History of The Computer

## Hardware
And
Software

The Antikythera Mechanism as found.

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A 2,000-year-old device often referred to as the world's oldest "computer" has been recreated by scientists trying to understand how it worked.

- The Antikythera Mechanism has baffled experts since it was found on a Roman-era shipwreck in Greece in 1901.
- The hand-powered Ancient Greek device is thought to have been used to predict eclipses and other astronomical events.
- But only a third of the device survived, leaving researchers pondering how it worked and what it looked like.
- The back of the mechanism was solved by earlier studies, but the nature of its complex gearing system at the front has remained a mystery.
- Scientists from University College London (UCL) believe they have finally cracked the puzzle using 3D computer modeling. They have recreated the entire front panel, and now hope to build a full-scale replica of the Antikythera using modern materials.

3D recreation of Antikythera Mechanism
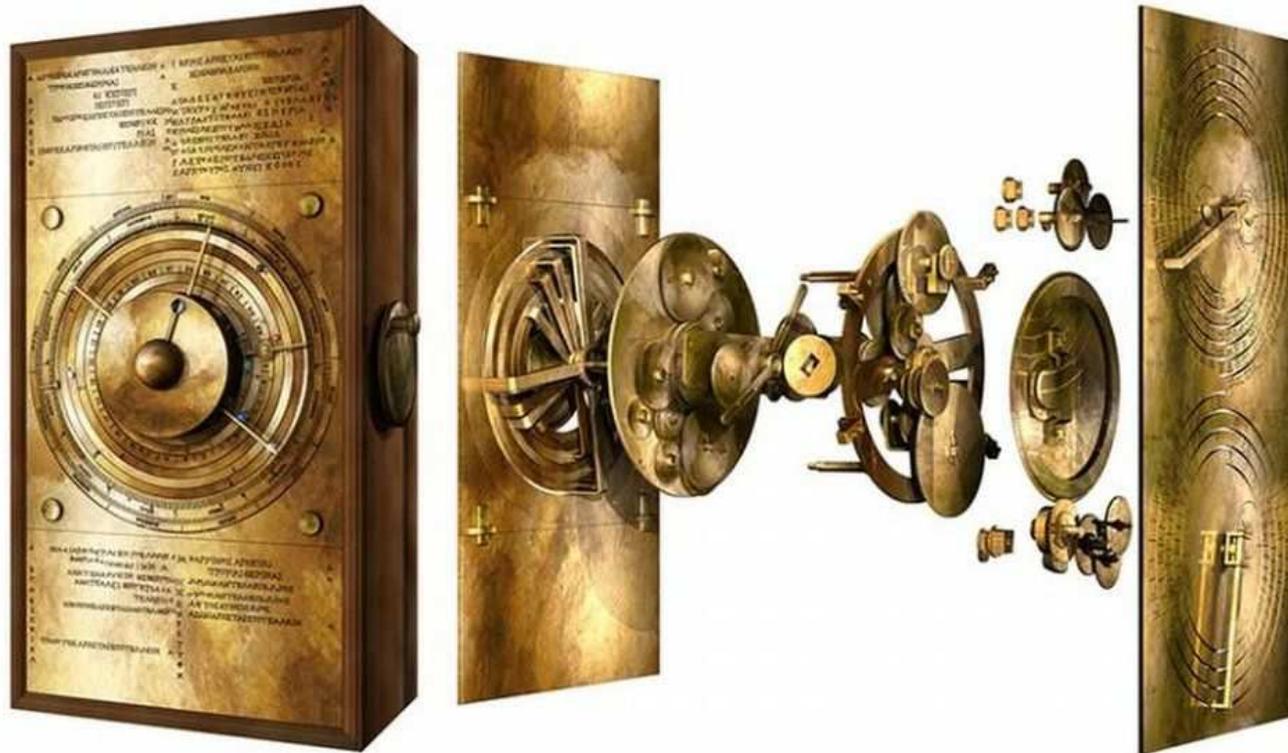
Computer's of the 1800

- **Computers in the 1800s**
- **1801**: In France, weaver and merchant Joseph Marie Jacquard creates a loom that uses wooden punch cards to automate the design of woven fabrics. Early computers would use similar punch cards.
- **1822**: Thanks to funding from the English government, mathematician Charles Babbage invents a steam-driven calculating machine that was able to compute tables of numbers.
- **1890**: Inventor Herman Hollerith designs the punch card system to calculate the 1880 U.S. census. It took him three years to create, and it saved the government $5 million. He would eventually go on to establish a company that would become IBM.

