Computers and Technology

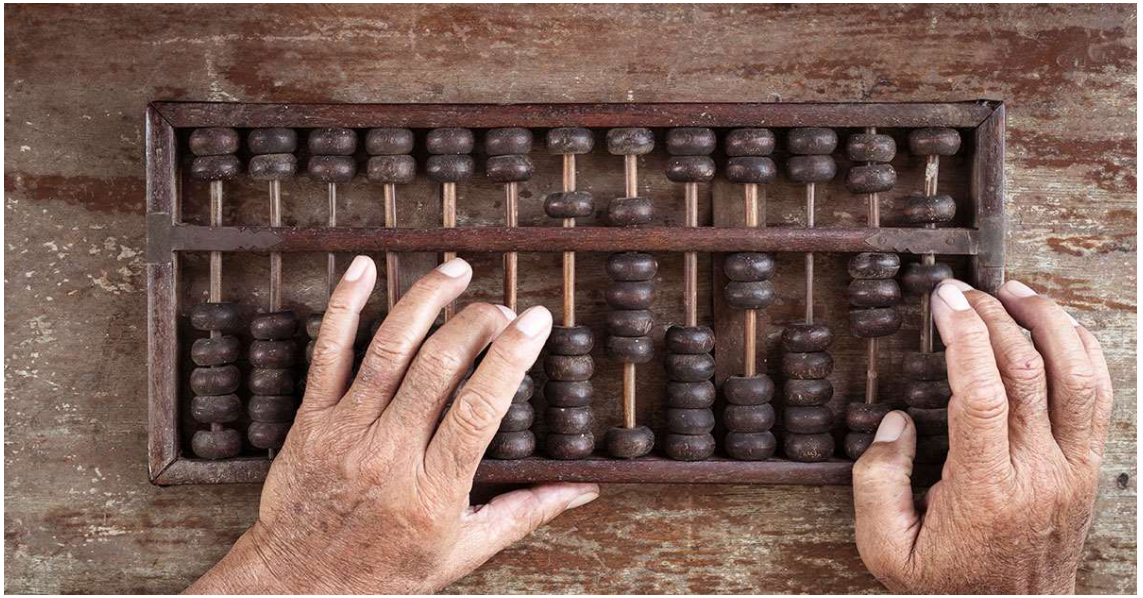
History and Components

Computer

- Before electronic binary computers were created, a “computer” was a job title – those people who calculated and computed numerical equations were computers.
- There were tools to help do the math throughout history.

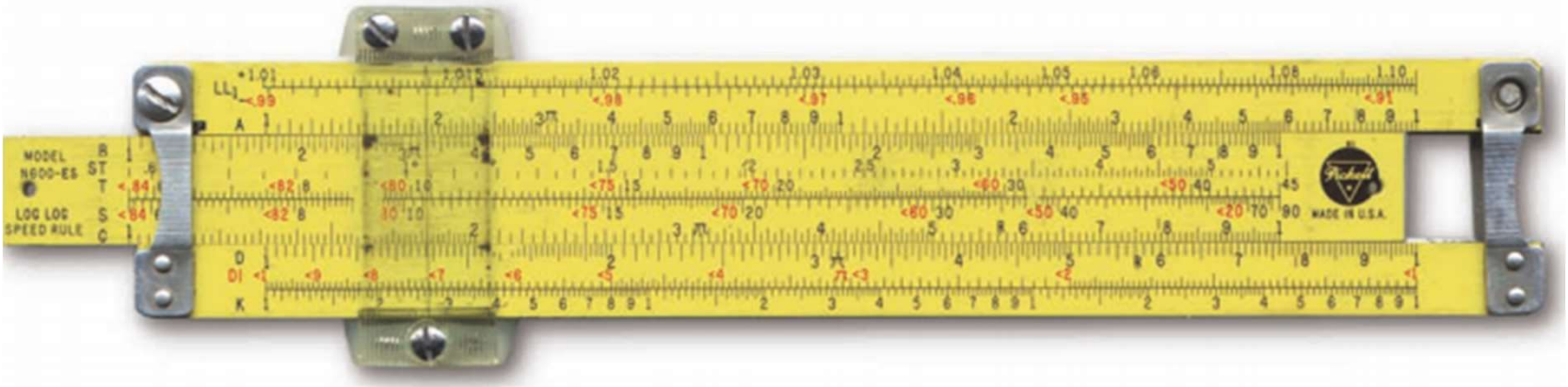
1100 BCE - First counting device

- The abacus, dating back to at least 1100 BCE, and still in use today, was the first device to aid in counting. It can be used to add, subtract, multiply and divide.



