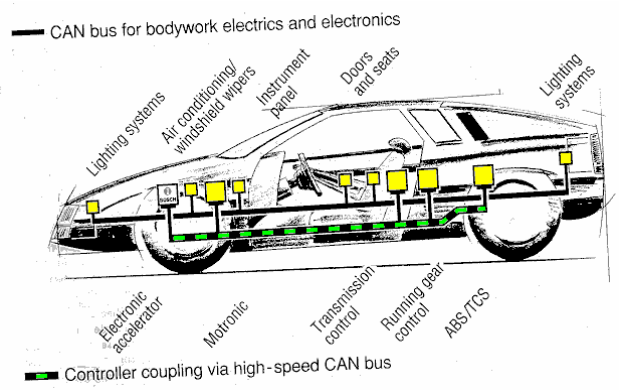
EECE416 :Microcomputer Fundamentals and Design ("Microcomputer & Microprocessor")

COMPUTER HISTORY

Source:www.mwftr.com

Computers and Microprocessors

- Everywhere
  - PC, VCR, Toys, etc
- Hardware and Software
- Evolution of uP
  - First Generation
    - ENIAC
    - 10s of Vacuum Tubes
    - Smithonian Museum
  - Second Generation
    - Advent of Transistors (solid-state)



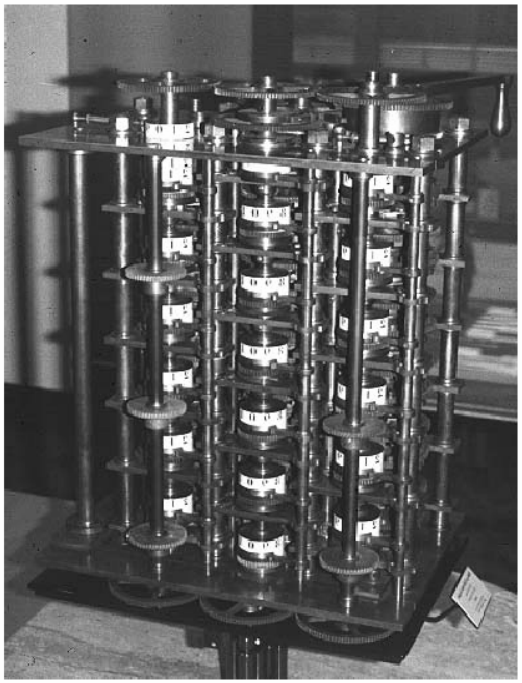
Microprocessor

- Third Generation
  - Advent of IC (Integrated Circuit)
  - Chips
- Fourth Generation
  - VLSI(Very Large Scale Integration)
- Advent of uP
  - Intel
    8080→8086→80186→286→386→486→Pentium
  - Motorola 6800→68000→68020
  - Zilog Z80 series

Charles Babbage's Differential Engine

- To solve 6th degree differential equation
- Uncompleted in 1842

$$f(x) = \sum_{i=0}^{n} a_i x^i$$



$$\Delta^i y_{j+1} = \Delta^i y_j + \Delta^{i+1} y_j$$

IBM

International Business Machines Corp. (IBM)

1890, Herman Hollerith (1860 - 1926, USA), (1890 Census)

- **Punching Cards, Tabulating Machine**

Electric Tabulating System

⇩

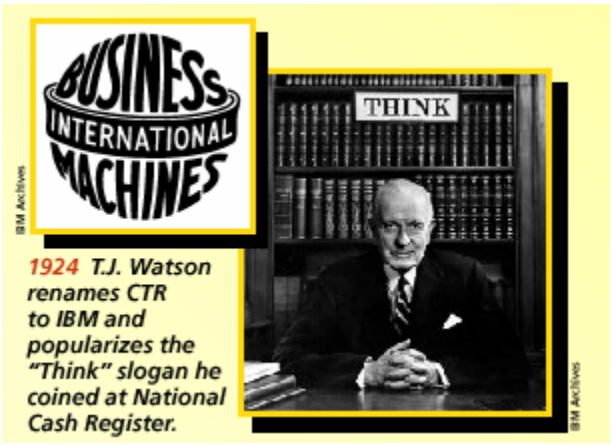
Tabulating Machine Co. (1896)

⇩

Computation-Tabulating Recording Co. (1911)

