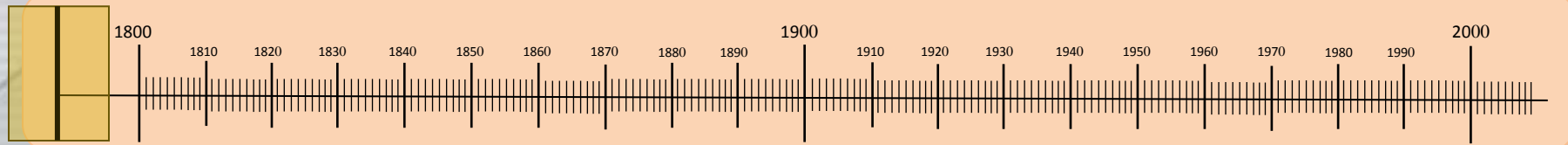


# **The History of Computers**

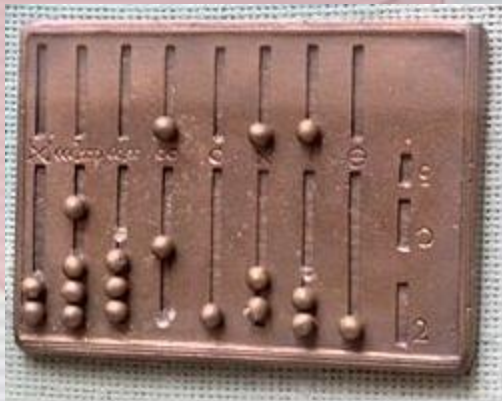
# What is a Computer?

- From the Latin word “computare” - to reckon or to sum up
- The Old Oxford English dictionary describes a computer as a person or device employed to make calculations
- Webster’s Dictionary defines “computer” as an programmable electronic device that can store, retrieve, and process data

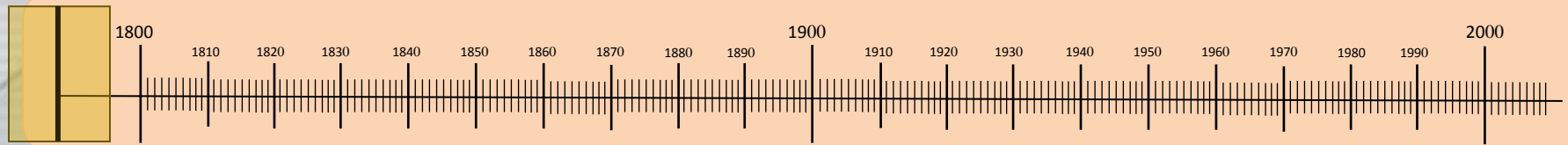
# B.C. - Abacus



- The period 2700–2300 BC saw the first appearance of the Sumerian abacus.
- Ancient China, Babylon, and Europe developed their own versions.



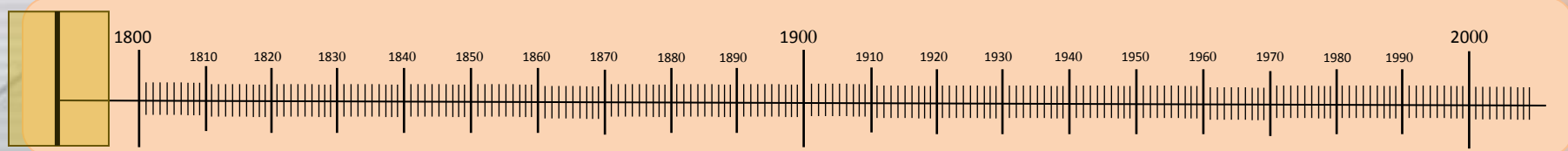
# 1622 – Slide Rule



- The slide rule is a mechanical precursor of the pocket calculator.
- It was invented in England by William Oughtred.
- Commonly used until the 1970s when it was made obsolete for most purposes by electronic calculators.



# 1623 – Mechanical Calculator



- Wilhelm Schickard, a professor at the University of Tübingen, Germany, builds the first mechanical calculator. It can work with six digits and carries digits across columns.



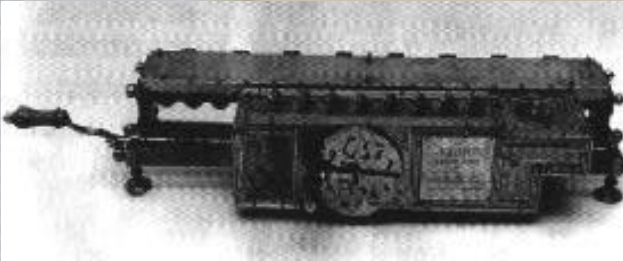
# 1642 – Mechanical Adding Machine



Blaise Pascal  
1623 - 1662

- Blaise Pascal, French philosopher and mathematician
- Operated similarly to a clock
- Designed to perform tax calculations for French government
- Addition
- Never worked properly

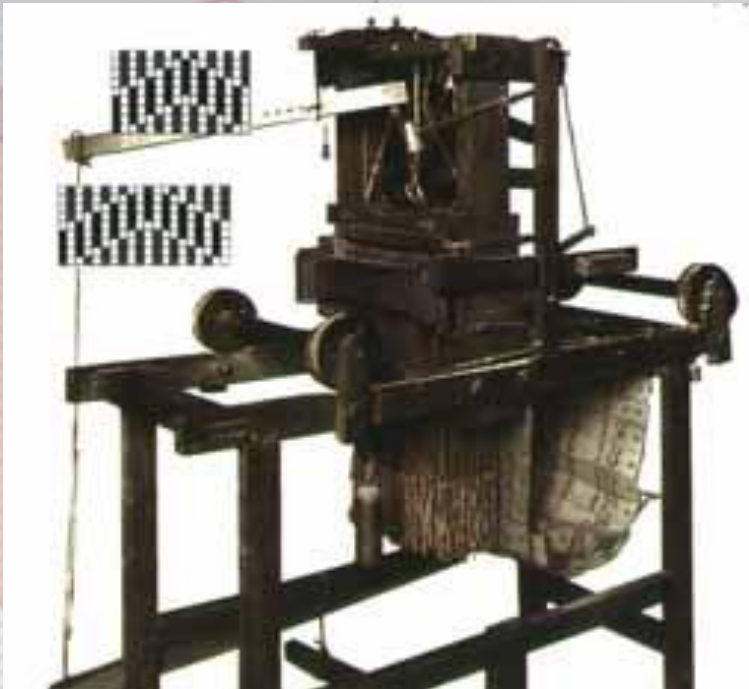
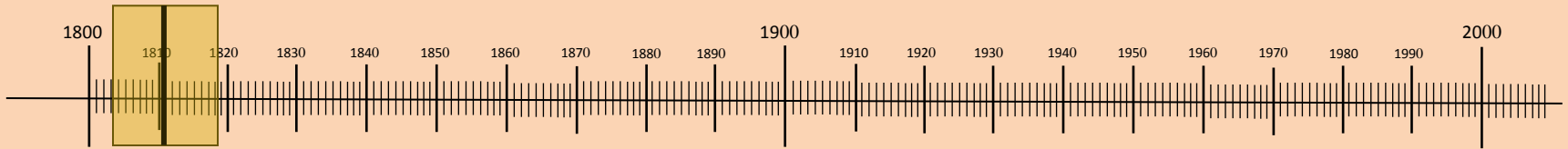
# 17<sup>th</sup> Century - Stepped Reckoner



Gottfried Wilhelm von Leibniz  
1646 - 1716

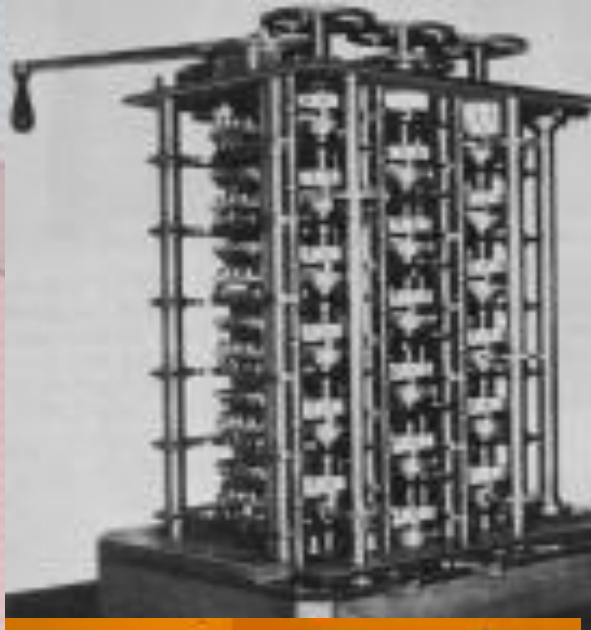
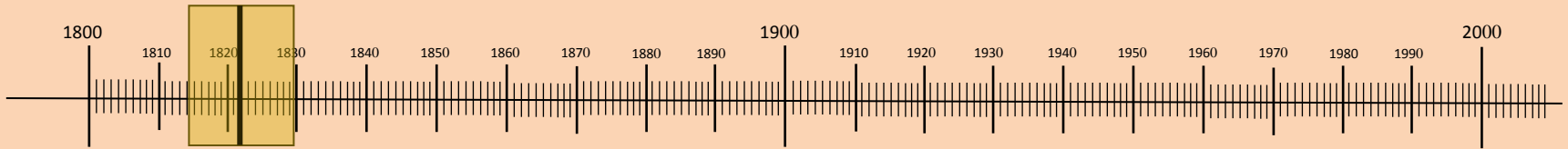
- Gottfried Wilhelm von Leibniz, mathematician (one of the developers of Calculus)
- Add, subtract, multiply, divide, square roots
- Cylindrical wheel and moveable carriage
- Device tended to jam and malfunction

