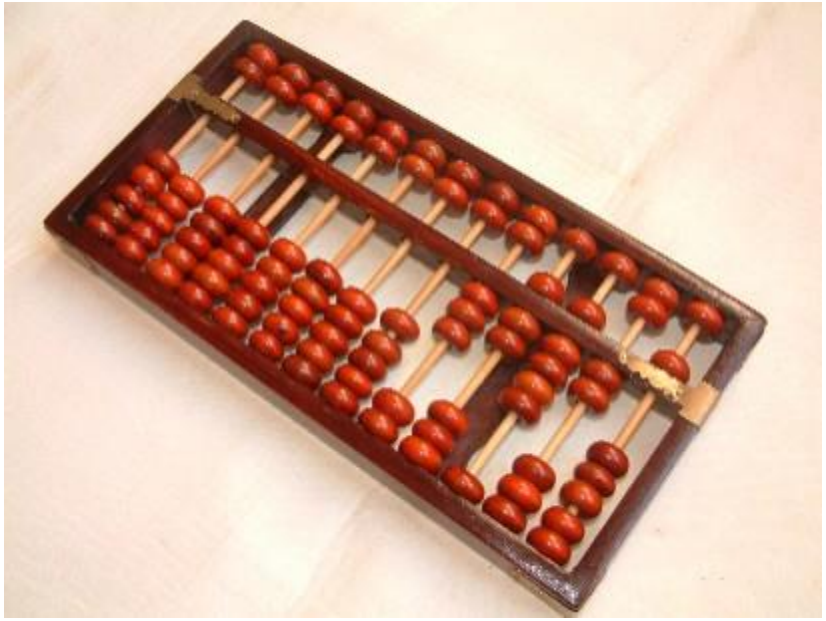
Fingers!

Digit: Latin for fingers

Kid Snippets: "Math Class" (Imagined by Kids)
http://www.youtube.com/watch?v=KdxEAt91D7k

Abacus



Asian abacus

Various forms date back to 2300 BC

Roman abacus

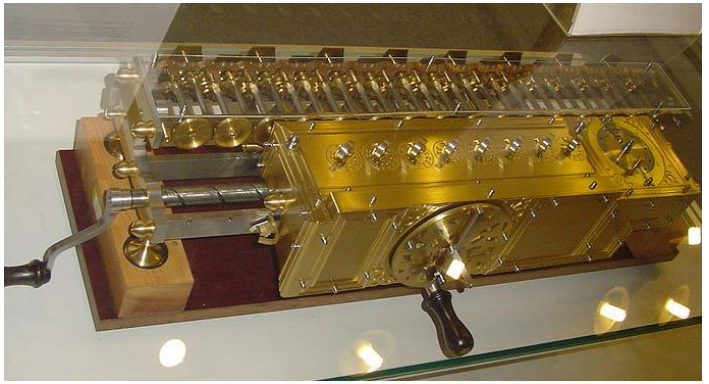
http://en.wikipedia.org/wiki/File:Boulier1.JPG
http://en.wikipedia.org/wiki/File:RomanAbacusRecon.jpg

1600s: Mechanical Calculating Machines

1610: Wilhelm Schickard's calculating machine

1642: Blaise Pascal's Pascaline

1694: Gottfried Leibniz's mechanical calculator



Photos courtesy of Wikipedia

1801: Jacquard Loom

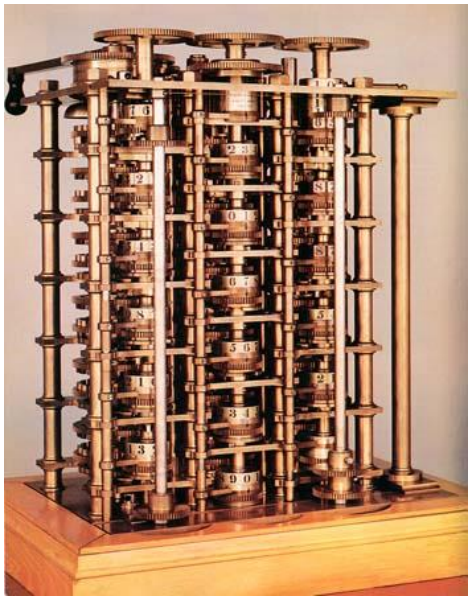
Joseph Jacquard invents loom that is “programmed” using punched cards

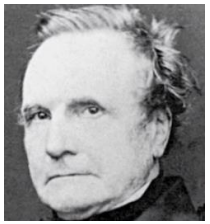
Machines replacing humans gives rise to fears: During the Industrial Revolution, *Luddites* broke into factories and mills and destroyed as many machines as possible

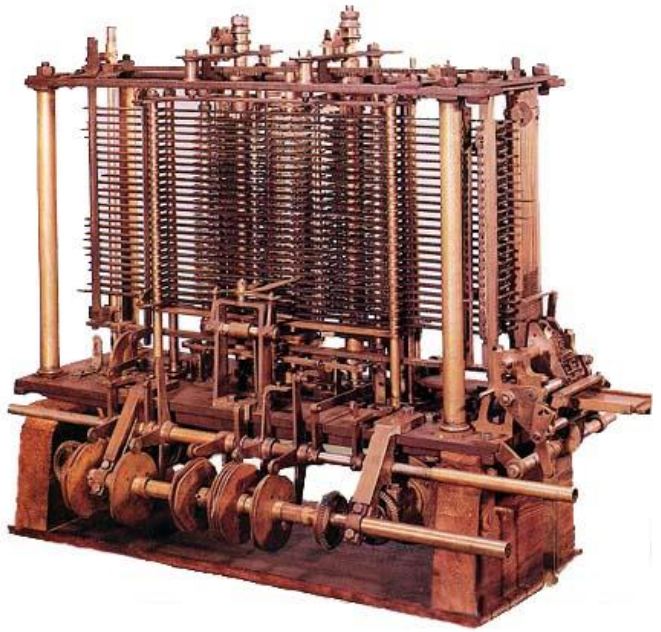
http://en.wikipedia.org/wiki/File:Jacquard.loom.full.view.jpg

1860s: Babbage's Engines

Charles Babbage invents (but never completely builds) two machines:







