

The History of Computers

1) The Generations of Computers

First Generation (1937 – 1946)

The first computers weighed many tons, and had thousands of vacuum tubes. They could only perform one task at a time, and they had no operating system. They used punched cards for the input and output of data. They generated a lot of heat and were extremely unreliable.

Examples:

- Mark I developed by Aiken in 1944.
- Electronic Numerical Integrator and Calculator (ENIAC) built in 1946.
- Electronic Discrete Variable Automatic Computer (EDVAC) built in 1946.

Second Generation (1947 – 1962)

These computers used transistors instead of vacuum tubes, which were smaller, cheaper and more reliable. In 1951, the first computer for commercial use was introduced to the public – the Universal Automatic Computer (UNIVAC). In 1953, the IBM 650 and 700 series of computers were developed. During this generation of computers, over 100 computer programming languages were developed, and computers had memory and operating systems. Storage media such as tapes and disks were used, and printers were used for output. Keyboards as input devices were also introduced. These computers still generated a lot of heat, so an air conditioner was needed for cooling.

Examples:

- Leprechaun, built by Bell Laboratories in 1947
- Transis, built by Philco, GE and RCA
- UNIVAC 1107, UNIVAC III
- RCA 501
- IBM 7030

Third Generation (1963 – 1975)

The invention of integrated circuits brought us the third generation of computers. With this invention, computers became smaller, cheaper, more powerful, more reliable and able to run many different programs at the same time. The integrated circuits were used for both data processing and storage. Computers became much smaller. Keyboards and mice were used for input, and monitors were used for output. Programming languages such as COBOL and FORTRAN were developed.

Examples:

- Honeywell 200
- IBM system 360
- UNIVAC 9000 series

Fourth Generation (1976 – 2022)

The sizes of computers became what we call “Personal Computers”, PCs. The cost of a computer became accessible to most people. The microprocessor was created by Intel – an integrated circuit which contained thousands of transistors. Microprocessors could multitask and were very fast.

Fifth Generation (2023 – future)

Computers based on artificial intelligence (AI) will invade all aspects of technology. Voice, face, finger and iris recognition technology will be ubiquitous. Virtual reality applications will also be widely available.

2) Important Milestones

1623: Wilhelm Schickard designed and constructed the first working mechanical calculator.

1673: Gottfried Leibniz demonstrated a digital mechanical calculator, called the “Stepped Reckoner”. He might be considered the first computer scientist.

1803: In France, Joseph Marie Jacquard invented a loom that uses punched wooden cards to automatically weave fabric designs.

<https://www.youtube.com/watch?v=MQzpLLhN0fY> (2 mins)

1820: Thomas de Colmar launched the mechanical calculator industry when he built his “arithmometer”, which was the first calculating machine to be used daily in an office environment (see image).

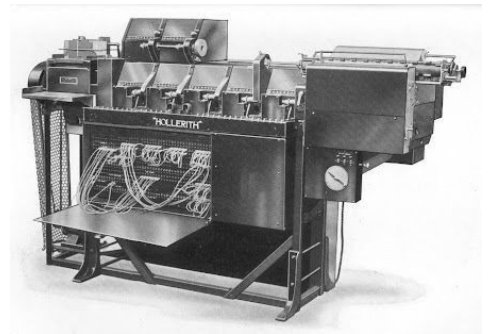
https://www.youtube.com/watch?v=s2T_158EsOw (4 mins)



1822: English mathematician Charles Babbage (known as the “Father of Computers”) designed a steam-driven calculating machine to compute tables of numbers. However, the project, funded by the English government, was a failure.

1843: Ada Lovelace wrote an algorithm to compute the Bernoulli numbers. It was considered to be the first computer program, and she to be the world’s first programmer.

1885: Herman Hollerith invented the “tabulator”, which used punched cards to process statistical information (see image). Eventually, his company became part of IBM.



1890: Herman Hollerith designed a punched card system to calculate the 1880 census, completing the task in just three years and saving the government \$5 million. He established a company that would ultimately become IBM.

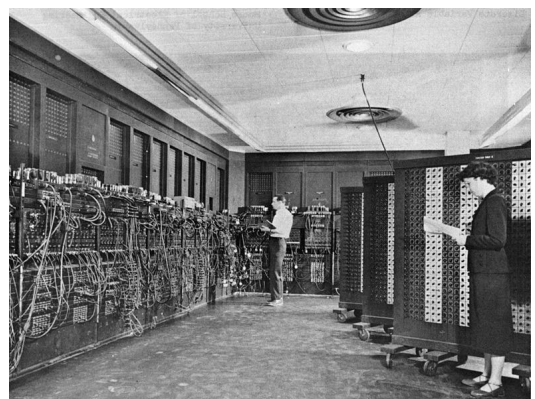
1936: Alan Turing presented the notion of a “universal machine”, later called the “Turing machine”, capable of computing anything that is computable. The modern computer was based on his ideas. The “Turing Test” was later developed to compare AI machines with humans.

1937: One hundred years after Babbage's impossible dream, Howard Aiken convinced IBM to develop his giant programmable calculator, the “ASCC/Harvard Mark I”, based on Babbage's Analytical Engine, which used punched cards and a central computing unit. When the machine was finished, some people called it "Babbage's dream come true".

1938: John Vincent Atanasoff, an American physicist and inventor, invented the first electronic digital computer.

1941: Atanasoff and Clifford Berry designed a machine that can store information (a memory).

1943-1944: Two University of Pennsylvania professors, John Mauchly and J. Presper Eckert, built the “Electronic Numerical Integrator and Calculator” (ENIAC). It was considered the grandfather of digital computers. It filled a large room (6m x 12m) and had 18,000 vacuum tubes (see image).