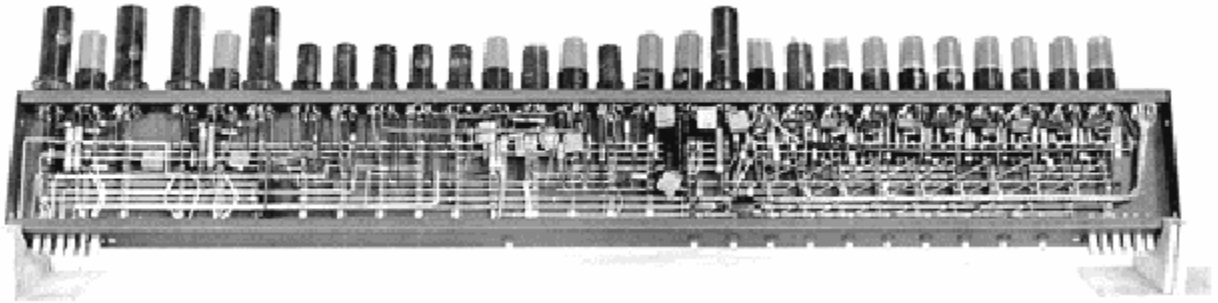
⇩

International Business Machines Corp. (IBM) (1924)

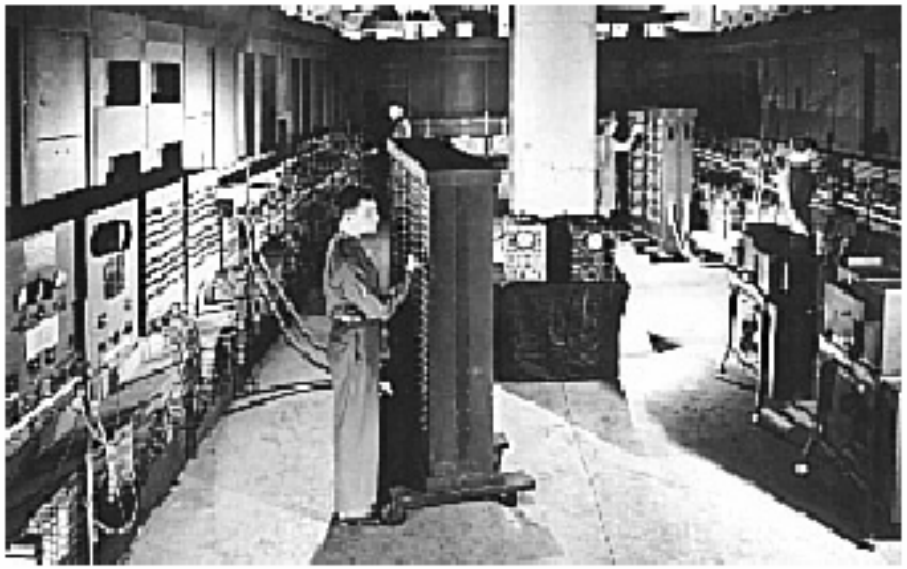


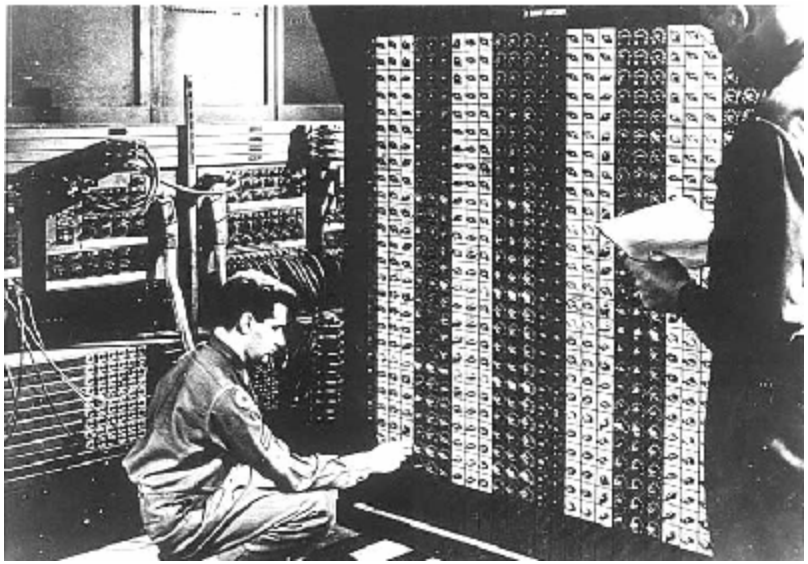
1924 T.J. Watson renames CTR to IBM and popularizes the "Think" slogan he coined at National Cash Register.