# 1810 - Punched Cards

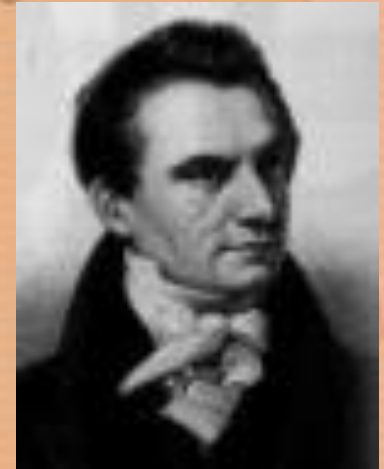


- Joseph Jacquard, French weaver
- Punched cards were originally used to provide instructions for weaving looms
- Passed through the loom in sequence, needles passed through the holes and picked up threads or correct color or texture

# 1822 - Difference Engine

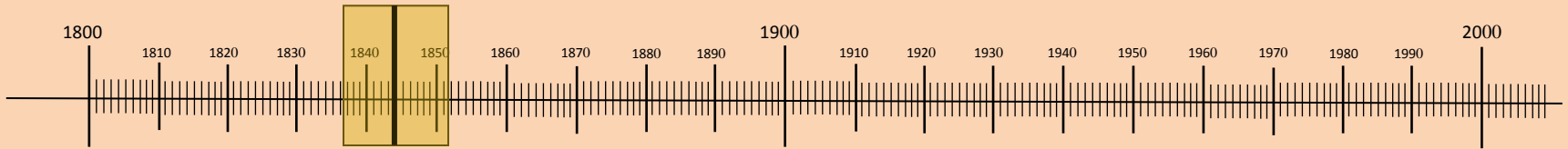


- Charles Babbage
- Calculate numbers to the 20<sup>th</sup> place
- Print them at 44 digits per minute
- Produce table of #s to help ships navigate



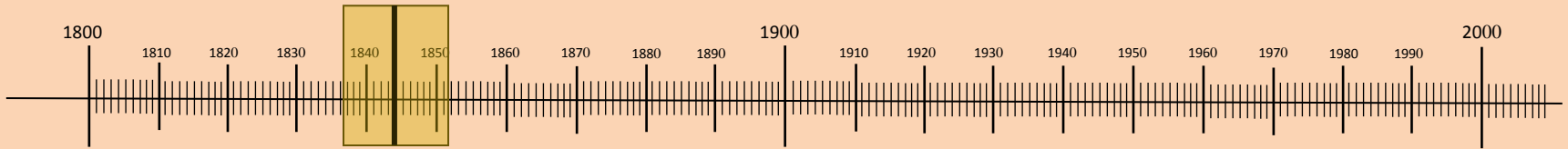
Charles Babbage  
1792 - 1871

# 1834 – Analytical Engine



- Charles Babbage, father of the modern computer, invented the principle of the analytical engine.
- Variety of calculations by following instructions on punched cards
- Make decisions and carry out instructions based on decisions
- Never built
- Served as a model for the modern computer

# 1844 - Samuel Morse Invents The Telegraph



- In 1844, Samuel Morse invented the original telegraph transmitter and receiver. This invention was the foundation which led to the information age as we know it today.

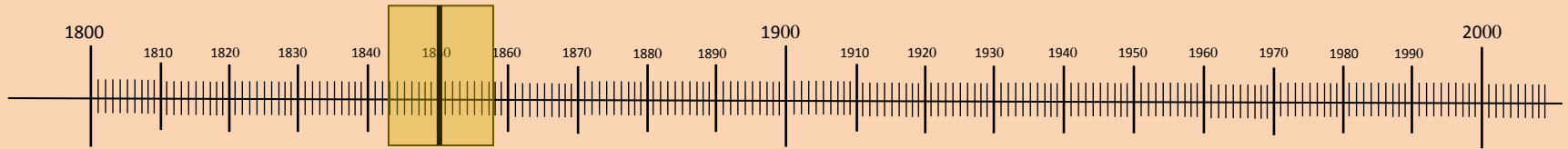


Samuel Morse



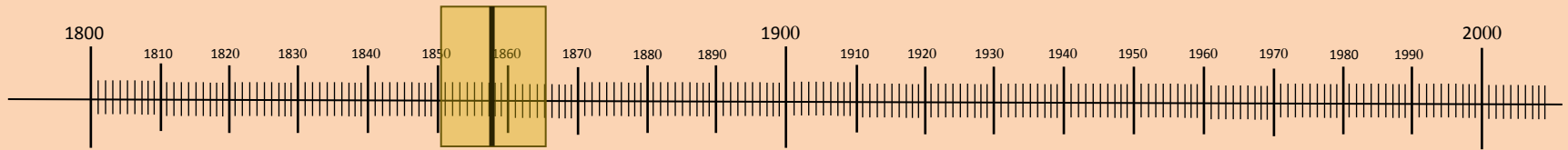
Telegraph

# 1850's Telegraph Expanded



- By 1850 there was over 12,000 miles of telegraph cable managed by 20 companies.
- By 1852 there was over 23,000 miles of cable

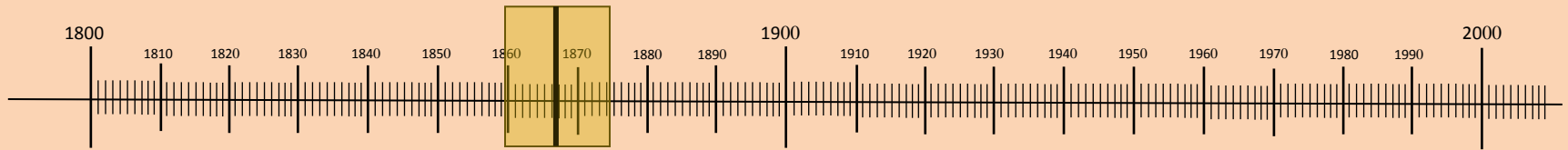
# 1858 - The First Trans-Atlantic Cable Attempt



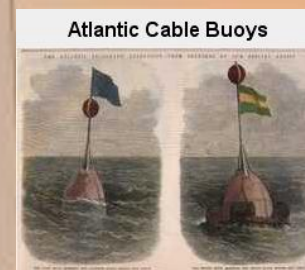
- In 1858, the Atlantic cable was established to carry instantaneous communications across the ocean for the first time. Although the laying of this first cable was seen as a landmark event, it only remained in service a few days.



# 1866 - The Next Trans-Atlantic Cable Is A Success



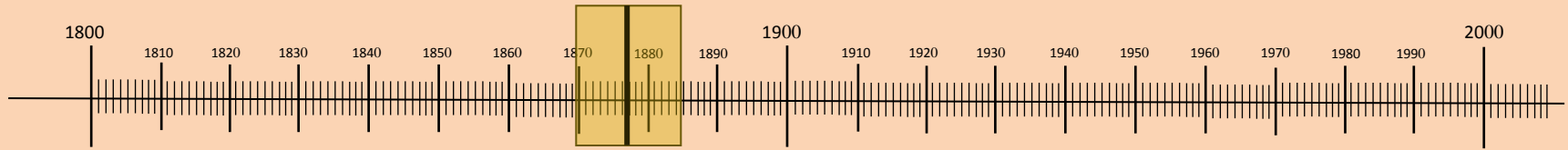
- On the next attempt, cables which were laid in 1866 were a complete success. This event, in its time, would compare to events like the moon landing of a century later. The cable of 1866 remained in service for the next 100 years.
- Cable buoys were used to mark the location of cables. The largest of the buoys used on the Atlantic telegraph cable of 1865-66 could carry a cable weight of 20 tons.



# Fiber optics today

- Currently a fiber optic cable can carry 10 trillion bits of information per second down a single fiber.
- That's enough to send for 1900 CDs or 150 million phone calls every second.
- It is currently tripling every 6 months and is expected to do so for the next 20 years.

# 1876 - Alexander Graham Bell Invents the Telephone

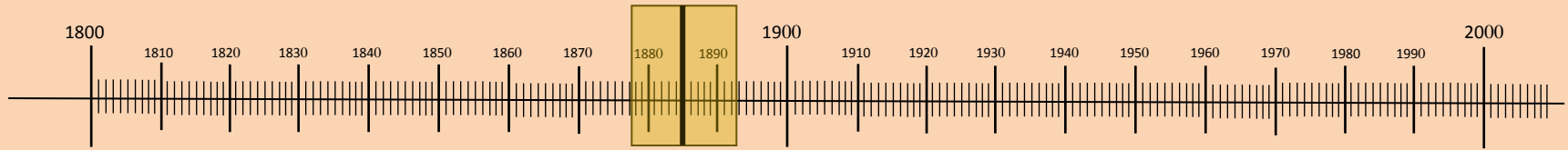


- The concept of communicating voice over large distances was the foundation for the backbone of Internet connections today. Many of the same principles that defined the phone system were later adapted to create the first data networks.
- 1877 marked the first telephone call from New York to Boston.
- By 1880, there were 30,000 phone in use around the world.