1) Difference Engine – To solve polynomial equations

2) Analytical Engine – General purpose machine, precursor to the computer

http://www.tcf.ua.edu/Classes/Jbutler/T389/ITHistoryOutline.htm
http://www.gprok.gr/blog/wp-content/uploads/2010/03/analytical_engine.jpg

Mid 1800s: Ada Lovelace

Ada Lovelace, daughter of the poet Lord Byron, worked with Babbage on the Analytical Engine

Programmed Analytical Engine using punched cards

Considered **first computer programmer**

Ada programming language named after her

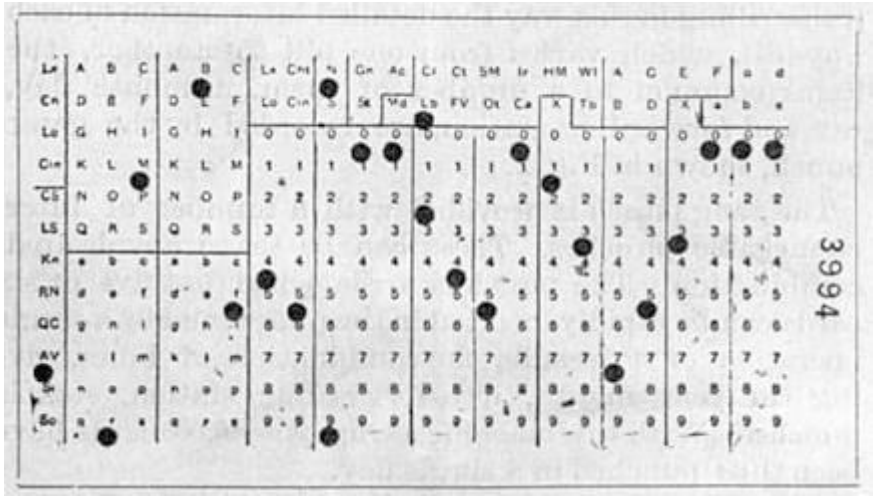
http://en.wikipedia.org/wiki/File:Ada_lovelace.jpg

1890: Hollerith's Census Machines

Herman Hollerith developed a machine for tabulating US census which used punched cards

1880 census took 8 years to tabulate
1890 census took 1 year

Hollerith's Tabulating Machine Company later became part of IBM

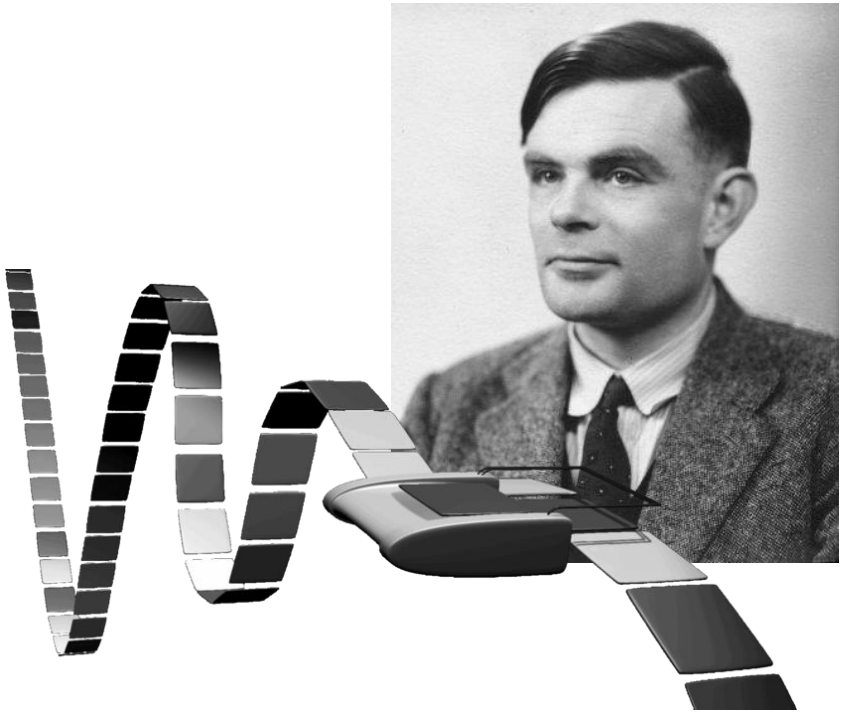


http://en.wikipedia.org/wiki/File:Hollerith_punched_card.jpg

1936: Turing Machine

Alan Turing, considered the **father of computer science**, described a theoretical device called the Turing machine or “a-machine”. Formalized the concepts of computation and algorithms

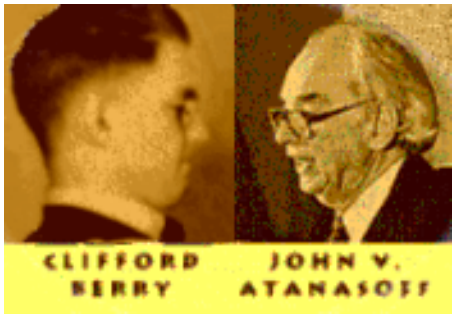
Turing later helped crack German military codes during World War II



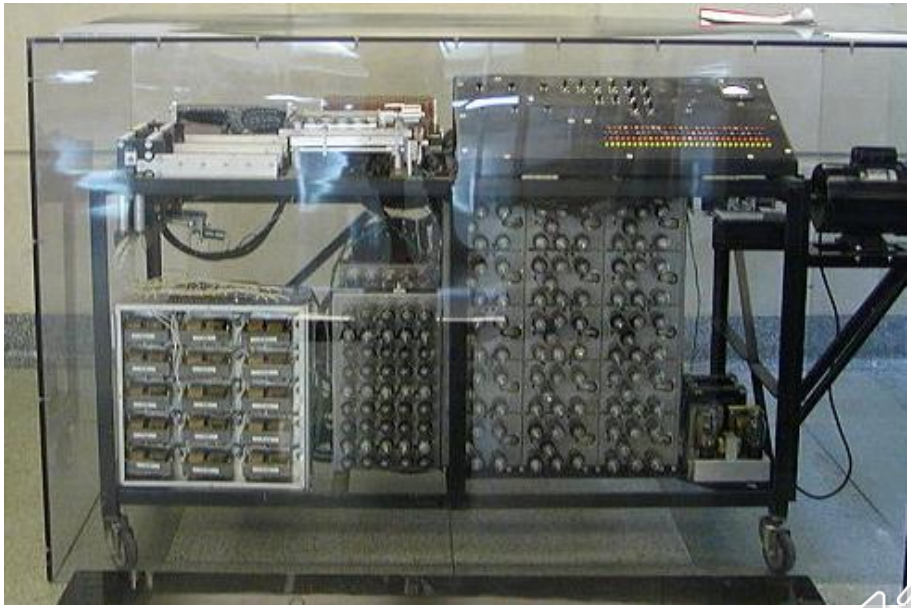
http://en.wikipedia.org/wiki/File:Alan_Turing_photo.jpg
http://en.wikipedia.org/wiki/File:Maquina.png