ENIAC



- Electronic Numerical Integrator and Calculator, 1943-46.
- First general purpose electronic computer



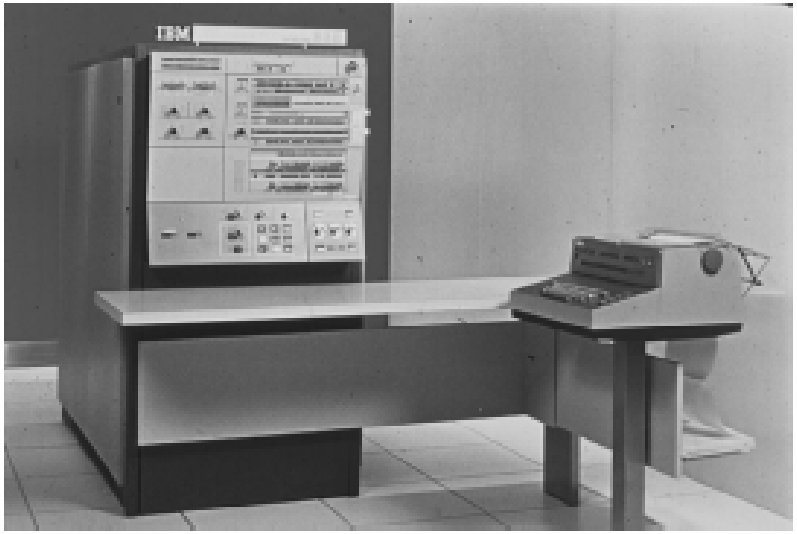


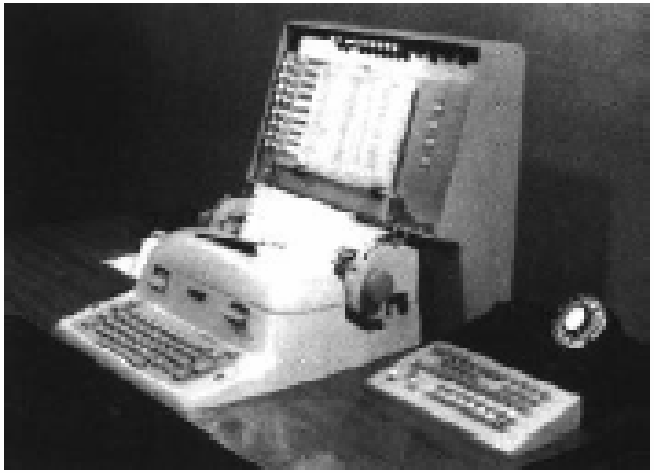
Von Neumann

- 1945, John von Neumann introduced the concept of stored program

IBM, 1964

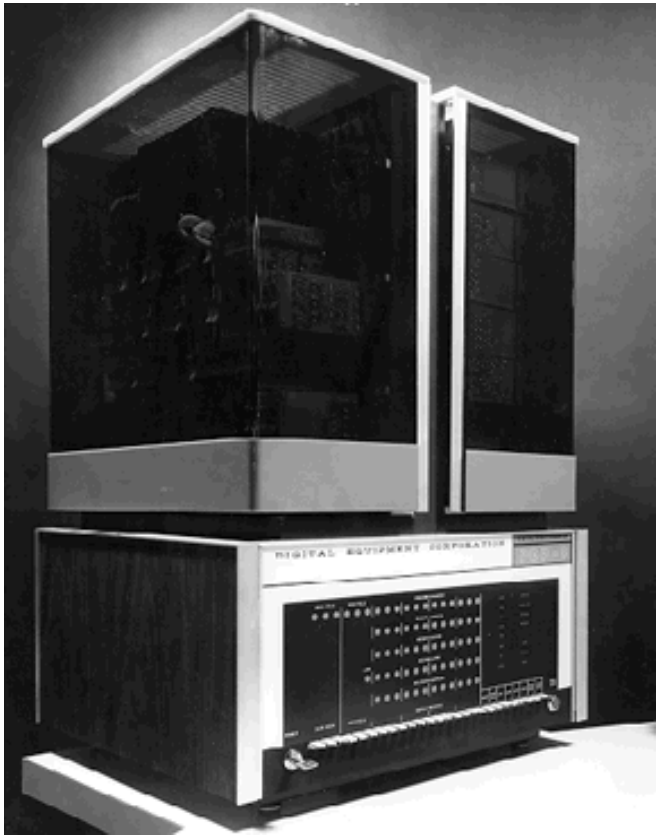
- System/360
  - “third-generation” computer
  - 7 Year long Sabre project for World wide airline reservation – fully implemented