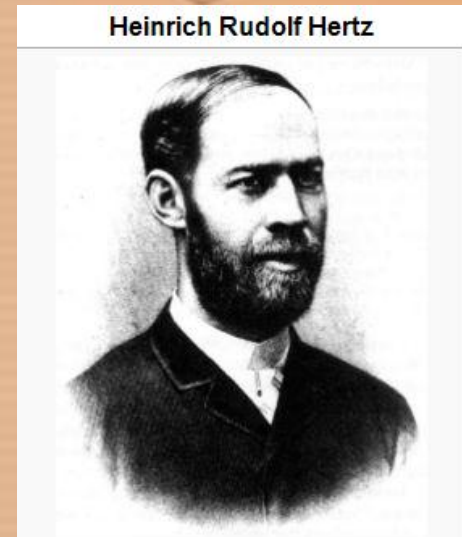


Alexander Graham Bell

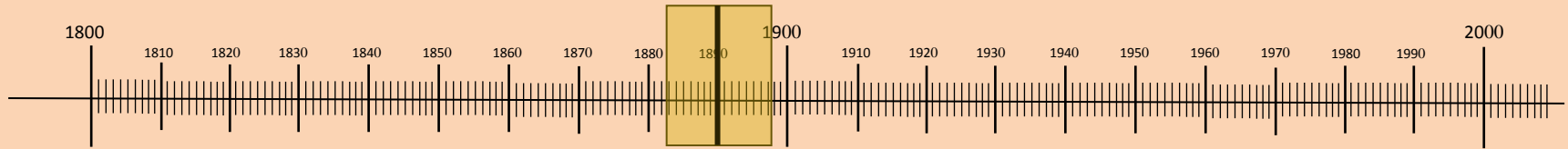
# 1885 – Hertz Discovers Radio Waves



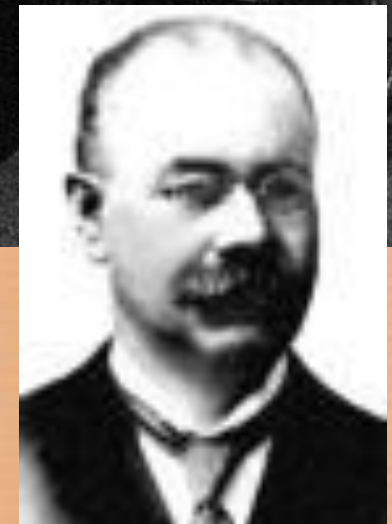
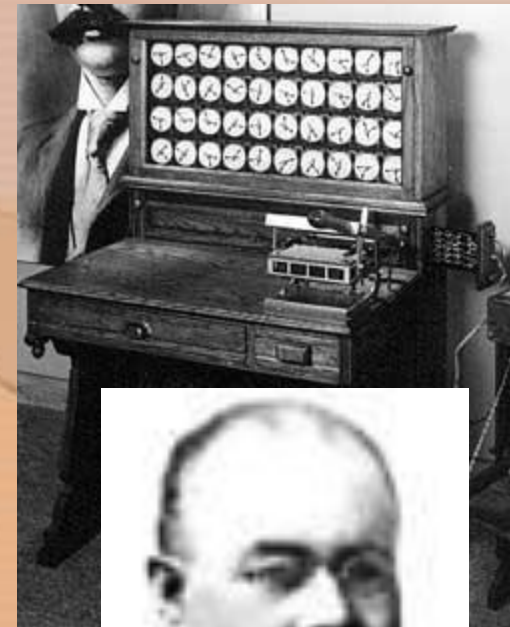
- In 1888, Hertz was the first to satisfactorily demonstrate the existence of electromagnetic radiation by building an apparatus to produce and detect UHF radio waves.



# 1890 – Hollerith Census Machine

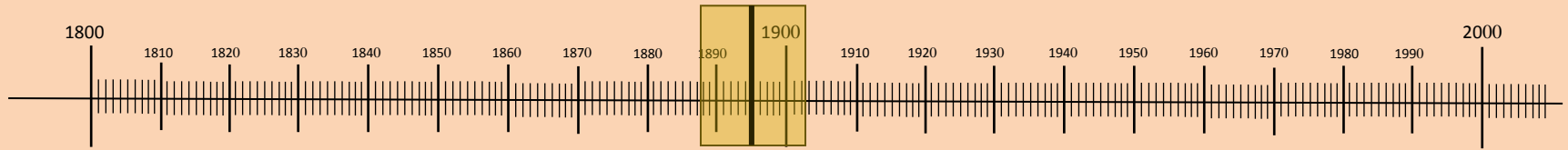


- Having completed the 1880 census with only months to spare, the U.S. Bureau of the Census established a competition for a technological solution for the 1890 tally. A young engineer, named Herman Hollerith, won the competition by proposing a manual cardpunch with mechanical counting (tabulating) dials.
- 1890, 62 million people were counted in 2 years.
- In 1924, he changed the name of his company to International Business Machine.



Herman Hollerith  
1860 – 1929

# 1895 – Marconi Invents to Wireless Telegraph

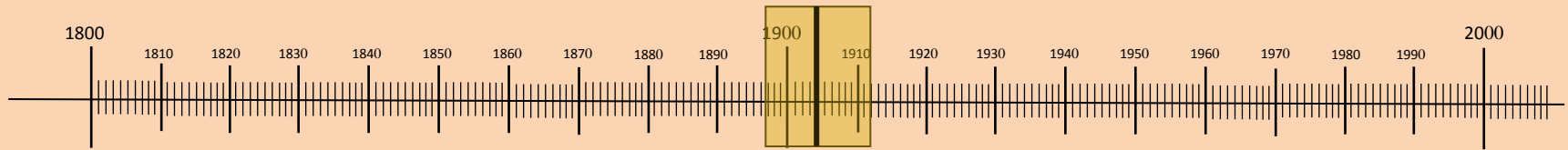


- In 1895, Marconi invented the antenna and wireless telegraph (short distance).
- In 1899, he established wireless service between England and France.
- In 1901, the first transatlantic wireless telegraph was established.

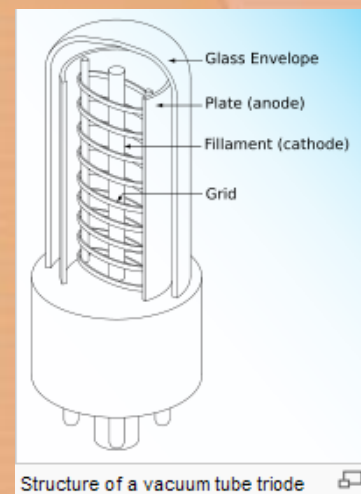
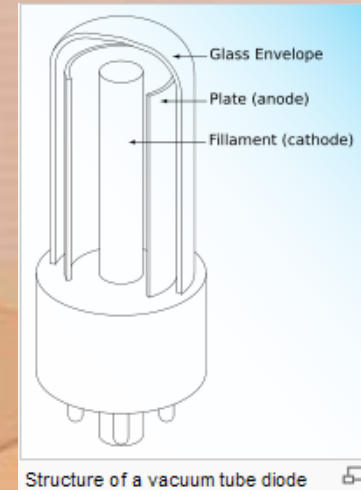


Guglielmo Marconi

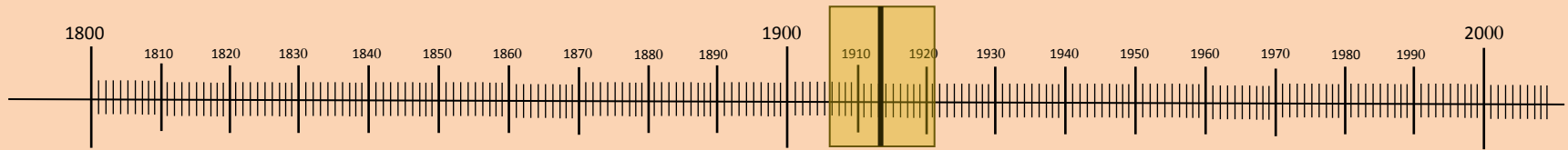
# 1904 – Fleming Invents the Vacuum Tube



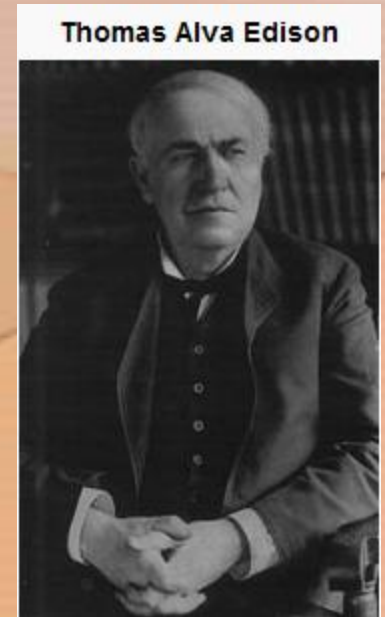
- 1903, Nikola Tesla patents electrical logic circuits called gates or switches.
- John Fleming, in 1904, as a result of experiments conducted on Edison Effect bulbs imported from the USA and while working as scientific adviser to the Marconi company, he developed the "oscillation valve", kenotron, or later as the vacuum tube diode.
- In 1906-07, Fleming invents the audion or triode vacuum tube.