1632 - Slide Rule

- Slide rules greatly sped up the calculations used in many fields, especially engineering.
- Slide rules were used in the NASA moon missions as back-up calculators



PICKETT N600-ES slide rule traveled with the NASA Apollo spacecraft to the moon as a backup calculator.

1644 - Arithmetic Machine

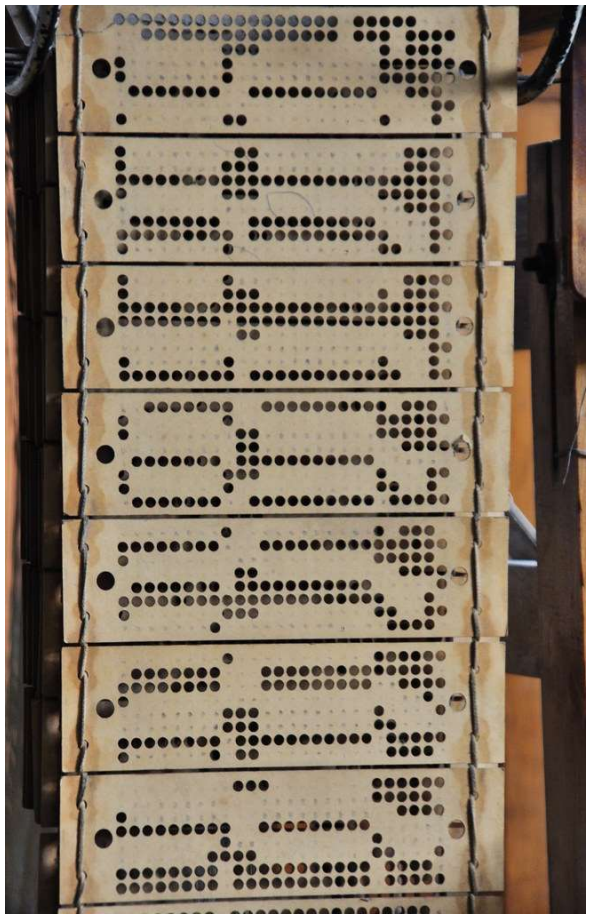
- French mathematician Blaise Pascal created the Arithmetic Machine, or Pascaline. It used dials to perform addition and subtraction.

1820 - Arithmometer

- Charles de Colmar created the first mass-produced calculating device.
- It was extremely popular for 90 years.
- It was large, covered a desktop.

1805 – Jacquard Loom

- Joseph-Marie Jacquard created a device to attach to his looms to create patterns in the fabric.
- The patterns were punched into cards, and the cards were fed into the loom, controlling the threads during weaving.



1805 – Jacquard Loom

- The use of decks of punched cards, sewn together in a long stack, allowed for very accurate results during weaving.
- It also meant the patterns could be altered easily with different cards.
- The punched cards were a “program” that could be fed into the machine, an idea that was extremely important in the development of computers.

1830s - The Difference Engine

- Charles Babbage proposed a machine that could perform many multiple calculations, with 20- to 30-digit results.
- The machine was never completed, due to escalating complexities that could not be solved with the engineering tools of the time, and lack of funding.
- It had storage, to hold data temporarily for later processing.

1830s – Analytical Engine

- While working on the Difference Engine, Charles Babbage found ways to improve it.
- He came up with plans for a general-purpose computing machine, able to perform any calculation.
- It had a calculating unit, storage, a reader for input, and a printer for output – the basics of any modern computer.
- The reader used punch cards, using the technology of Jacquard looms.
- It was also never completed, due to funding and technical difficulties.