1890: Inventor Herman Hollerith's Punch Card Computer

Computers from the 1900-1950s

- **1936**: Alan Turing developed an idea for a universal machine, which he would call the Turing machine, that would be able to compute anything that is computable. The concept of modern computers was based on his idea.
- **1937**: A professor of physics and mathematics at Iowa State University, J.V. Atanasoff, **attempts to build the first computer without cams, belts, gears, or shafts.**
- **1939**: Bill Hewlett and David Packard founded Hewlett-Packard in a garage in Palo Alto, California. Their first project, the HP 200A Audio Oscillator, would rapidly become a popular piece of test equipment for engineers.
- In fact, Walt Disney Pictures would order eight to test recording equipment and speaker systems for 12 specially equipped theaters that showed *Fantasia* in 1940. A film that is still in Theaters Today.
- Also in 1939, Bell Telephone Laboratories completes The Complex Number Calculator, designed by George Stibitz.

Computers of the 1900 – 1950 Continued

- **1941**: Professor of physics and mathematics at Iowa State University J.V. Atanasoff and graduate student Clifford Berry design a computer that can solve 29 equations simultaneously. **This is the first time a computer is able to house data within its own memory.**

- **1943**: John Mauchly and J. Presper Eckert, professors at the University of Pennsylvania, build an Electronic Numerical Integrator and Calculator (ENIAC). **This is considered to be the grandfather of digital computers, as it is made up of 18,000 vacuum tubes and fills up a 20-foot by 40-foot room.**

Vacuum Tubes in Early Computers
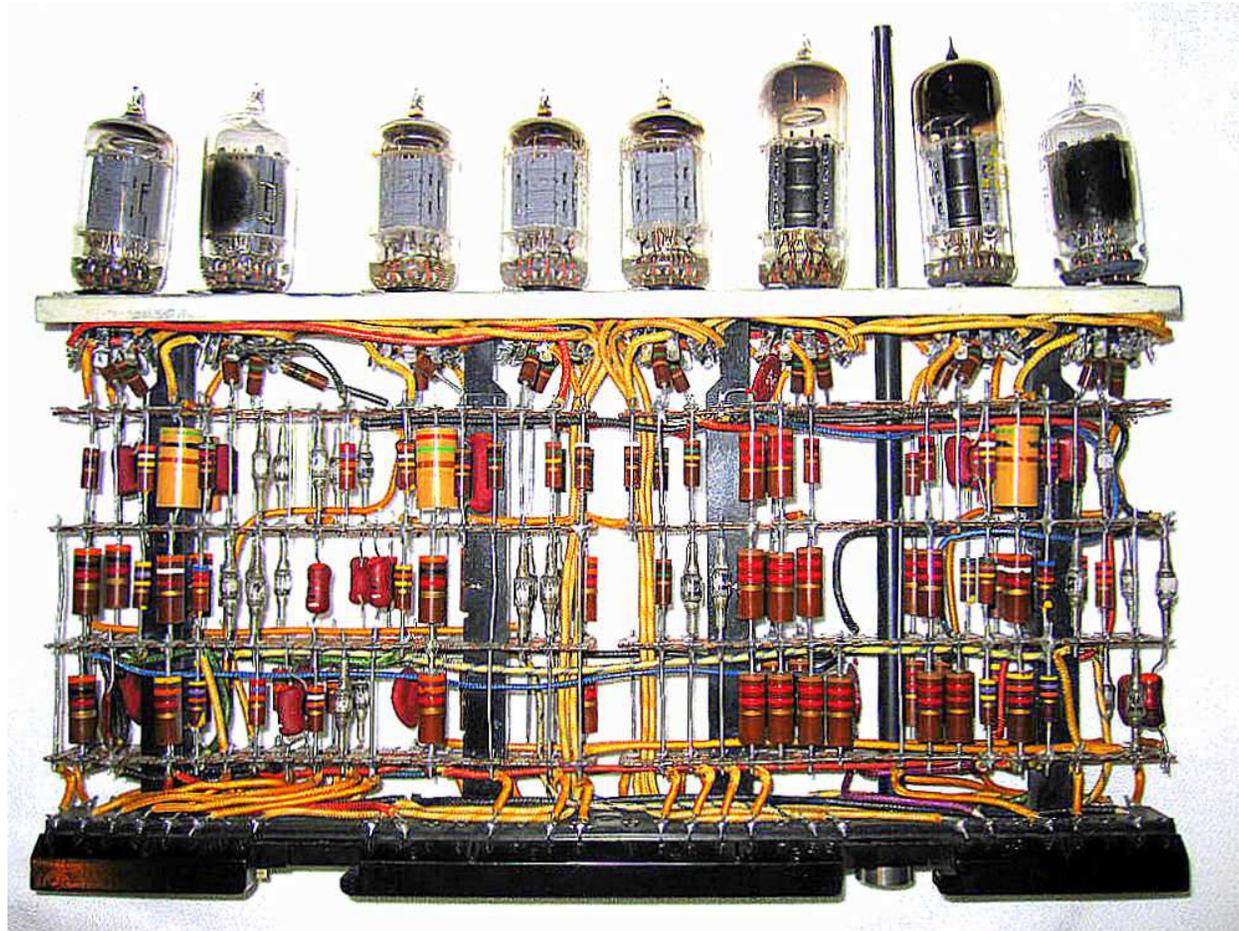
- Vacuum Tubes, alternatively referred to as an **electron tube** or **valve** and first developed by John Ambrose Fleming in 1904. The **vacuum tube** is a glass tube with its gas removed, creating a vacuum. Vacuum tubes contain electrodes for controlling electron flow and were used in early computers as a switch or an amplifier. The picture shows a collection of different vacuum tubes used with different devices.