1939: Atanasoff-Berry Computer

John Atanasoff and **Clifford Berry** built the **ABC** at Iowa State which found solutions to systems of linear equations



Considered **first fully electronic digital computing device**, but was not programmable or fully functional



http://inventors.about.com/library/inventors/blatanasoff_berry.htm
http://en.wikipedia.org/wiki/File:Atanasoff-Berry_Computer_at_Durhum_Center.jpg

Infamous Quotes

“I think there is a world market for maybe five computers.”

-Thomas Watson Senior, Chairman of IBM, in 1943

This would remain true for 10 more years.

1944: Harvard Mark I

Howard Aiken designs Mark I, the **first operational general-purpose electro-mechanical computer**. Financed and built at IBM

On display at Harvard University

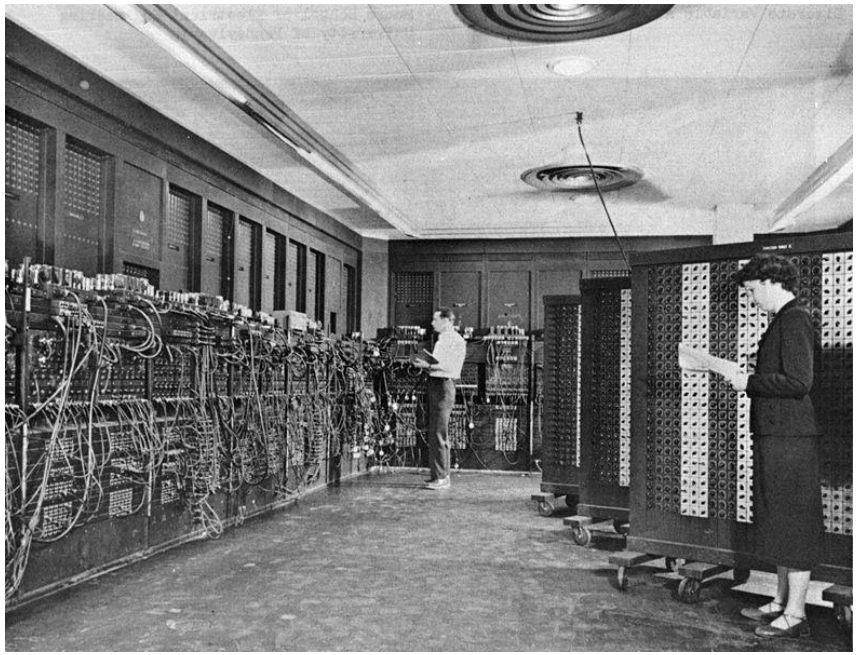
http://www.harding.edu/fmccown/photos/mark1_harvard.jpg

1946: ENIAC

John Mauchley and **Presper Eckert** complete the Electronic Numerical Integrator and Calculator (ENIAC) at Univ of Pennsylvania. Much based on Atanasoff's ABC

First general purpose, digital electronic computer

Could compute a ballistic firing trajectory in 20 sec vs. 30 min conventional way



Dimensions: 30 x 30 feet
Weight: 30 tons
Powered by 18,000 vacuum tubes

http://en.wikipedia.org/wiki/File:Eniac.jpg

1947: Computer Bug

Computer operators working with **Grace Murray Hopper** on Harvard's Mark II computer discover a "**bug**", a moth lodged in the components, and paste it into the computer's logbook which now resides in Smithsonian

http://en.wikipedia.org/wiki/File:H96566k.jpg

1947: Transistor

Bell Labs develops the **transistor** (right), an electronic switch made with a small piece of silicon with added impurities. It's smaller, uses less power, more reliable, and cheaper to produce than vacuum tubes (left)

http://en.wikipedia.org/wiki/File:Triody_var.jpg
http://en.wikipedia.org/wiki/File:Transistorer_(croped).jpg

1951: UNIVAC I

UNIVersal Automatic Computer I (UNIVAC I)**,** designed principally by Eckert and Mauchly, is the **first commercially successful computer**

Price: $1.25M - $1.5M

Units Produced: 46

Sweeney (left) and Eckert (center) demonstrate the U.S. Census Bureau's UNIVAC for CBS reporter Walter Cronkite (right).

http://en.wikipedia.org/wiki/File:UNIVAC_1_demo.jpg

1954: FORTRAN

John Backus and IBM develop **FORTRAN**, the first successful high-level programming language and compiler