1890 – Tabulating Machine

- The 1880 census had taken 8 years to process; estimates said it would take 13 years to process the 1890 census, which was unacceptable.
- Herman Hollerith had observed punched holes to store data about railway ticket holders, such as gender and age.
- Hollerith created a tabulating machine to read data punched into cards and process that data to come up with the census numbers.

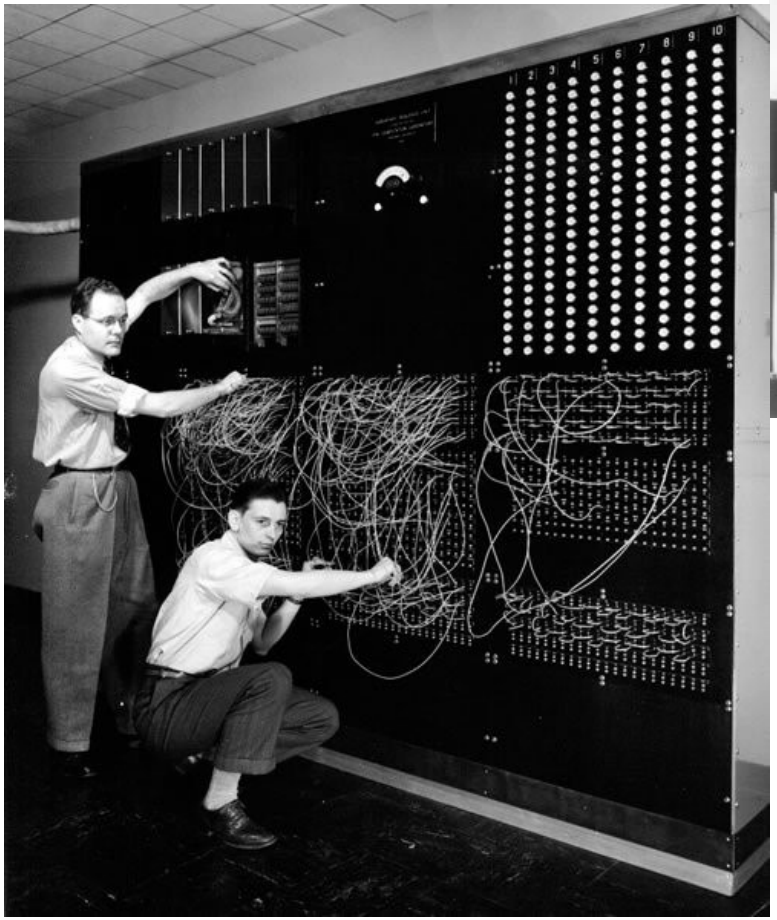
1890 – Tabulating Machine

- Data written by census takers was punched into cards, and processed with the tabulating machine.
- Hollerith's company later became part of IBM.

Digital Devices

- Digital devices deal with two states – on or off, true or false, zero or one.
- Electricity and electrical switches or relays have only 2 states – electricity is present (on) or it is absent (off).
- Binary numbers are 0 and 1, used to specify the two states, in all computers.
- In the early 1900s, the use of electricity and digital states were crucial in the development of computers.