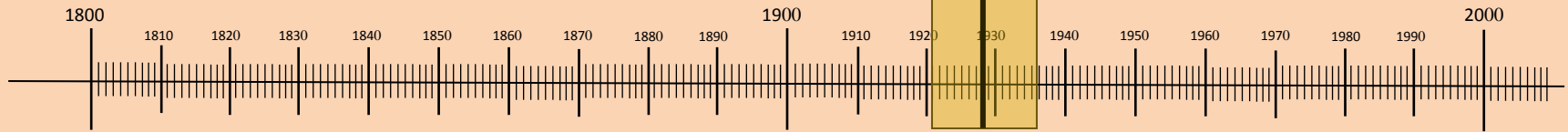
# 1913 – Edison Invents Motion Pictures with Sound



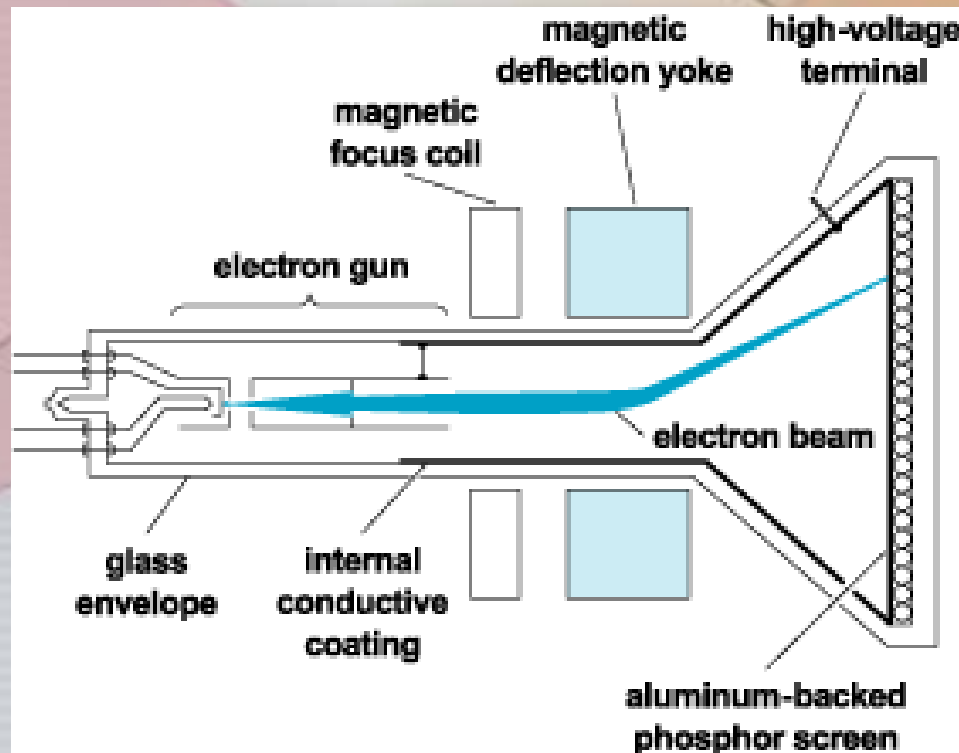
- 1894, the first kinetoscopes or motion picture was shown in London.
- In 1908, Edison started the Motion Picture Patents Company, which was a conglomerate of nine major film studios.
- In 1913, Edison showed the first talking motion picture.



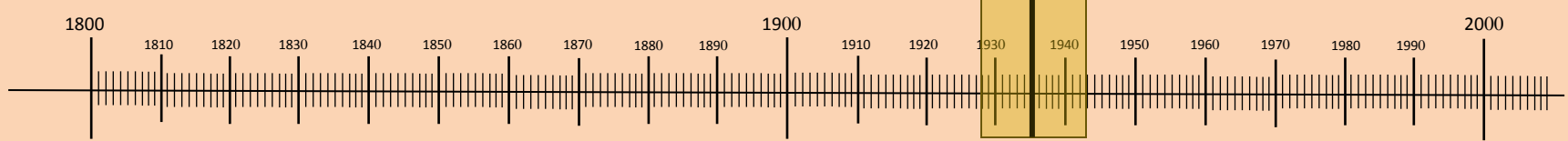
# 1928 – Cathode Ray Tube



- A Russian immigrant, Vladimir Zworykin, invents the Cathode Ray Tube (CRT).



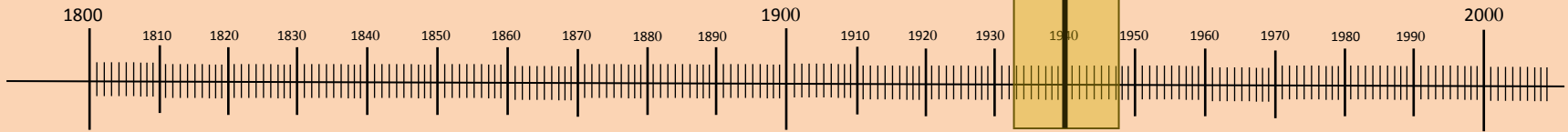
# 1936 – First Television broadcast



- 1936, the first television broadcast was made available in England.
- 1937, the first public demonstration of television in America.
- Since it first became commercially available from the late 1930s, the television set has become a common household communications device in homes
- First TV station in Texas was in 1948.
- In 1938 this 12 inch TV cost \$445, the equivalent of \$6,256 today.



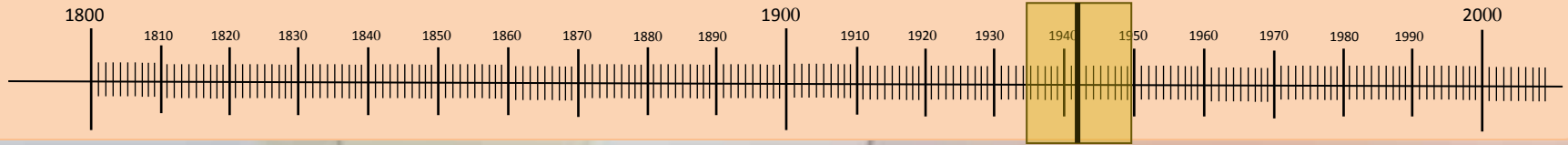
# 1938-40



- 1938, Hewlett-Packard Company was founded to make electronic equipment.
- 1939, first Radio Shack catalog is published.
- 1940, first Color TV broadcast.



# 1942 - Atanasoff – Berry Computer (ABC)



- Between 1939 and 1942
- John Atanasoff, math and physics professor
- Clifford Berry, grad student
- Binary # system of 1s and 0s
- Electronically burning holes in sheets of paper
- Output displayed on an odometer type device
- Not until almost 50 years later did Atanasoff receive full acknowledgement
- In 1990, awarded Presidential Medal of Technology
- Working replica of the ABC on display at the Smithsonian in D.C.

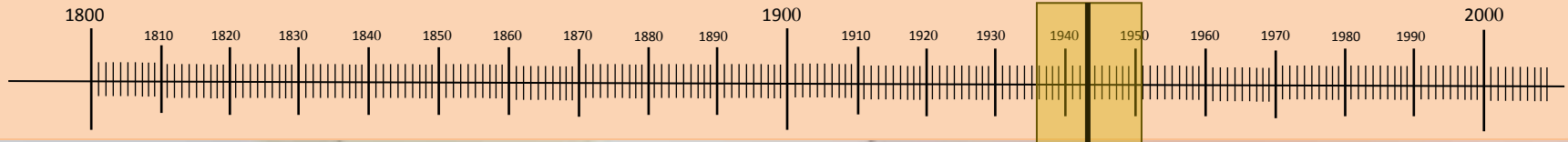


John Atanasoff  
1903 - 1995



Clifford Berry  
1918 - 1963

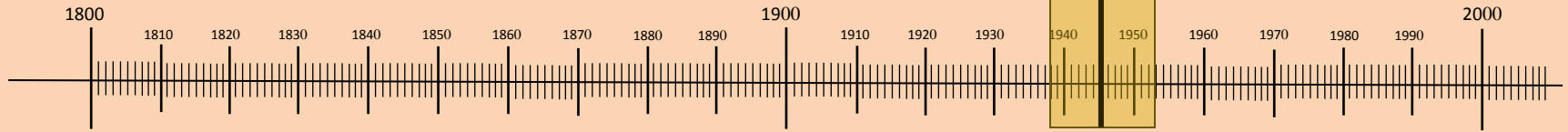
# 1944 - Mark I



Howard Aiken  
1900 – 1973

- Team from IBM and Harvard University under Howard Aiken
- Used mechanical telephone switches to store info and accept data on punched cards
- Paper output
- Highly sophisticated calculator
- Over 51 feet in length
- 5 tons
- Over 750,000 parts
- Not only huge but also unreliable