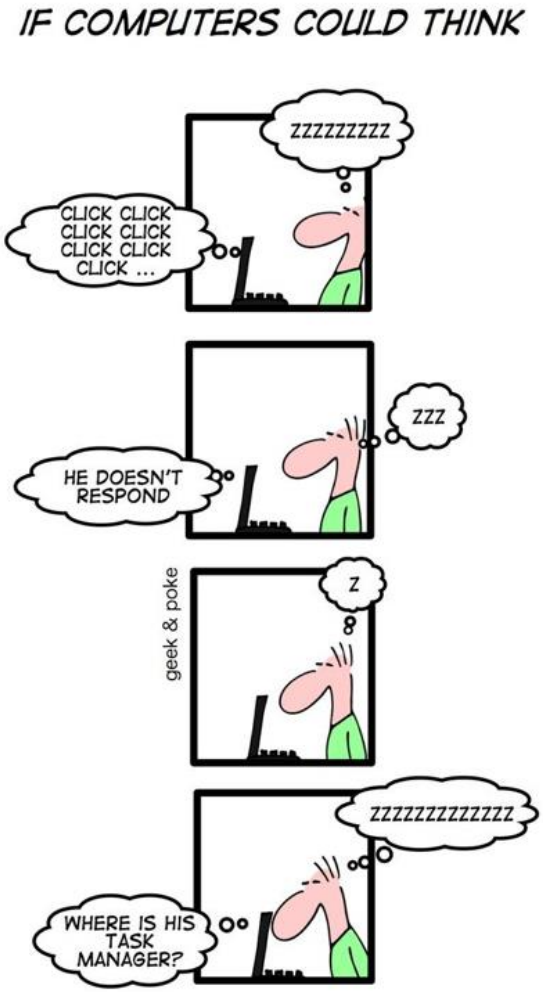
Designed for scientific problems and still widely used today

http://www.smh.com.au/news/technology/programming-language-pioneer-passes-away/2007/03/21/1174153117713.html

1955: Logic Theorist

The **first artificial intelligence program** written by Allen Newell, Herbert Simon and J. C. Shaw mimicked the problem solving skills of a human by proving math theorems

The term *artificial intelligence* (AI) would be coined in 1956 at the Dartmouth summer research project on artificial intelligence

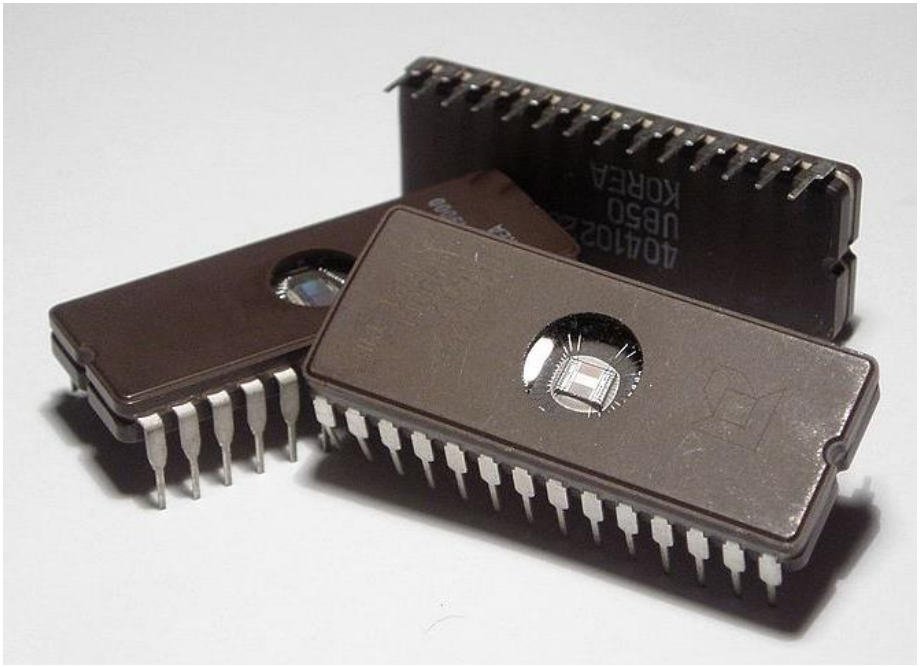


http://itmanagement.earthweb.com/cnews/article.php/3883606/Tech-Comics-If-Computers-Could-Think.htm

1958: Integrated Circuit

Integrated circuits (chips) independently co-invented by Jack Kilby of Texas Instruments and Robert Noyce of Fairchild Semiconductor

Transistors, and other electronic components all fabricated on single chip of silicon



Chip in DIP (Dual Inline Package)

http://en.wikipedia.org/wiki/File:Microchips.jpg

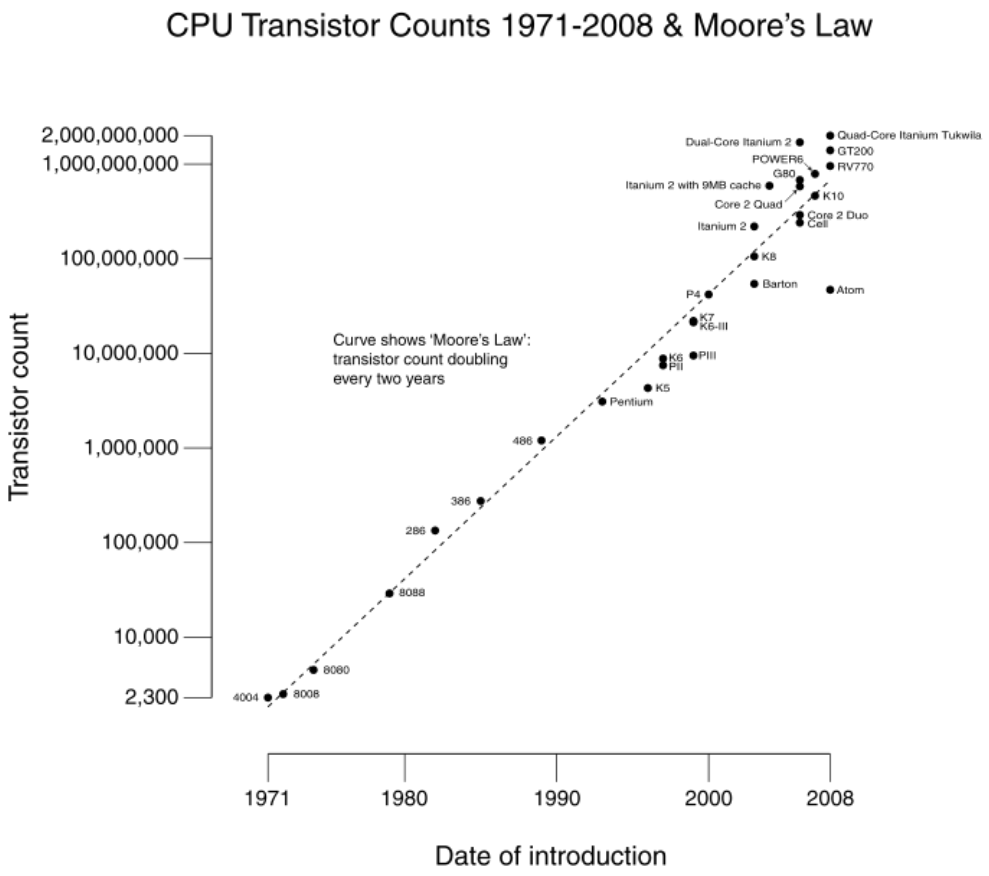
1962: Spacewar!