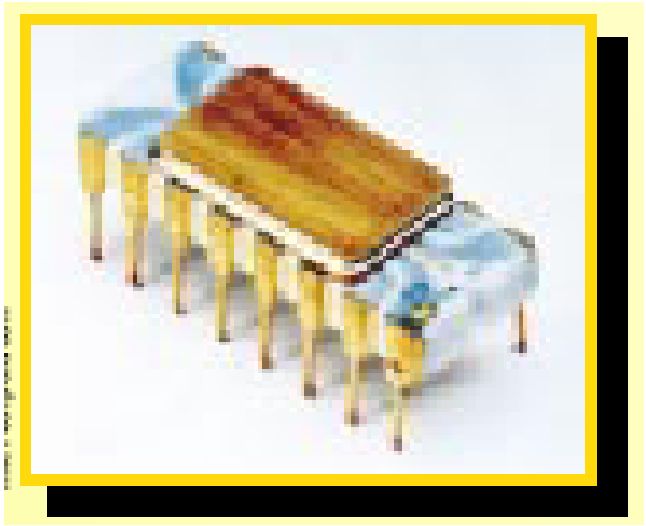
DEC, 1965

- **Digital Equipment Corp (DEC)**
  - **PDP-8**
  - **first commercially** successful minicomputer
  - **$18,000 - one-fifth the price of a small IBM 360 mainframe.**
  - **A great success by**
    - **Speed**
    - **small size**
    - **reasonable cost**
  - **Well accepted by**
    - **manufacturing plants**
    - **small businesses**
    - **scientific laboratories.**



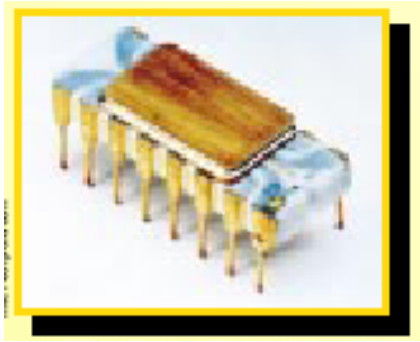
INTEL, 1971

- Intel
  - introduced 4-bit Microprocessor (4004)