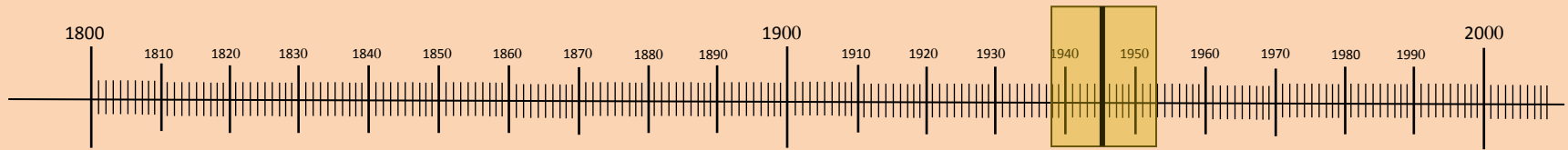
# 1945 - CPU (Central Processing Unit)



John von Neumann  
1903 - 1957

- John von Neumann
- Stored program concept
- Store computer instructions in a CPU

# 1946 – ENEAC

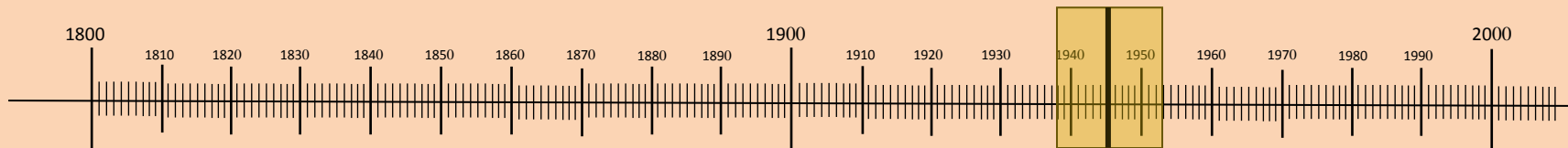


- **ENIAC**, short for **Electronic Numerical Integrator And Computer**, was the first large-scale, electronic, digital computer capable of being reprogrammed to solve a full range of computing problems. ENIAC was designed and built to calculate artillery firing tables.

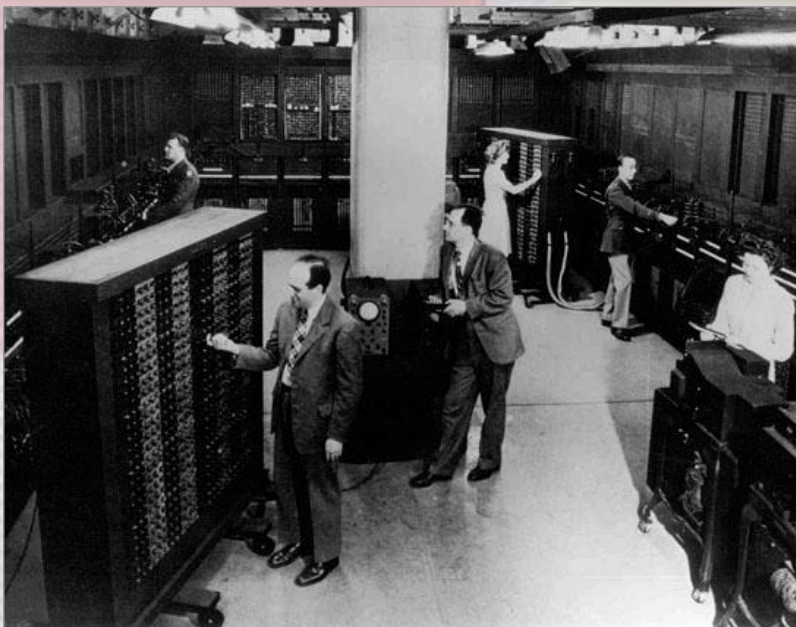


- John Mauchly and J. Presper Eckert
- Time to solve a problem: mathematicians = 3 days; ENIAC = 20 seconds
- Not finished until 1946, after the war ended

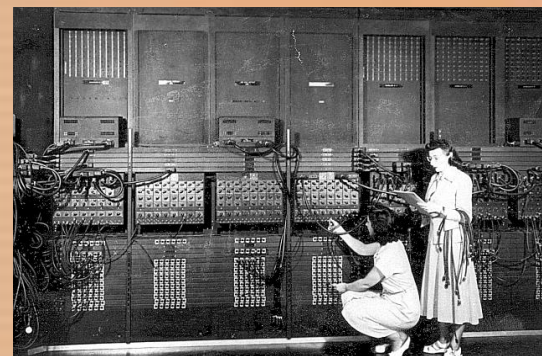
# 1946 – ENIAC



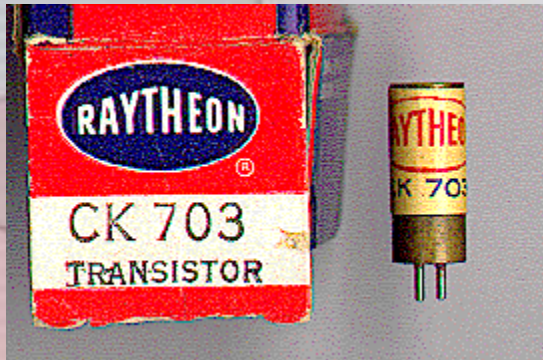
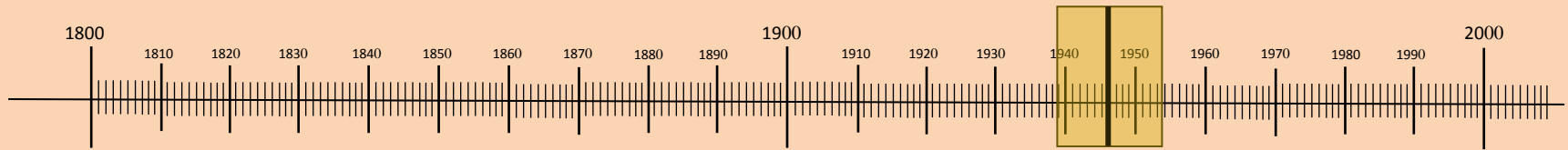
- It contained 17,468 vacuum tubes, 7,200 crystal diodes, 1,500 relays, 70,000 resistors, 10,000 capacitors and around 5 million hand-soldered joints. It weighed 27 tons, was roughly 8 feet by 3 feet by 100 feet, took up 1800 square feet, and consumed 150 kW of power.



- It took a staff of 6 technicians to replace about 2,000 vacuum tubes per month.



# 1947 - Transistor

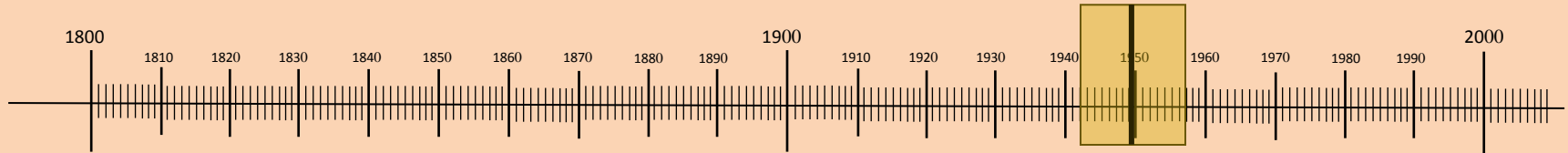


Shockley, Bardeen, Brattain

- William Shockley, John Bardeen, and Walter Brattain of Bell Laboratories
- Made computers smaller, faster, more energy efficient, and less expensive
- Increased calculating speeds to up to 10,000 calculations per second

# 1948-1954 - EDVAC & EDSAC

## Mauchly, Eckert, and von Neumann

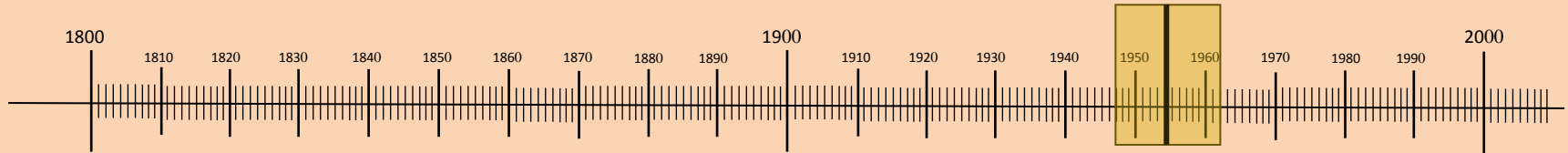


EDVAC (Electronic Discrete Variable Automatic Computer)



EDSAC (Electronic Delay Storage Automatic Computer)

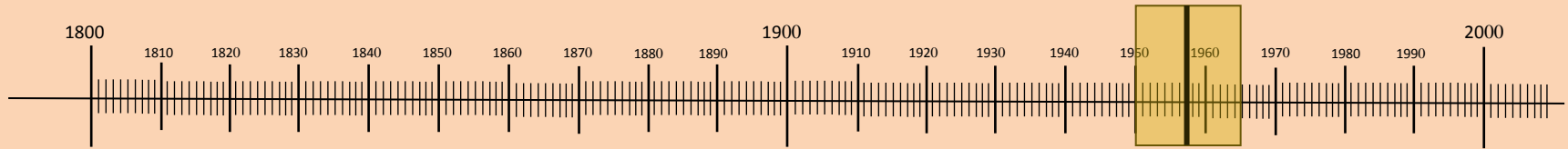
# 1951 - UNIVAC & C-10 (UNIVersal Automatic Computer)