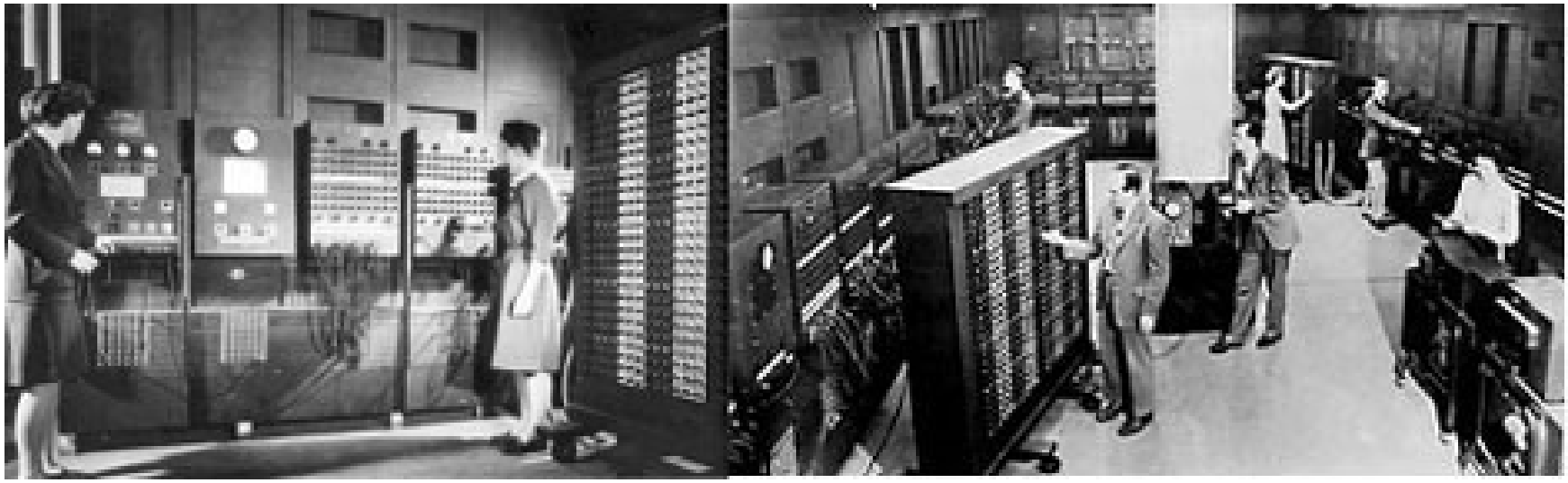
1937 – First Electronic Digital Computer



Atanasoff-Berry Computer or ABC

Look at its size. It uses vacuum tubes, punched cards, and binary (digital) numbers.

1943 – ENIAC



The physical size of this machine is enormous compared to the computers we have today. According to Wikipedia, the ENIAC "contained **17,468 vacuum tubes, 7,200 crystal diodes, 1,500 relays, 70,000 resistors, 10,000 capacitors and around 5 million hand-soldered joints. It weighed 30 short tons (27 t), was roughly 8.5 feet by 3 feet by 80 feet (2.6 m by 0.9 m by 26 m), took up 680 square feet (63 m²), and consumed 150 kW of power.** Input was possible from an IBM card reader, while an IBM card punch was used for output."

1951 – Univac-1

First commercial computer

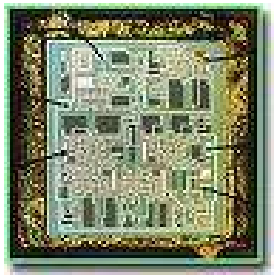
- Used 5,200 vacuum tubes
- Weighed 29,000 pounds (13 metric tons)
- Consumed 125 kW electricity
- 1,905 operations per second running on a 2.25 MHz clock
- 25 feet by 50 feet in length
- Internal storage capacity of 1,000 words or 12,000 characters.

Big Changes

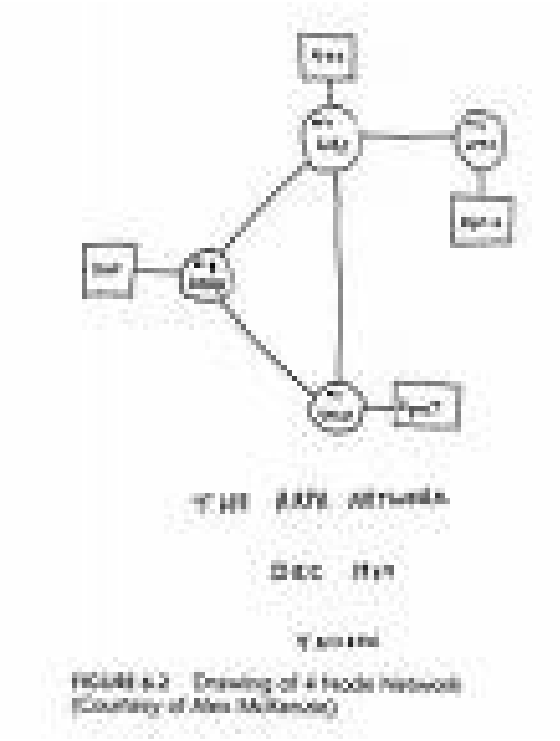
- Programs in earliest computers were hard-wired – switches and cables were arranged to accomplish specific purposes with data in memory
- John von Neumann spelled out requirements for a general purpose electronic computer
- Computers with von Neumann architecture store data AND program in internal memory – both are easily changed