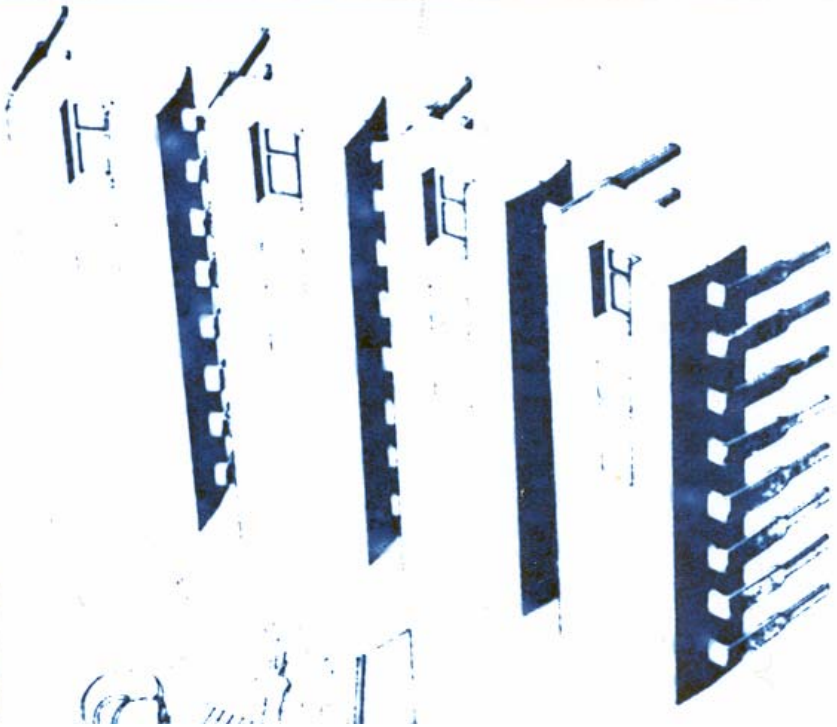


Intel 4004

Intel's first advertisement for the 4004 microprocessor appeared in the 15 November 1971 issue of Electronic News.



Announcing a new era of integrated electronics



A micro-programmable computer on a chip!

Intel introduces an integrated CPU complete with a 4 bit parallel adder, sixteen 4-bit registers, an accumulator and a push-down stack on one chip. It's one of a family of four new ICs which comprise the MCS-4 micro computer system -- the first system to bring you the power and flexibility of a dedicated general-purpose computer at low cost in as few as two dual in-line packages.

MCS-4 systems provide complete computing and control functions for test systems, data terminals, billing machines, measuring systems, numeric control systems and process control systems.

The heart of any MCS-4 system is a Type 4004 CPU, which includes a powerful set of 45 instructions. Adding one or more Type 4001 ROMs for program storage and data tables gives you a fully functioning micro-programmed computer. To this you may add Type 4002 RAMs for read-write memory and Type 4003 registers to expand the output ports.

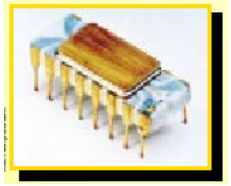
Using no circuitry other than ICs from this family of four, you can create a system with 4096 8-bit bytes of ROM storage and 5120 bits of RAM storage. When you require rapid turn-around or need only a few systems, Intel's erasable and re-programmable ROM, Type 1701, may be substituted for the Type 4001 mask programmed ROM.

Behind Story of 4004

- Intel
  - Robert Noyce and Gordon Moore founded Intel in 1968
  - 12 employees
  - First year revenue: $2672
  - Main product: Computer Memory
  - First Product: 3101 (64-bit memory)

Story-Continued

- 1969: Busicom(Japanese Co) order “A set of chips for a programmable calculator” with advanced money of $60,000.→ multiple custom chips.
- Ted Hoff (designer): “single-chip, general purpose logic device, which would retrieve its instructions from memory”
- Result: Intel 4004 Microprocessor
  - 1/8”x 1/6”
  - 2300 transistors
- Busicom under financial problem→ Intel bought back the right
- And, the rest is history
- 1971: Intel 4004, $200
- 1972: Intel 8008, 8-bit, $360



Computer based on 8080

- Altair 8800 Computer
  - Intel 8080
  - Model Instrumentation Telemetry Systems
  - Ed Roberts
  - His daughter's name
  - $397
  - Intel supplied the chip for $75 each