Francis "Betty" Holberton  
1917 - 2001

- UNIVAC—3<sup>rd</sup> computer built by Mauchly and Eckert
- C10—first computer language
- Betty Holberton
- Designed 1<sup>st</sup> computer keyboard and numeric keypad
- 1<sup>st</sup> commercially available computer

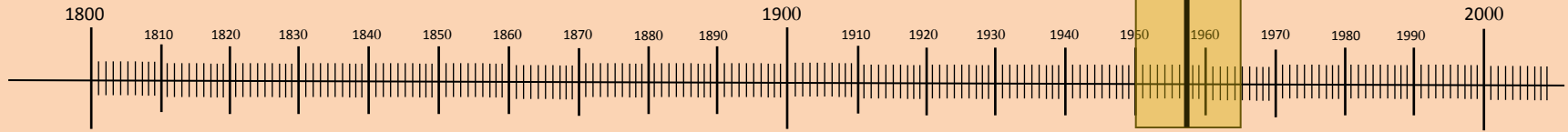
# 1957 - Sputnik Launches ARPA



- USSR launched Sputnik 1, launched on Oct. 4, 1957, became the first artificial satellite to successfully orbit the Earth. It was a metallic sphere about 2 feet across, weighing 184 lbs (84 kg), with long "whiskers" pointing to one side, and stayed in orbit for 6 months before falling back to Earth. Its rocket booster, weighing 4 tons, also reached orbit and was easily visible from the ground.
- In response, President Dwight Eisenhower created the Advanced Research Projects Agency (ARPA) within the Department of Defense to establish a US lead in science and technology applicable to the military.



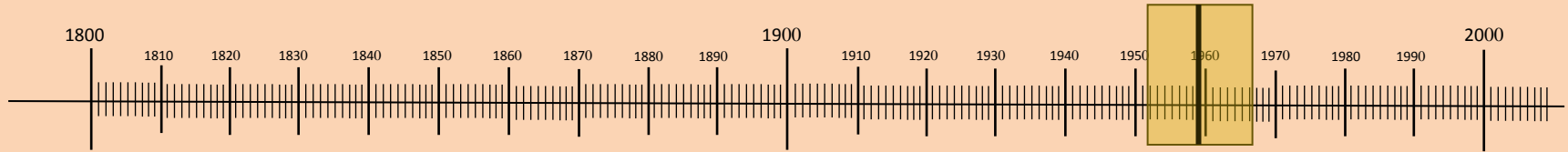
# 1957 - Fortran



- John Backus
- Programming language w/ intuitive commands such as READ and WRITE

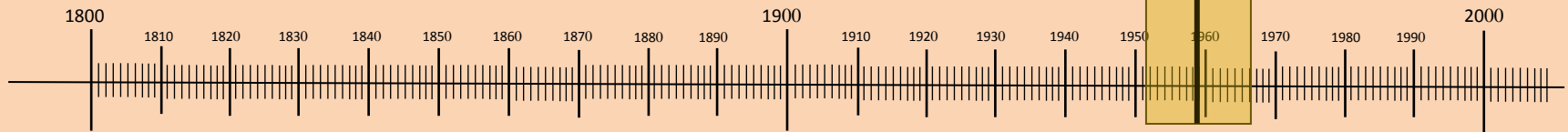
# 1959 = COBOL

(Common Business Oriented Language)



- Grace Murray Hopper
- Developed by the Dept of Defense in 1959
- Provide a common language for use on all computer
- “Debugging”
- DOD also developed Ada
  - A programming language named after Ada Byron

# 1959 – Second Generation Computer



- Transistors replaces vacuum tubes and ushered in the second generation of computers.
- 1959, IBM shipped its first transistORIZED computer, the IBM 1401.
- 1960, first removable disk

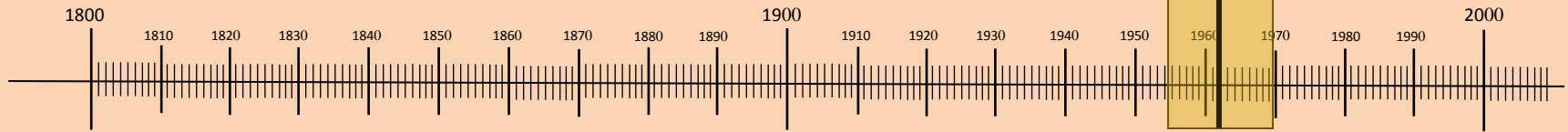


# 1961 - Integrated Circuits (IC) “Chip”



- Jack Kilby and Robert Noyce (working independently)
- Replace hundreds of transistors
- Millions of calculations per second
- Made computers smaller in size and less expensive
- A typical chip is about 1 cm wide by 2.5 cm long

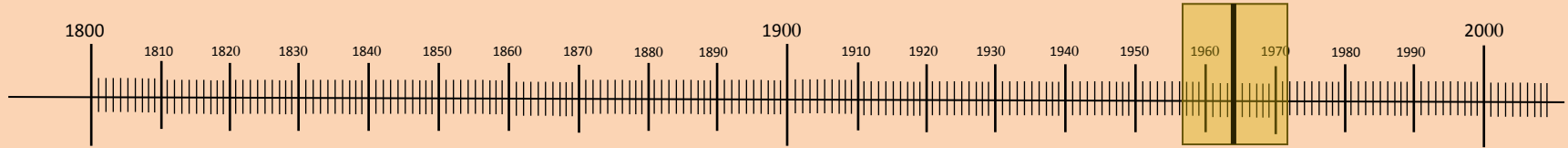
# 1954-1962 - Model 650



- Early 1960s
- IBM
- 1<sup>st</sup> medium-sized computer
- Expensive
- 1<sup>st</sup> mass produced computer
- 1963, Douglas Engelbart invents the mouse

# 1964 - BASIC

(Beginner's All-Purpose Symbolic Instruction Code)



- John Kemeny and Thomas Kurtz at Dartmouth University
- Developed to provide access for non-science student to computers
- Later evolved to Visual Basic



# Last 1964 - Mainframe

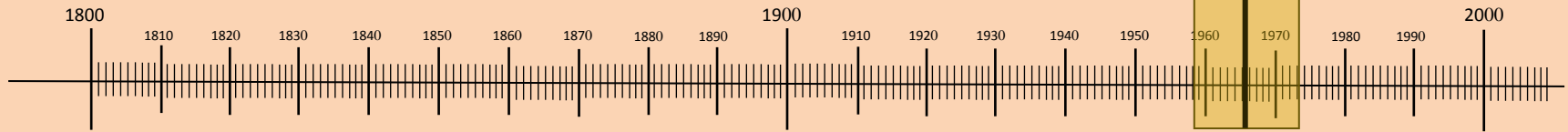
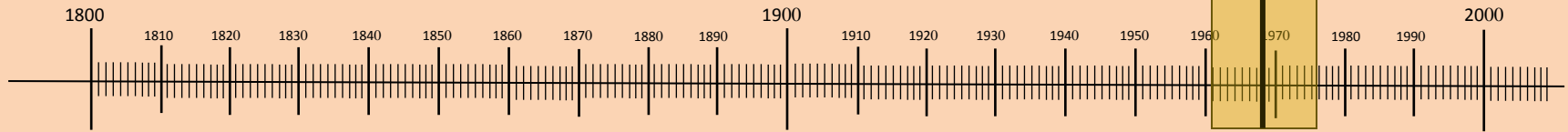


Figure 1. IBM System/360 Model 40 Data Processing System

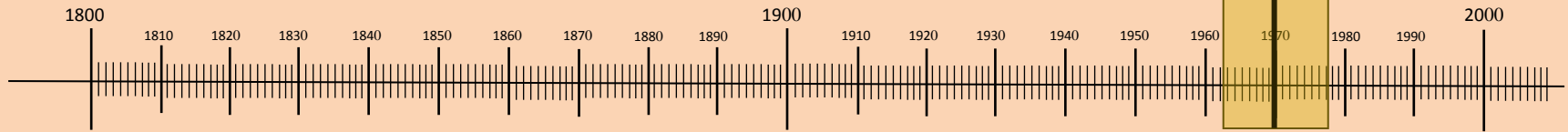
- Large computer system usually used for multi-user applications
  - Ex: Delta
- Communicate using *terminals*—keyboard for data input and a monitor for viewing output
  - Connected by wired to the computer
- The IBM 360, the first integrated-circuit or third generation computer.

# 1967



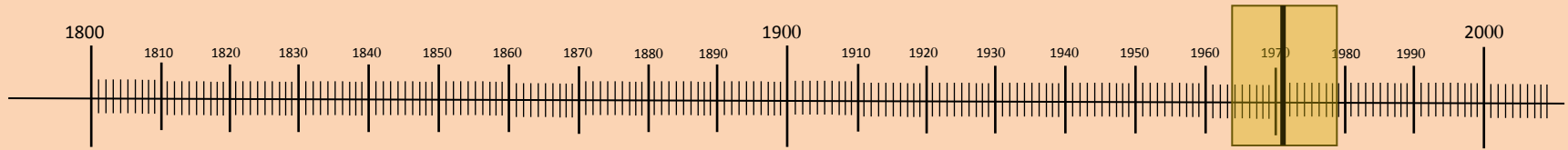
- AMD was founded
- GPS was available for commercial use

# 1970 - Microprocessor



- Marcian Hoff created the microprocessor, the 1<sup>st</sup> CPU entirely on a single chip
- Led to Microcomputers, our PCs of today.
- The microprocessor brought the fourth generation of computers.
- 1969, Bell Labs developed its own operating system, UNIX.