Spacewar! is the **first computer game**, written by Steve Russell (from MIT) and his small team for the PDP-1 computer

Spacewar! running on PDP-1

http://en.wikipedia.org/wiki/File:Spacewar!-PDP-1-20070512.jpg

1965: Moore's Law

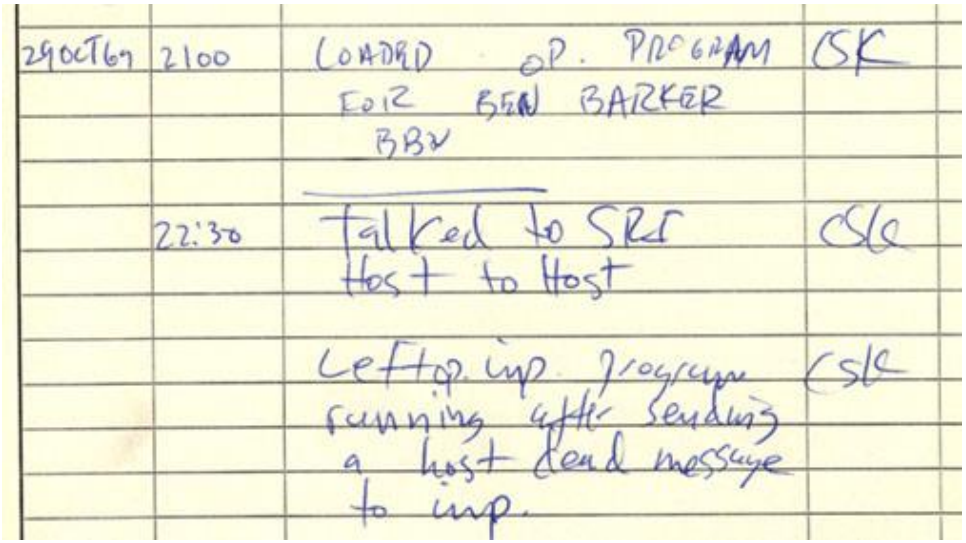


Gordon Moore, a co-founder of Intel, predicts that the number of transistors which can be placed on a single chip will double every year. The prediction was later modified to every 2 years, but it has held steady and was dubbed "**Moore's Law**" around 1970

http://en.wikipedia.org/wiki/File:Transistor_Count_and_Moore's_Law_-_2008.svg

1969: ARPANET

ARPANET, which eventually becomes the **Internet**, goes online with 4 nodes. Department of Defense sponsors ARPA (Advanced Research Projects Agency) to build a robust interconnected network of geographically distant computers



ARPANET IMP log showing Charles S. Kline sent first message ever on ARPANET on Oct 29, 1969

http://en.wikipedia.org/wiki/ARPANET

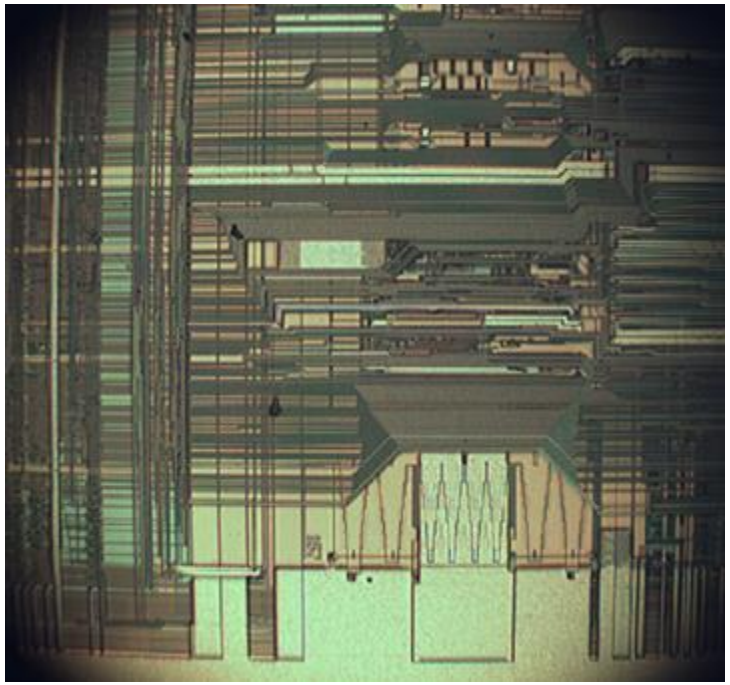
1970: UNIX

UNIX operating system developed at Bell Laboratories by Ken Thompson, Dennis Ritchie, Brian Kernighan, and others. Re-written in 1972 using the C programming language

Several variations of UNIX are popular today: Mac OS X, Linux, BSD

1971: Microprocessor

Microprocessor: entire CPU fits on a single chip. Three companies developed the microprocessor independently at the same time: Texas Instruments, Intel, and Garrett AiResearch



Look through microscope (200x) at Intel microprocessor

http://en.wikipedia.org/wiki/File:80486DX2_200x.png

1977: Apple II Personal Computer

Apple II, designed primarily by Steve Wozniak, was the **first highly successful, mass-produced personal computers** (PCs)

Price: $1300 for model with 4 KB RAM, $2600 for 48 KB RAM model

http://img258.imageshack.us/i/appleiipd2.jpg/

Infamous Quotes

“There is no reason anyone would want a computer in their home.”

-Ken Olson, President and Founder of Digital, in 1977

1978: Spam!