The January 1975 cover of Popular Electronics

Seattle Connection and Microsoft

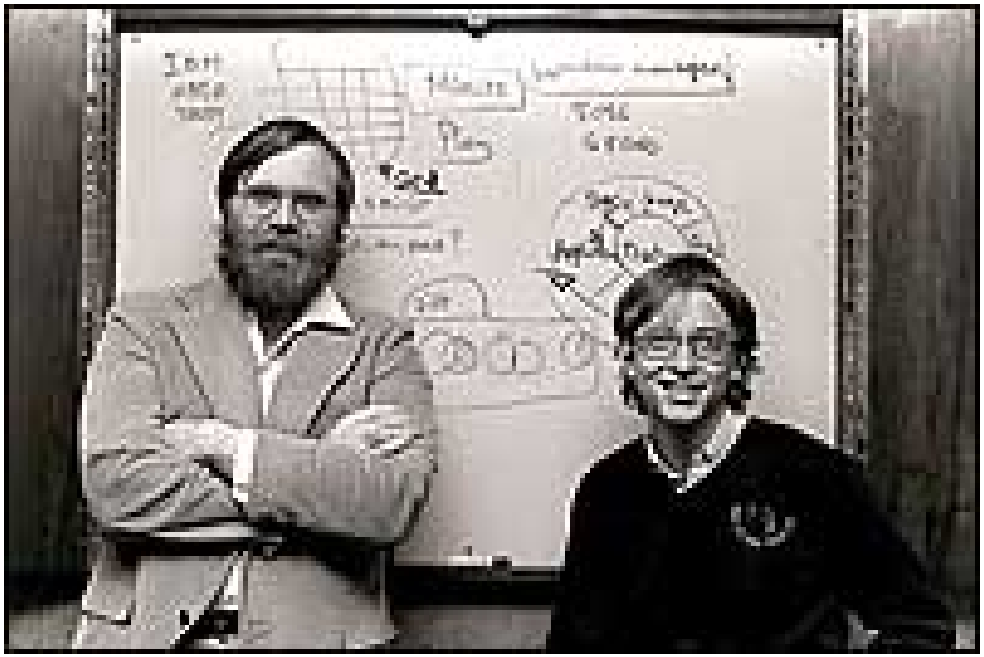
- 1968: Mother's group at Lakeside School raised money for Math class project ($3000)
- Arranged to buy sometime on a computer for the class ("time-sharing")
- Old teletype machine →Telephone→DEC Minicomputer (owned by General Electric) in downtown Seattle
- 2 gifted students: 10th grader (Paul Allen) and 8th grader (Bill Gates) → computer nerds
- Learned how to program using Basic (**b**eginner's **a**ll purpose **s**ymbolic **i**nstruction **c**ode; developed at Dartmouth College in 1964)
- 1971:Paul Allen went to Washington State University, and Bill Gates, later in 1973, to Harvard.
- 1971: Started a part-time company, Traf-O-Data.
- 1972: They bought one of the first Intel 8008 chip for $360. Added some electronics for traffic data collection in digital format

Altair 8800 and Micro Soft

- Altair8800 needed software
- Ed Roberts received letter from a company: “they already created a version of Basic for Altai 8800”
- Within 30 days they [Gates and Allen] finished the version.
- They also regained the right to market in themselves.
- Formed Micro Soft in 1977.

Micro soft - main IBM PC software provider

- **MS-DOS**
  - **or Micro soft Disk Operating System**
  - **the basic software for the newly released IBM PC**
  - **Start of a long partnership between IBM and Microsoft**



Behind Story of MS-DOS

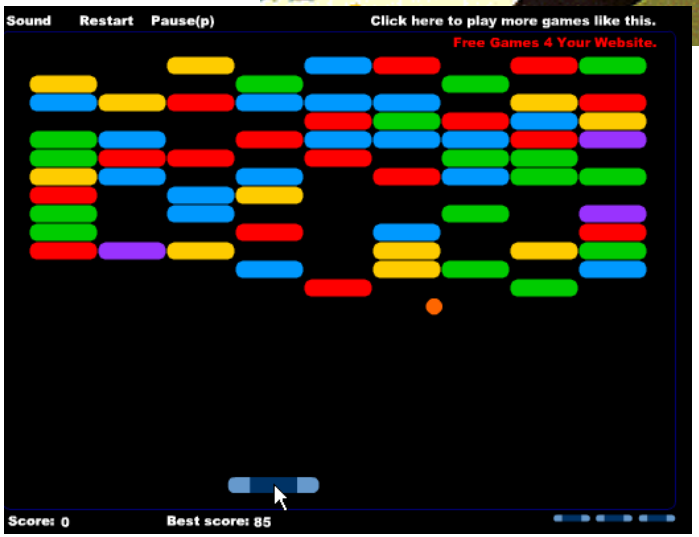
- IBM: Manhattan Project for PC
  - Approached Microsoft
  - Intel 8086 suggested
  - *Basic* for PC project offered
  - Operation System needed
- Bill Gates
  - Contacted Tim Patterson (Seattle Computer Products): File Allocation for Basic→QDOS(quick and dirty operating system)
  - Deal of the Century
    - Bought QDOS for $50,000.
    - Supplied it to IBM as MS-DOS

Commodore, 1977

- The Commodore PET
  - Personal Electronic Transactor
  - first of several personal computers released in 1977
  - straightforward to operate.