1958 – Miniaturization

Jack Kilby of Texas Instruments invented integrated circuits



1969 – ARPANET



First networked computers – UCLA, UC-Santa Barbara, Stanford, University of Utah

1976 – First Apple Computer

These computers were small enough to sit on the dining room table, making it accessible at home.

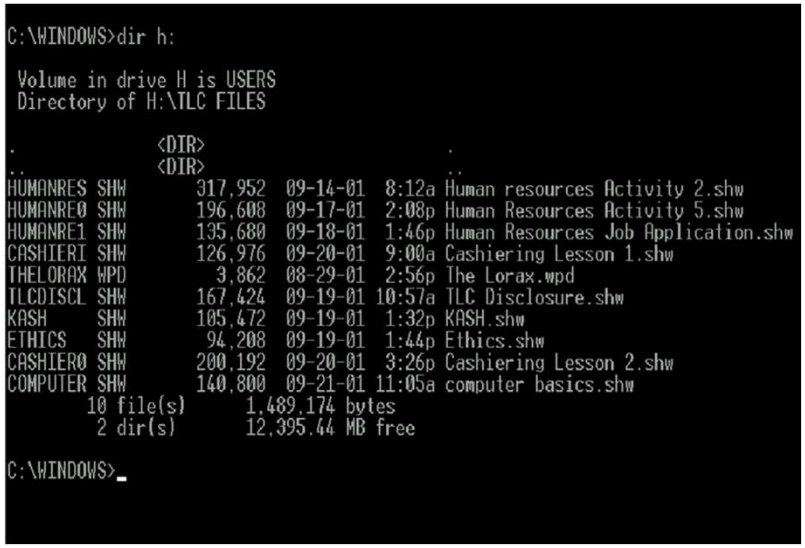
The mouse and graphical user interface made it easier to use, didn't require a college degree to use.

The software was fixed, not changeable.

1980 – DOS

DOS or Disk Operating System is software that runs a computer. It was available on diskettes, easily loaded to any computer, easily upgraded and changed.

It was written so that anyone could program a computer with it, didn't require a college degree.



1981 – First IBM PC

IBM licensed DOS and created small computers – personal computers – that could be programmed and upgraded easily and in a home environment.

It was significantly faster than other early PC systems, had about 10 times the memory of other systems.

It became the world's most popular PC, and its microprocessor (Intel 8088) and its operating system (MS-DOS) became industry standards.

1984 – Cell Phones Available to Public

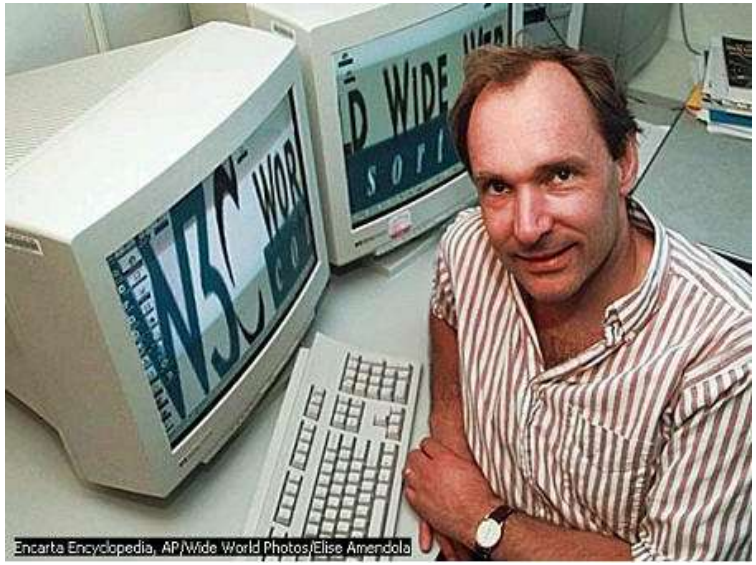
Dr. Martin Cooper, inventor of first cellular phone. He was inspired by the *Star Trek* communicator.