Gary Thuerk, an aggressive DEC marketer, attempted to send the **first commercial spam message** to every Arpanet address on the west coast (393 recipients)

DIGITAL WILL BE GIVING A PRODUCT PRESENTATION OF THE NEWEST MEMBERS OF THE DECSYSTEM-20 FAMILY; THE DECSYSTEM-2020, 2020T, 2060, AND 2060T. THE DECSYSTEM-20 FAMILY OF
<cut>
PRESENTATIONS WE WILL BE GIVING IN CALIFORNIA THIS MONTH. THE LOCATIONS WILL BE:
THURSDAY, MAY 11, 1978 - 2 PM
DUNFEY'S ROYAL COACH
SAN MATEO, CA
(4 MILES SOUTH OF S.F. AIRPORT AT BAYSHORE, RT 101 AND RT 92)

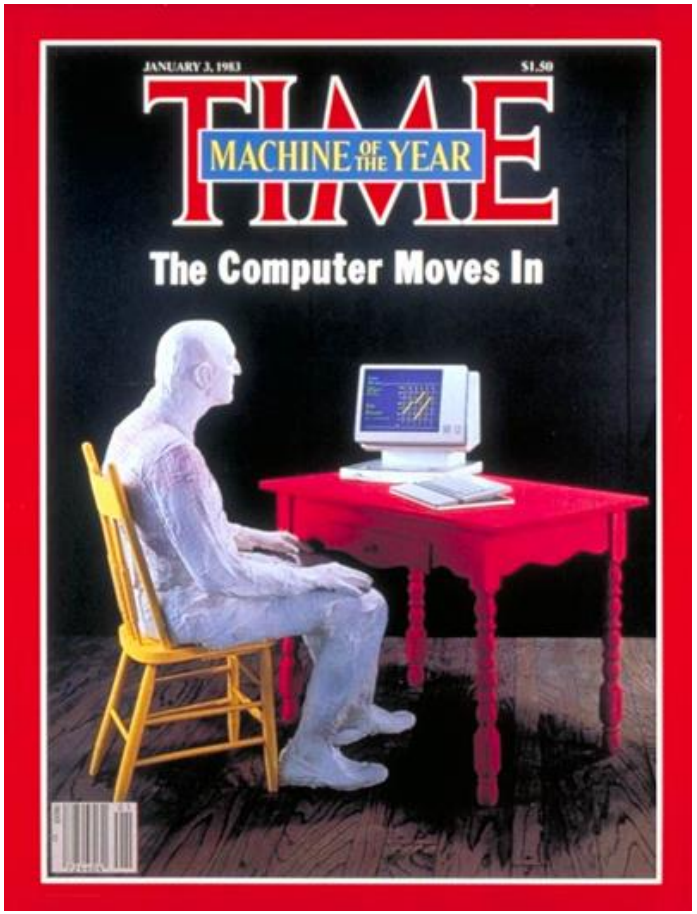
http://www.thocp.net/reference/internet/spam.htm

1981: IBM Personal Computer

IBM develops a PC with an **Intel microprocessor** and Microsoft's **DOS** operating system

Price started at $1,565

300,000 sold in 1981;
3,274,000 sold in 1982

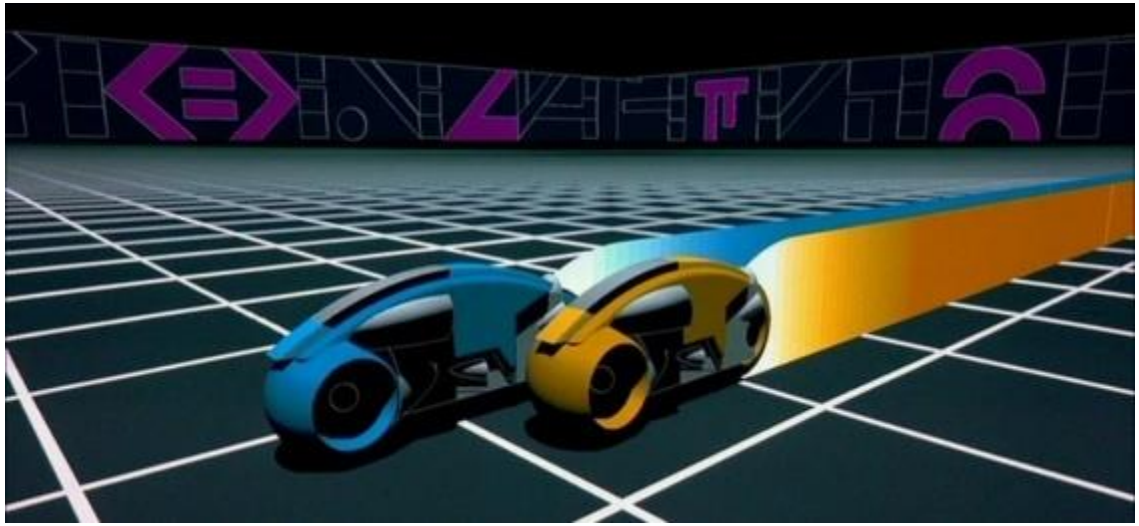


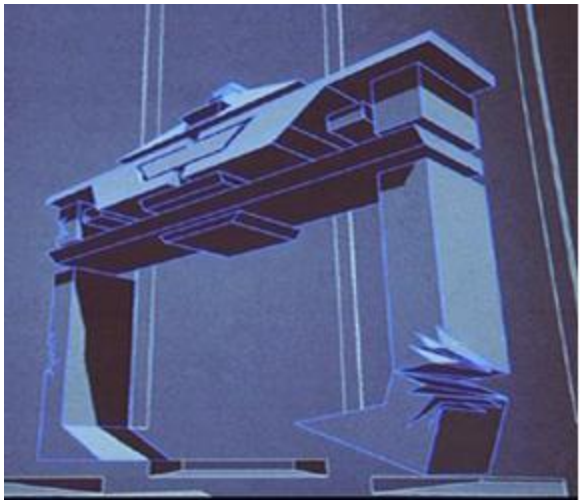
PC named "Machine of the Year" in 1982

http://www.time.com/time/covers/0,16641,19830103,00.html

1982: *Tron* Movie

Disney's *Tron*, a movie about the fictional world inside a computer, is the first major film to use extensive 3D **computer graphics**