1977: Apple II

- **Apple II**
  - instant success when released in 1977
  - printed circuit motherboard
  - switching power supply
  - Keyboard
  - case assembly
  - Manual
  - game paddles
  - A/C powercord,
  - cassette tape
  - computer game "Breakout”



1977: TRS-80

- **TRS-80**
- **Tandy Radio Shack**
- **In the first month after its release, sold 10,000 units**
- **company's projected sales for 1 year: 3,000 units**

1981: IBM PC

- IBM 5150 PC Personal Computer
  - 4.77-MHz Intel 8088 CPU
  - 64KB RAM
  - 40KB ROM
  - one 5.25-inch floppy drive (160KB capacity)
  - PC-DOS 1.0 (Microsoft's MS-DOS)
  - US$3000
  - Microsoft BASIC
  - CP/M-86
  - Easywriter 1.0. A fully loaded version with color graphics costs US$6000.
  - CGA graphics card for the PC, giving 640x200 resolution with 16 colors.

1981: big portable

- Adam Osborne
- first portable computer
- the Osborne I
  - weighed 24 pounds
  - cost $1,795
  - Used Z80 (NOT IBM-PC clone (yet)!)

1981: Apollo - First Workstations

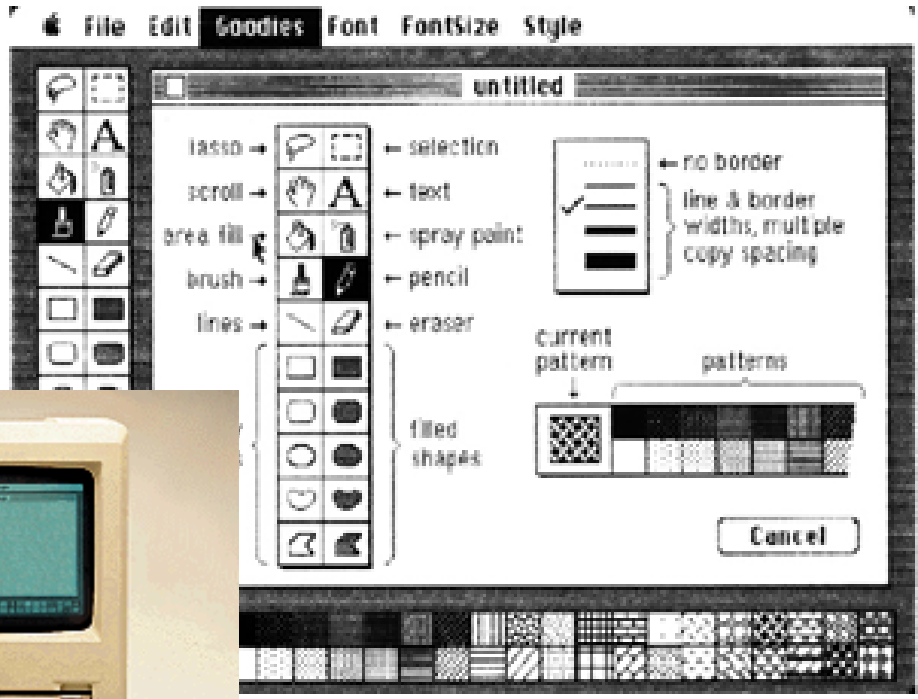
- **Apollo Computer**
  - **first workstation**
  - **DN100**
  - **offering more power than some minicomputers at a fraction of the price.**

1982: SUN Microsystems

- Sun Microsystems is founded in 1982. "SUN" - Stanford University Network.
- Motto: “Network is the computer”.
- Four employees.
- The SUN-2 features
  - a Motorola 68010 processor.
  - 4MB of memory
  - 400MB Fujitsu M2351 disk.

1984: Apple Macintosh

- **Apple Computer's Steve Jobs**
- **Apple Macintosh** at the Flint Center of DeAnza College in Cupertino, California.
- **The Macintosh:**
  - **8-MHz 32-bit Motorola 68000 CPU**
  - **built-in 9-inch B/W screen**
  - **512x342 graphics**
  - **400KB 3.5-inch floppy disk drive**
  - **Mouse**
  - **128KB RAM**
  - **weighs 20 pounds**
  - **Price: $2500.**



Windows

- Windows 3.0: 1987
- Windows 3.1
- Windows 95: 1995
- Windows 98
- Windows XP
- Windows Vista
- Windows 7 (?)