The first cell phone, “the Brick”, weighed almost 2 pounds.

1991 – World Wide Web

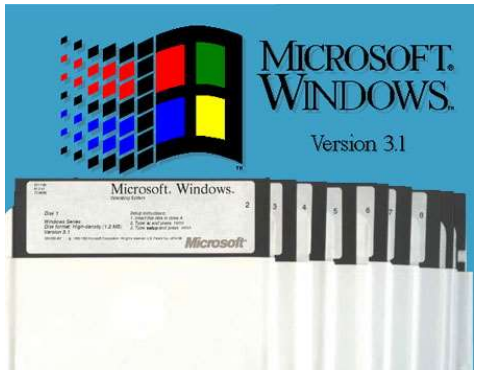
To make it easier to share documents across the Internet, Tim Berners-Lee proposed the protocol (http) and mark-up language (html), which created the World Wide Web.

The Web is a part of the Internet – a very large part. It is NOT the same as the Internet, which is a collection of networks networked together. The Web uses the Internet's connections to transfer documents, which are the Web pages you see in your Web browser.

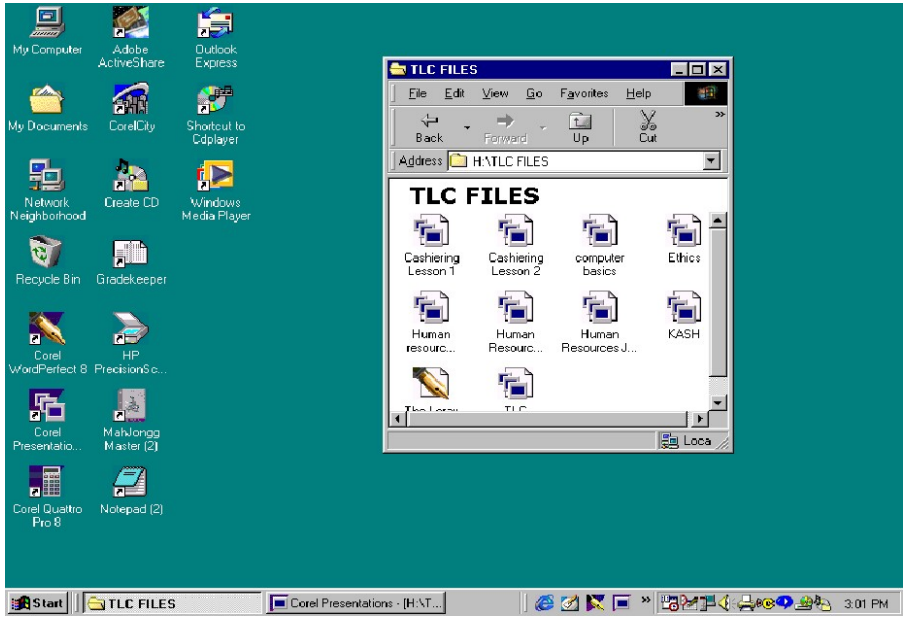


Sir Tim Berners-Lee

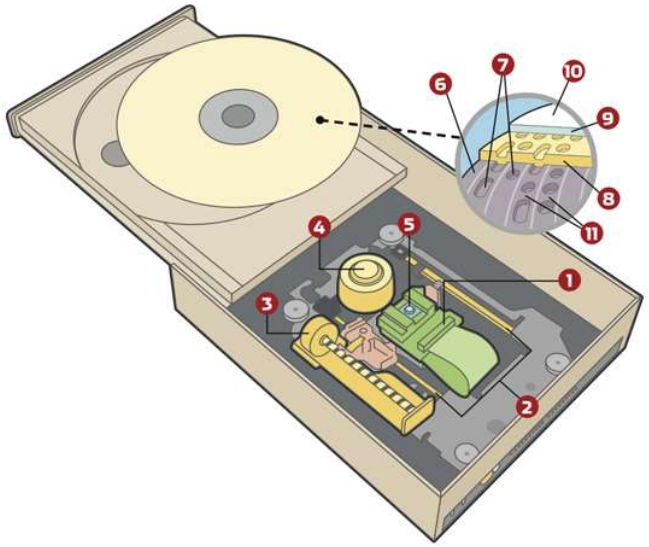
1992 – Windows 3.1



Windows 3.1 combined the graphical user interface (screen with icons) and a mouse with the extremely popular Windows operating system. It was extremely popular, and dominated the PC market for many years.



1997 – DVD Technology