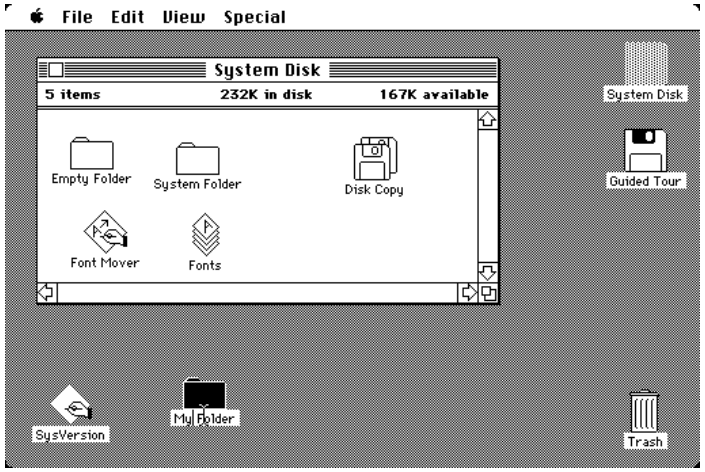




http://cutprintreview.com/reviews/4-stars/tron-1982-review/
http://deep-structure.blogspot.com/2007/06/tron.html

1984: Apple's Macintosh

Apple Computers (Steve Jobs and Steve Wozniak) developed the **Macintosh** which **popularized the graphical user interface (GUI**)



Apple's iconic **1984 commercial** promoting the Macintosh was the most expensive commercial ever produced at the time (about $1 million) and played only once during the Super Bowl

http://en.wikipedia.org/wiki/File:Apple_Macintosh_Desktop.png
http://www.youtube.com/watch?v=R706isyDrqI

1985-87: Therac-25

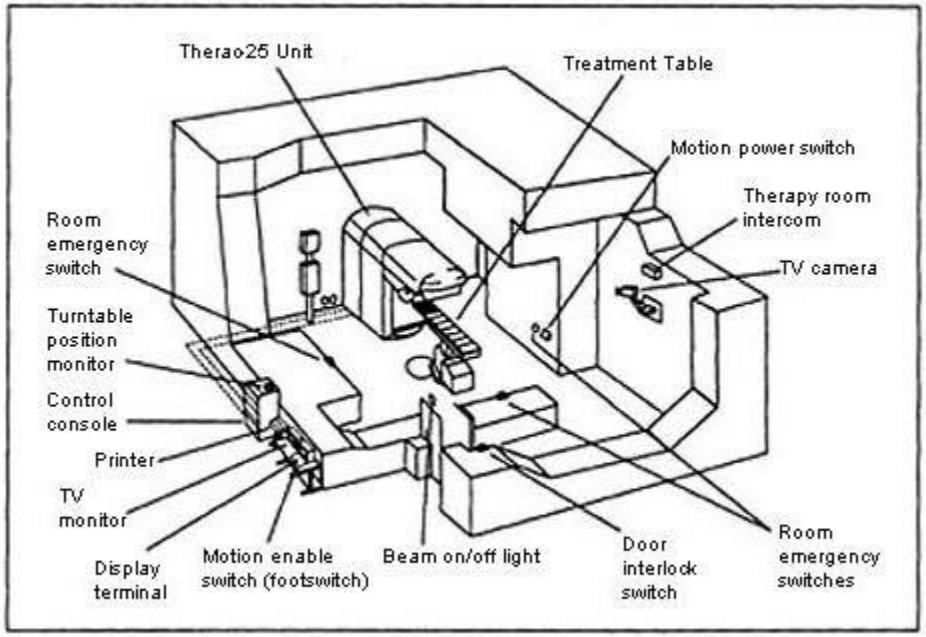


Figure 1. Typical Therac-25 facility

Therac-25 provided radiation therapy to patients with cancer

Several software bugs caused radiation overdoses leading to **five deaths** and other serious injuries

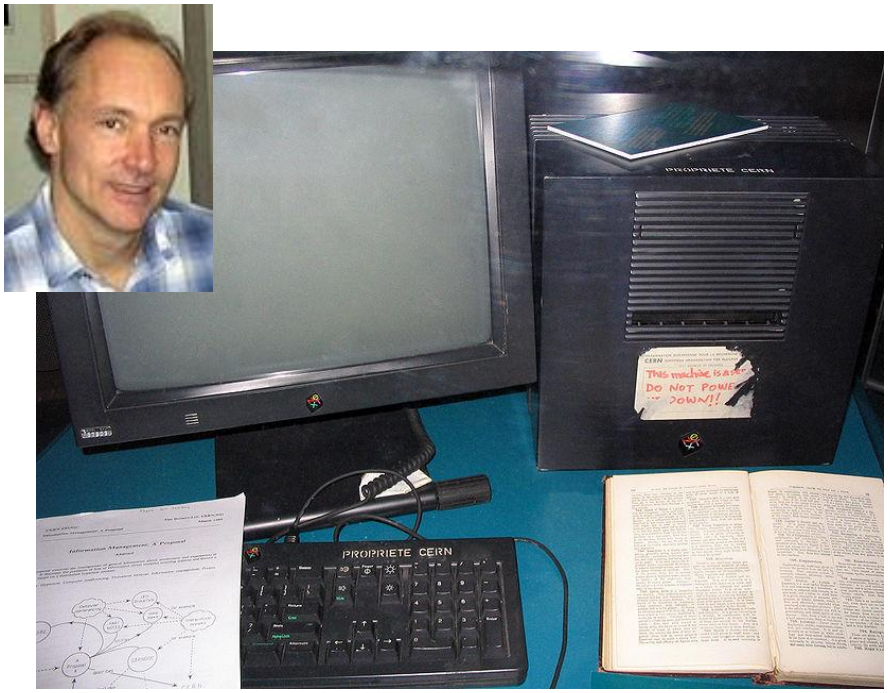
Highlights seriousness of writing software and difficulty in finding bugs

http://computingcases.org/case_materials/therac/analysis/SocioTechnical_Analysis.html

1990: World Wide Web

Tim Berners-Lee at CERN develops the WWW, a global web of interconnected documents, which runs on top of the Internet

The Web would become popular several years later when Netscape develops an easy-to-use web browser