- By using vacuum tubes instead of mechanical relays, computers could move away from mechanical switching and speed up switching on and off the flow of electrons. Vacuum tubes were also used in radios, televisions, radar equipment, and telephone systems during the first half of the 1900s.

- In the 1950s, the invention of the transistor started to replace the vacuum tube, as vacuum tubes were larger, fragile like a light bulb, and expensive. As computing devices started to become smaller in size, transistors were more ideal to use due to their smaller size.

- To learn more about the role Vacuum Tubes played in the development of early computers go to:
- https://www.mapcon.com/us-en/the-vacuum-tube-in-computer-history

Non-existent Operating Systems

- The essence of an operating system is a program or programs that help you manage the running of the machine.

- ENIAC was programmed with patch cords, dials, and switches. Programming was very expensive, a program to help manage the running of the machine would have been considered too expensive, even if they had thought of it.

- Even as late as the 1970s I remember sitting in a computer lab toggling in a small machine language program into a PDP11 so it could read a paper tape that would load a programs that would let me edit, assemble, run, read, and **punch assembly language programs.**

Punch Cards

- **Punch cards (or "punched cards"), also known as Hollerith cards or IBM cards**, are paper cards where holes may be punched by hand or machine to represent computer data and instructions. They were a widely-used means of inputting data into early computers.Feb 5, 2021

- **Inventor:** Herman Hollerith

- Languages used to create the cards were Fortran, Basic Assembly, Assembly.

Paper Tape Storage

- How does punch tape work?
- Similar to a punch card, punch tape is used with some early computers as a means to store and input data into the computer. Instead of storing the data on individual cards, punch tape **stores data on rolls of paper containing punched holes that represent the data being input or output**.

- ## Paper Tape
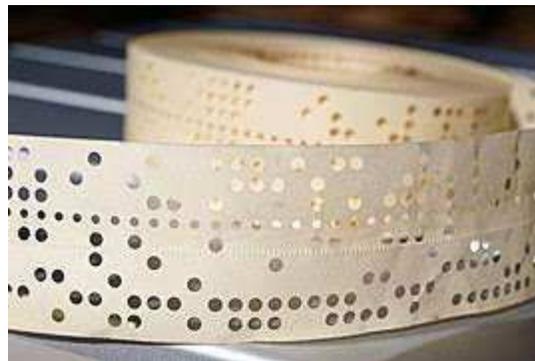
- Mainframes[edit]
- The first operating system used for real work was GM-NAA I/O, produced in 1956 by General Motors'.
- Early operating systems were very diverse, with each vendor or customer producing one or more operating systems specific to their particular mainframe computer. Every operating system, even from the same vendor, could have radically different models of commands, operating procedures, and such facilities as debugging aids. Typically, each time the manufacturer brought out a new machine, there would be a new operating system, and most applications would have to be manually adjusted, recompiled, and retested.
- **Systems on IBM hardware**[edit]

- The state of affairs continued until the 1960s when IBM, already a leading hardware vendor, stopped work on existing systems and put all its effort into developing the System/360 series of machines, all of which used the *same* instruction and input/output architecture. IBM intended to develop a single operating system for the new hardware, the OS/360. The problems encountered in the development of the OS/360 are legendary, and are described by Fred Brooks in *The Mythical Man-Month*—a book that has become a classic of software engineering.