Movies are very dense and require a lot of storage. Before 1997, the only way to store a movie was on reel-to-reel tapes. Big advances in storage technology made it possible to store an entire movie on a single DVD, which led to huge changes in entertainment.

2000 – USB Flash Drives

These small storage devices made it possible to store large amounts of data in removable and portable devices. They are more durable than any other portable storage options. Because they can be plugged into any computer in a USB port, flash drives are universally usable.

2001 – Entertainment

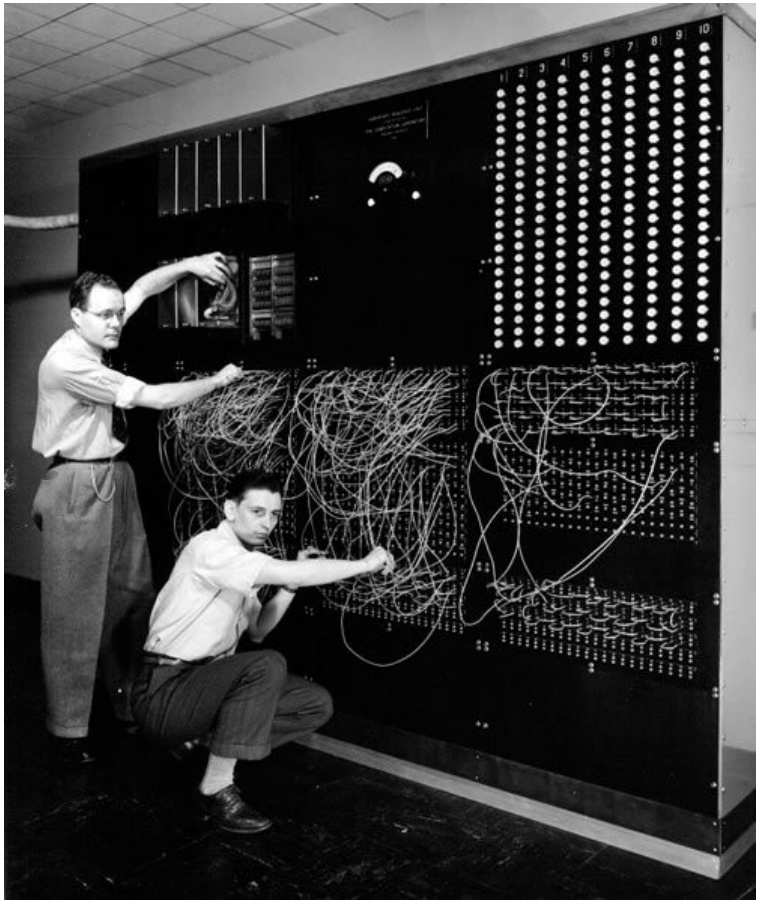
First Xbox – January 2001

First iPod – October 2001

Microsoft in 2001

- Internet Explorer 6.0 released August 27, dominating the browser market for many years
- XP released October 25, the basis of all Microsoft software upgrades since that date

What a HUGE difference in 80 years!



First computer in 1937

Devices in 2017