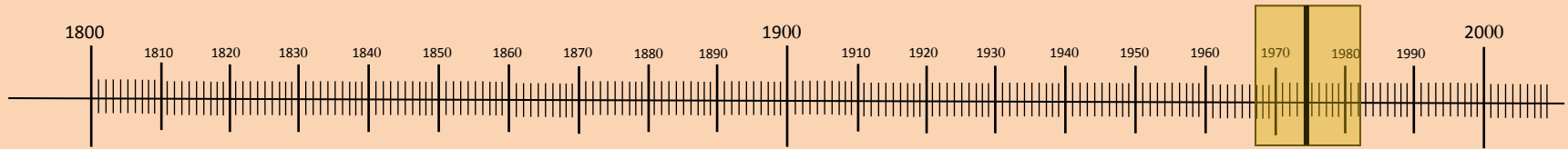
# 1971



- The Intel 4004 chip located all the components of the computer on a single chip.
- Texas Instruments introduced the first “pocket calculator.” It weighed 2.5 pounds.



# 1975 – 1<sup>st</sup> Micro Computer



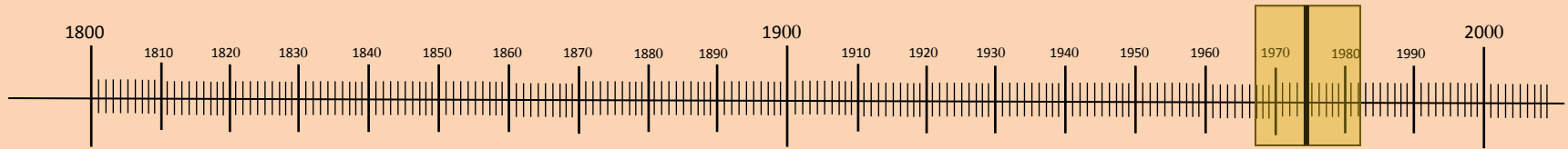
- Micro Instrumentation and Telemetry Systems (MITS) created the **Altair 8800**, the first microcomputer. It was based on the Intel 8080 CPU and sold as a mail-order kit through advertisements in hobbyist magazines.
- The designers intended to sell only a few hundred to hobbyists, and were surprised when they sold thousands in the first month.



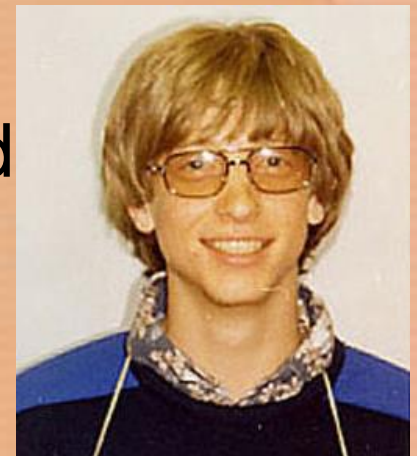
Altair 8800 Computer with 8 inch floppy disk system



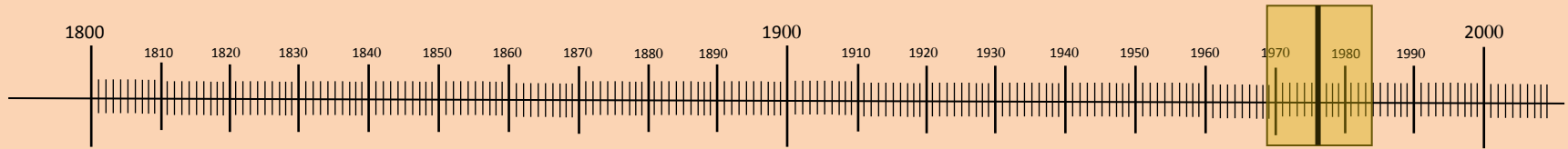
# 1975 – Microsoft Founded



- Following the launch of the Altair 8800, Bill Gates called MITS offering to demonstrate an implementation of the BASIC programming language for the system. MITS agreed to distribute Altair BASIC.
- Bill Gates left Harvard University, moved to Albuquerque, New Mexico where MITS was located, and founded Microsoft there April 4, 1975.



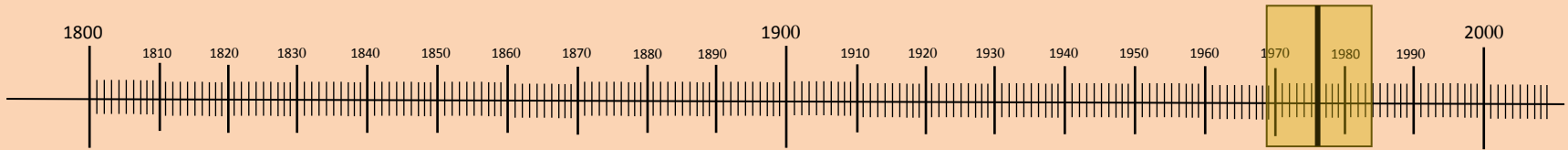
# 1976 – A Little Fun



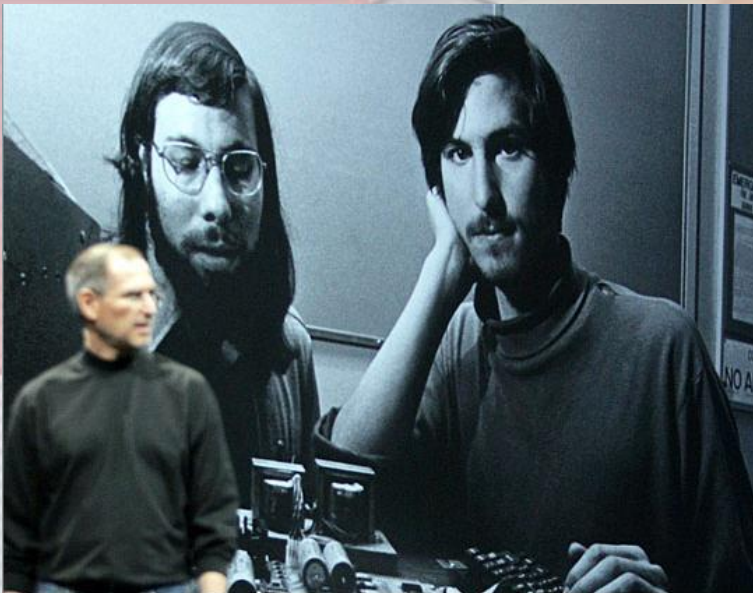
- Steve Wozniak, age 25, was the technical brains and Steve Jobs, age 21, was the dreamer with a knack for getting others to dream along with him.
- Woz's computer wasn't much to look at – just a bunch of chips screwed to a piece of plywood. But it was small, cheap, and easy to use. They took it to a local computer club. He said, “We'll make it for \$20 bucks and sell it for \$40.”



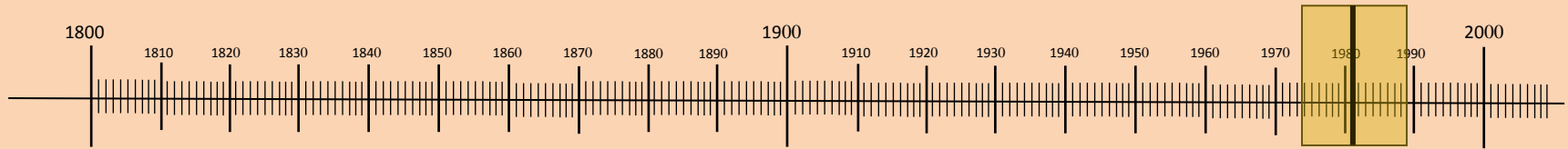
# 1977 – Apple Computer Founded



- Apple Computer Inc. was founded by Steve Jobs in 1977 as he introduced the new Apple II in Cupertino, California.
- The Apple II was the first mass produced PC.
- Sold over six million between 1977 and 1993.



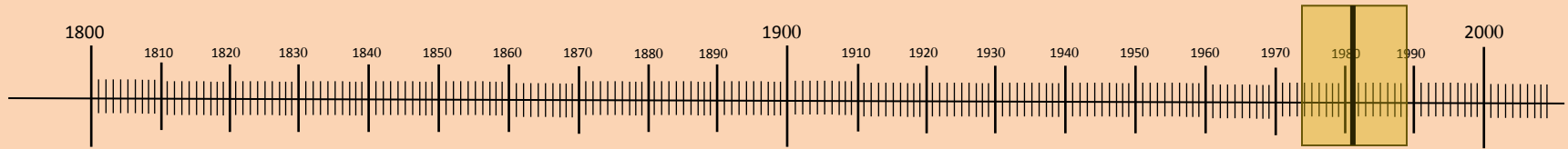
# 1981 – First Personal Computer



- IBM introduced its PC, igniting a fast growth of the personal computer market. The first PC ran on a 4.77 MHz Intel 8088 microprocessor and used Microsoft's first MS-DOS operating system.
- Adam Osborne completed the first portable computer, the Osborne I, which weighed 24 pounds and cost \$1,795. The price made the machine especially attractive, as it included software worth about \$1,500. The machine featured a 5-inch display, 64 kilobytes of memory, a modem, and two 5 1/4-inch floppy disk drives.