- **1953**: Computer scientist Grace Hopper **develops the first computer language**, which is eventually known as COBOL, that allowed a computer user to use English-like words instead of numbers to give the computer instructions. In 1997, a study showed that over 200 billion lines of COBOL code were still in existence.

- **1969**: Developers at Bell Labs unveil UNIX, an operating system written in C programming language that addressed compatibility issues within programs.

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- Source: Nokia Bell Labs

Internet

- What most of us think of as the Internet is really just the pretty face of the operation— browser windows, websites, URLs, and search bars. But the real Internet, the brain behind the information superhighway, is an intricate set of protocols and rules that someone had to develop before we could get to the World Wide Web. **Computer scientists Vinton Cerf and Bob Kahn are credited with inventing the Internet communication protocols we use today and the system referred to as the Internet.**

- Before the current iteration of the Internet, long-distance networking between computers was first accomplished in a 1969 experiment by two research teams at UCLA and Stanford. Though the system crashed during the initial attempt to log in to the neighboring computer, the researchers, led by Leonard Kleinrock, **succeeded in creating the first two-node network. The experiment was also the first test of "packet switching**," a method of transferring data between two computer systems. Packet switching separates information into smaller "packets" of data that are then transported across multiple different channels and reassembled at their destination. The packet-switching method is still the basis of data transfer today. When you send an email to someone, instead of needing to establish a connection with the recipient before you send, the email is broken up into packets and can be read once all of the packets have been reassembled and received.

Birthday of the Internet

- **January 1, 1983** is considered the official birthday of the Internet. Prior to this, the various computer networks did not have a standard way to communicate with each other.

- **1970**: Intel introduces the world to 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 among computers.
- That same year, Xerox introduced the world to the first laser printer, which not only generated billions of dollars but also launched a new era in computer printing.
- Also, email begins to grow in popularity as it expands to computer networks.
- **1973**: Robert Metcalfe, research employee at Xerox, develops Ethernet, connecting multiple computers and hardware.
- **1974**: Personal computers are officially on the market! The first of the bunch were Scelbi & Mark-8 Altair, IBM 5100, and Radio Shack's TRS-80.
- **1975**: In January, the *Popular Electronics* magazine featured the Altair 8800 as the world's first minicomputer kit. Paul Allen and Bill Gates offer to write software for the Altair, using the BASIC language. You could say writing software was successful, because in the same year they created their own software company, Microsoft.

- **2007**: Apple released the first iPhone, bringing many computer functions to the palm of our hands. It featured a combination of a web browser, a music player, and a cell phone -- all in one. Users could also download additional functionality in the form of "apps". The full-touchscreen smartphone allowed for GPS navigation, texting, a built-in calendar, a high-definition camera, and weather reports.

Computers from 2011 - present day

- **2011**: Google releases the Chromebook, a laptop that runs on Google Chrome OS.
- **2012**: On October 4, Facebook hits 1 billion users, as well as acquires the image-sharing social networking application Instagram.
- Also in 2012, the Raspberry Pi, a credit-card-sized single-board computer is released, weighing only 45 grams.
- **2014**: The University of Michigan Micro Mote (M3), the smallest computer in the world, is created. Three types were made available, two of which measured either temperature or pressure, and one that could take images.

- **2015**: Apple releases the Apple Watch, which incorporated Apple's iOS operating system and sensors for environmental and health monitoring. Almost a million units were sold on the day of its release.
- This release was followed closely by Microsoft announcing Windows 10.
- **2016**: The first reprogrammable **quantum computer** is created. The technology could usher in a much-anticipated era of quantum computing, which researchers say could help scientists run complex simulations and produce rapid solutions to tricky calculations.
- Previous research suggested that quantum computers could simultaneously perform more calculations in one instant than there are atoms in the universe. Prior work also found that such capabilities would allow quantum computers to solve certain problems much faster than conventional computers can, for instance, breaking encryption that would take regular computers longer than the lifetime of the sun to crack.
- **2019**: Apple announces iPadOS, the iPad's very own operating system, to better support the device as it becomes more like a computer and less like a mobile device.

- What is next? To be continued…..
- Once the computer era left the mechanically operated, they all run on the binary system. 0 (zeros) and 1 (one). Filling a set of charged or uncharged points to represent values that the operating system uses to instruct the hardware and software to solve problems.
- Any Questions?