1946: Mauchly and Presper left the University of Pennsylvania and received funding from the Census Bureau to build the UNIVAC, the first commercial computer for business and government applications.

1947: William Shockley, John Bardeen and Walter Brattain of Bell Laboratories invented the transistor. They discovered how to make an electric switch with solid materials with no need for a vacuum tube.

1953: Grace Hopper developed a computer language, which was later called COBOL. Thomas Johnson Watson Jr., son of IBM CEO Thomas Johnson Watson Sr., designed the IBM 701 EDPM to help the United Nations keep information about Korea during the war.

1954: The FORTRAN programming language (FORmula TRANslation) was developed by a team of programmers at IBM led by John Backus.

1958: Jack Kilby and Robert Noyce created the first integrated circuit, also known as a "computer chip". Kilby was given the Nobel Prize in Physics in 2000 for his work.

1964: Douglas Engelbart made a prototype of the modern computer, with a mouse and a graphical user interface (GUI).

1969: A group of developers at Bell Labs produced UNIX, an operating system that addressed compatibility issues. Written in the C programming language, UNIX was portable across multiple platforms and became the operating system of choice among mainframes at large companies and governments. Due to its slow nature, it never became popular among home PC users.

1970: Intel developed the "Intel 1103", the first Dynamic Access Memory (DRAM) chip.

1971: Alan Shugart and a team of IBM engineers invented the "floppy disk," allowing data to be shared between computers.

1973: Robert Metcalfe, a member of the research staff for Xerox, developed the Ethernet for connecting multiple computers and other hardware.

1974 – 1977: A number of personal computers arrived on the market, including Scelbi & Mark-8 Altair, IBM 5100, Radio Shack's TRS-80 (image below, left) and the Commodore PET. Radio Shack sold thousands of their TRS-80 model, and it gave everybody the power to write computer programs.

1975: The Altair 8080 (image below, center) is described as the "world's first minicomputer to rival commercial models". Two computer nerds, Paul Allen and Bill Gates, offered to write software for the Altair, using the new "Beginners All Purpose Symbolic Instruction Code" (BASIC) language. After this success, the two friends created their own software company, Microsoft.

1976: Steve Jobs and Steve Wozniak started "Apple Computers" and built the "Apple I", the first personal computer with a single circuit board (image below, right).



1977: Jobs and Wozniak showed the “Apple II” (image) at the first West Coast Computer Fair. It had color graphics and an audio cassette drive for storage.



1978: VisiCalc, the first computerized spreadsheet program, was created.

1979: Word processing became a reality as the company “MicroPro International” produced the program “WordStar”.

1981: The first IBM personal computer, named "Acorn" (image below), was introduced. It used Microsoft's new MSDOS operating system. It had an Intel chip, two floppy disks and an optional color monitor.

1983: Apple's “Lisa” was the first personal computer with a graphical user interface (GUI). It also featured a dropdown menu and icons. It wasn’t successful, but it eventually evolved into the “Macintosh” (image below). The Gavilan SC was the first portable computer and the first to be marketed as a "laptop" (image below).

1985: Microsoft announced “Windows”. This was the company's response to Apple's graphical user interface (GUI). Commodore unveiled the Amiga 1000, which featured advanced audio and video capabilities (image below).

1985: The first “dot-com” domain name was registered on March 15th – the Symbolics Computer Company, a small Massachusetts computer manufacturer, registered the name “symbolics.com”. More than two years later, only 100 “dot-coms” were registered.

1986: Compaq created the “Deskpro 386”. Its 32-bit architecture provided speeds comparable to mainframes (image below).



1990: Tim Berners-Lee, a researcher at CERN, developed "Hyper Text Markup Language" (HTML), which was later used to create the "World Wide Web".

1993: The Pentium microprocessor advanced the use of graphics and music on PCs.

1994: PCs became gaming machines. Games such as "Command & Conquer", "Alone in the Dark", "Theme Park", "Magic Carpet", "Descent" and "Little Big Adventure" became big hits.

1996: Sergey Brin and Larry Page developed the Google search engine at Stanford University.

1997: Apple sued Microsoft, alleging that Microsoft copied the "look and feel" of its operating system. Microsoft was ordered to pay \$150 million to Apple.

1999: The term "Wi-Fi" became common and everybody could connect to the Internet without wires.

2001: Apple unveiled the "Mac OS X" operating system, which provided protected memory architecture and pre-emptive multi-tasking, among other benefits. Microsoft released "Windows XP", which had a significantly redesigned GUI.

2003: The first 64-bit processor, AMD's Athlon 64, became available.

2004: Mozilla's Firefox 1.0 challenged Microsoft's Internet Explorer, the dominant Web browser. Facebook, a social networking site, was launched.

2005: YouTube, a video sharing service, was founded. Google acquired Android, a Linux-based mobile phone operating system.

2006: Apple introduced the MacBook Pro, its first Intel-based, dual-core mobile computer, as well as an Intel-based iMac. Nintendo's Wii game console hit the market.

2007: Apple launched the first iPhone.

2010: Apple launched the iPad, changing the way that users viewed media and accessed the internet.

2011: Google released the Chromebook, a laptop that used the Google Chrome OS.

2015: Apple released the Apple Watch. Microsoft released Windows 10.

2017: Much money was invested in quantum computing.

2023: Companies such as Google, Amazon, Microsoft, IBM and Facebook develop AI programs, based on GPT (Generative Pre-Trained) algorithms.

Today: Most organizations use AI, and AI tools are embedded in daily workflows, boosting productivity and enabling automation across industries. Adoption among workers is rising rapidly, with about 50% using AI at work. However, many challenges exist, and an uncertain economic impact means that AI's full potential is still unknown.