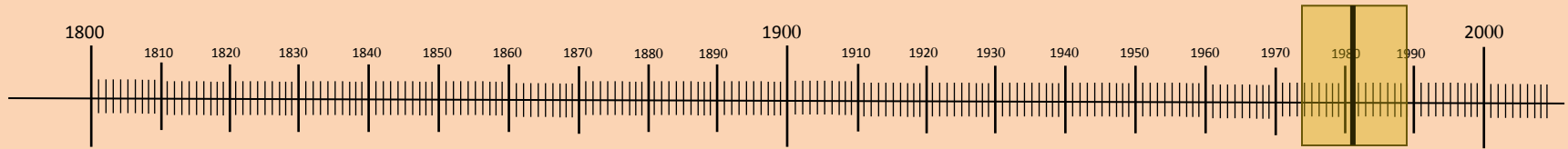


# 1981 – 1982



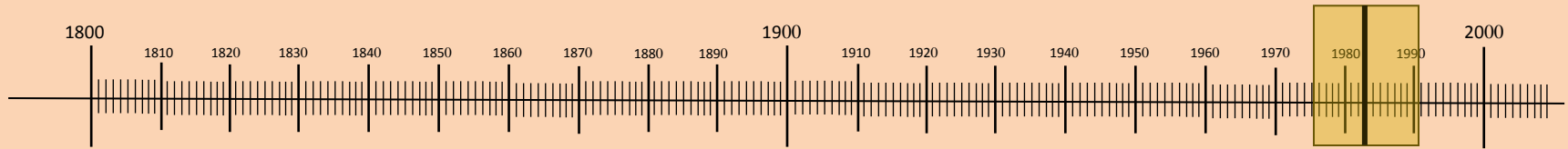
- Logitech is founded
- Kensington is founded
- Peter Norton creates Norton Utilities
- 1982, Intel 80286 processor is first released
- Sony invents CDs

# 1982



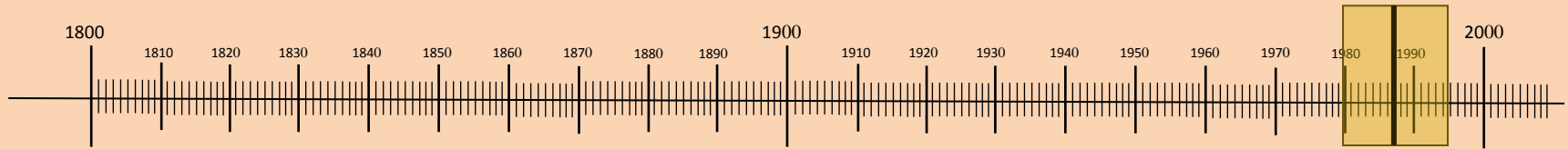
- Labtec is founded in 1982
- Disney releases the movie Tron on July 9, 1982, the first movie to use computer generated special effects
- Symantec is founded
- Sun is incorporated
- Compaq Computer Corp. is founded
- The Commodore 64 begins to be sold for \$200 allowing it to become the best-selling computer of all time
- Adobe is founded

# 1983 – First Graphical Computer



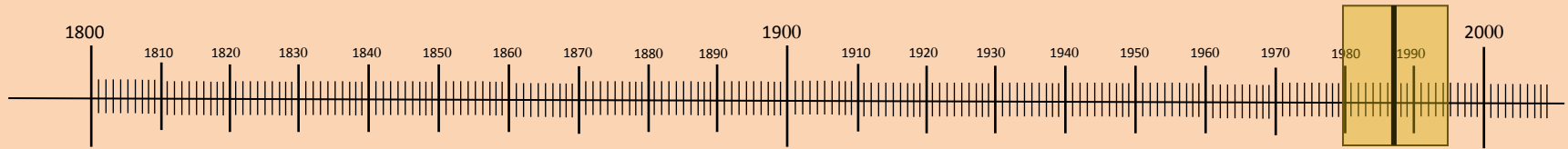
- Apple introduced its Lisa. The first personal computer with a graphical user interface, its development was central in the move to such systems for personal computers.
- The Lisa ran on a Motorola 68000 microprocessor and came equipped with 1 megabyte of RAM, a 12-inch black-and-white monitor, dual 5 1/4-inch floppy disk drives.
- Sold for \$10,000

# 1984 - 1985



- 1984 (Nov. 1983) also saw the introduction of the Domain Named Server (DNS). Using the name server, users were no longer required to know the exact path to other systems.
- The 3.5-inch floppy diskette is introduced
- Dell Computer is founded
- The computer company Gateway 2000 is founded in 1985
- Intel introduces the 80386
- ATI is founded

# 1988 - 1990

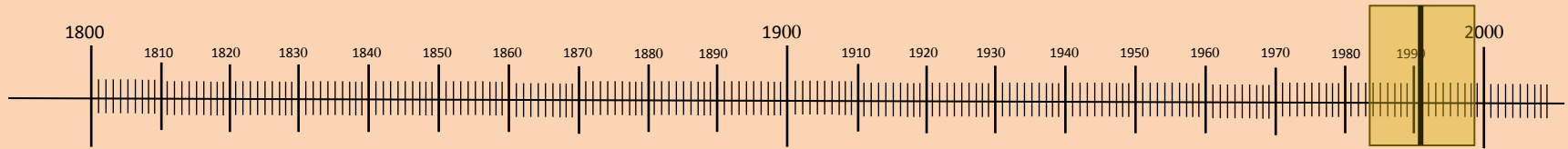


- Jonathan B. Postel, created of the Internet's address system (IP address).
- 1988 also brought the creation of the Internet Assigned Numbers Authority (IANA) to hand out network addresses.
- 1989, Intel releases the 486 processor
- 1990, Microsoft exceeds \$1 billion in sales and becomes the first company to do so



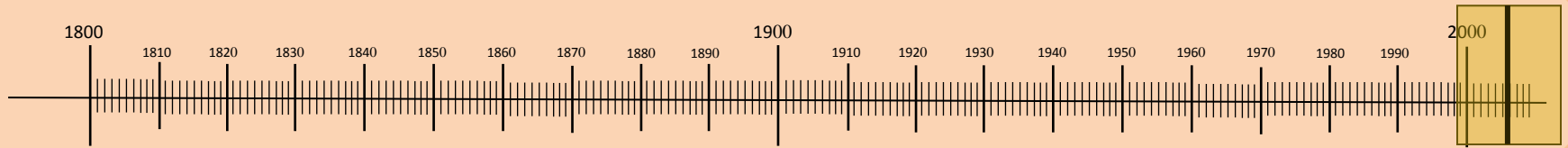
Jonathan B. Postel

# 1991 - 1995



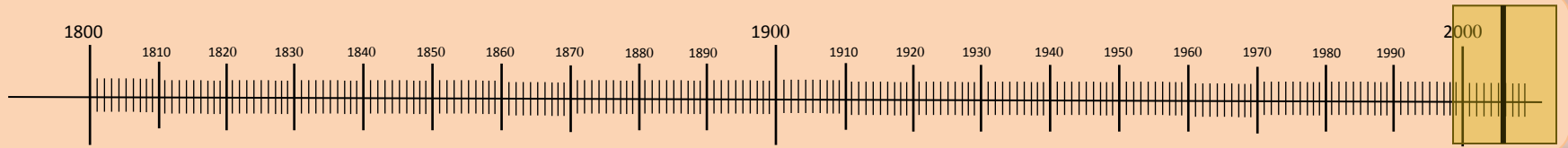
- Tim Berners-Lee “Father of the World Wide Web” introduces WWW to the public
- Linux is introduced
- 1993, Intel releases the Pentium Processor
- 1995, Apple develops FireWire
- Java is introduced
- Intel releases the new motherboard form factor ATX.
- USB standard is released

# 1996 - 2001



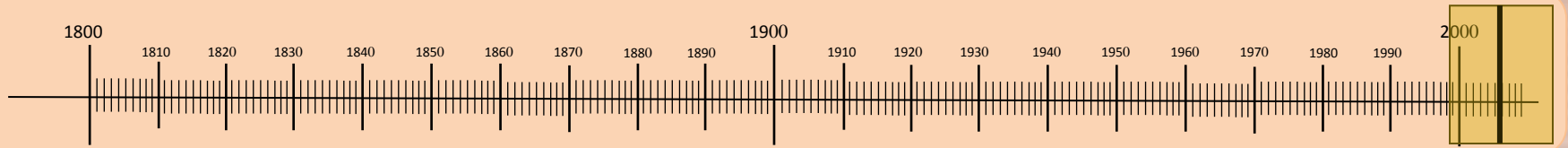
- Netgear is founded
- DVD introduced
- 1997, Intel Pentium II is introduced
- 1999, Intel Pentium III is released
- Bill Gates unveils the Xbox in 2001
- SATA 1.0 is introduced
- PCI Express is introduced
- Windows XP was released October 25, 2001.

# 2002 - ?



- 2002, Handheld devices with Internet connectivity
- 2003, Fingerprint readers
- Intel announces the new BTX form factor
- 2005, Flashdrives
- 2006, The blu-ray is introduced
- 2007, Apple introduces the iPhone

# New Horizons



- Kindle
- Cloud computing
- Surface computing