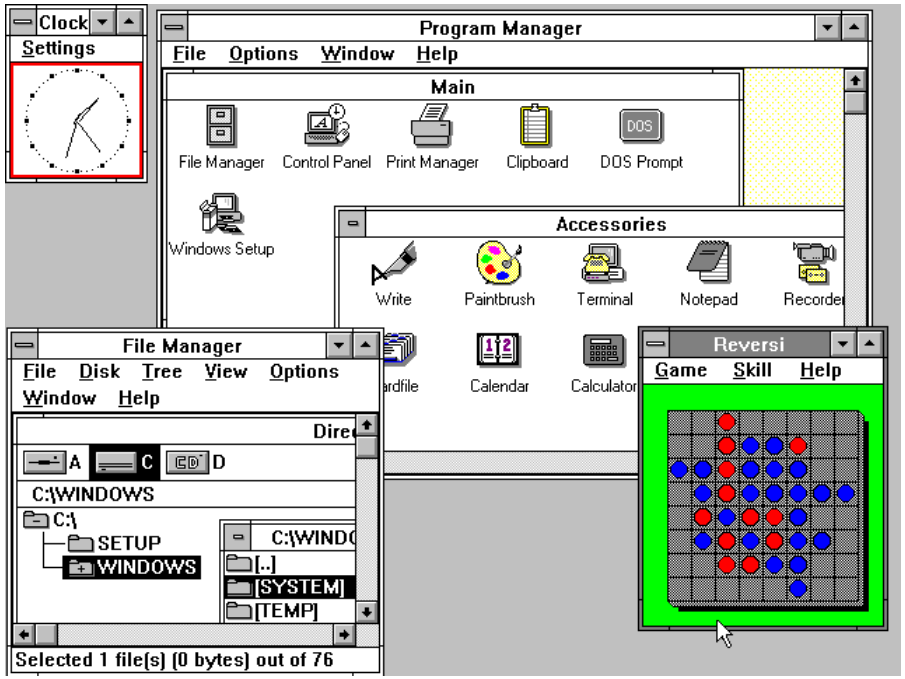


Berners-Lee's NeXT Computer which was the world's first web server

http://en.wikipedia.org/wiki/Tim_Berners-Lee

1992: Microsoft Windows

Microsoft (Bill Gates) releases **Windows 3.1**, the first version of Windows that was widely successful



http://en.wikipedia.org/wiki/File:Windows_3.0_workspace.png

1997: Deep Blue

IBM's **Deep Blue** computer defeats world chess champion Garry Kasparov in their second six-game showdown, becoming the first computer system to defeat a reigning world champion under standard chess tournament time controls

http://en.wikipedia.org/wiki/File:Deep_Blue.jpg
http://en.wikipedia.org/wiki/File:Kasparov-29.jpg

Infamous Quotes

“I wouldn’t put my company on the Internet.”

-Ken Olson, Chairman Modular Computer Systems, in 1996

1998: Google

Ph.D. students **Larry Page** and **Sergey Brin** drop out of Stanford to create **Google**, a Web search engine which uses their novel PageRank algorithm to order search engine results

Google originated from a misspelling of *googol* which is 1 followed by 100 zeros

Google's first server.
Photo taken in Gates Building lobby
at Stanford University

2003: Worms and Viruses

The most devastating **Internet worms** and **viruses** (SQL Slammer, Sobig.F, Blaster) cause millions of dollars in damages to individuals and companies

Worm: Self-replicating malware that spread through a network

Virus: Malware that infects a computer and often attaches to another executable file

200x: Online Social Networks

Online social networks (and sharing too much trivial information) first became popular in the early 2000s

2002: **Friendster** created by Jonathan Abrams and Peter Chin

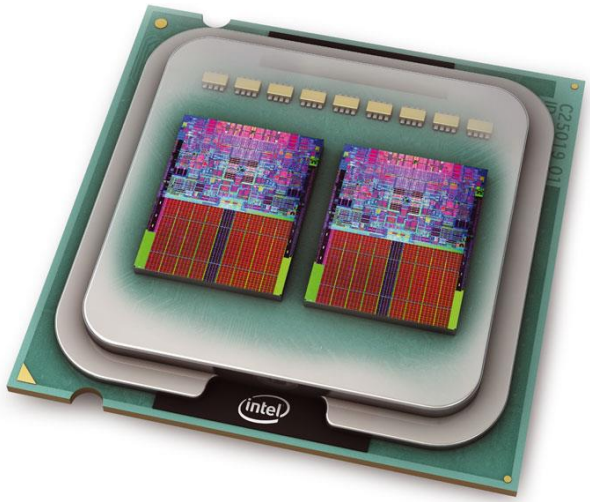
2003: **MySpace** created by eUniverse employees

2004: **Facebook** created by Mark Zuckerberg while a Harvard student

2006: **Twitter** created by Jack Dorsey

http://www.despair.com/somevedi.html

2005: Multi-core Processors



PCs with **dual core CPUs** hit the market. Multi-core CPUs have multiple processors on a single chip, and they allow more throughput with a lower processor speed, thus using less power

Places more emphasis in parallel programming

2007: iPhone

iPhone by Apple revolutionizes touch-screen interfaces for mobile devices

iPhone is Time Magazine's 2007 Invention of the Year

http://www.time.com/time/covers/0,16641,20071112,00.html

2010: iPad

iPad by Apple re-invigorates the tablet computing market

2011: IBM's Watson

IBM's Watson defeats veteran Jeopardy champs

http://latimesblogs.latimes.com/technology/2011/02/ibms-watson-on-jeopardy-the-machine-has-won.html

2012: Google's Driverless Car

Google is awarded the **first self-driven car license** in Nevada

http://www.reuters.com/article/2012/05/08/uk-usa-nevada-google-idUSLNE84701320120508
http://www.fox5vegas.com/story/18164996/dmv-rolls-out-red-license-plates-for-self-driving-cars

2013: Google Glass

Wearable computers get lots of buzz

http://news.cnet.com/8301-1023_3-57578072-93/google-releases-full-google-glass-explainer-video/

The Future?

- Smart clothing
- Brain-powered prosthesis
- Gesture recognition
- Quantum computers
- The Singularity?

http://healthinformatics.wikispaces.com/Smart+Clothes