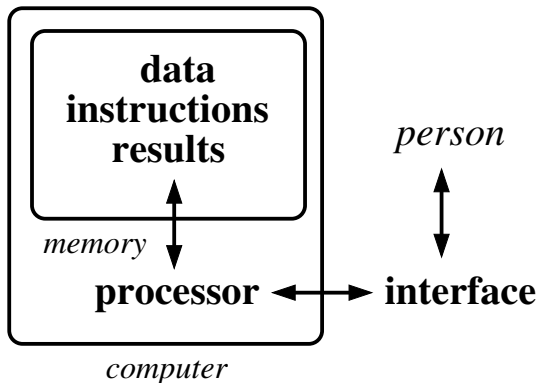Science 1000: Part #3 (Wareham):

Getting Here:
The Networked Society (1970–now)

THE DAWN OF PERSONAL COMPUTERS

THE COMPUTER USABILITY REVOLUTION

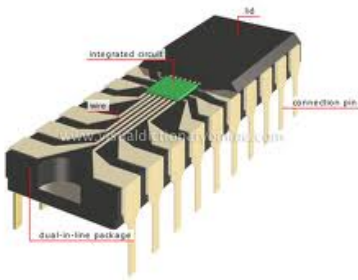COMPUTER NETWORKS

What *is* a Computer? (Take III)

- Proposed by John von Neumann (1903–1957) and collaborators in 1945 as the stored program computer.

Computing in 1970: The State of the Art

- Mainframe computers (government / business / scientific)
- Minicomputers (business / scientific)
- Consolidation of the computer industry (IBM and the Seven Dwarves (BUNCH))
- Computers operate in isolation from human users and other computers

The Personal Computer (PC)

Instead of being a little mainframe, the PC is, in fact, more like an incredibly big chip. – Robert X. Cringely

- The microprocessor was invented by Ted Hoff in 1971.
- Manufactured massively and marketed cheaply as per Intel policy; widely available to small PC startup companies.

The Personal Computer (Cont'd)
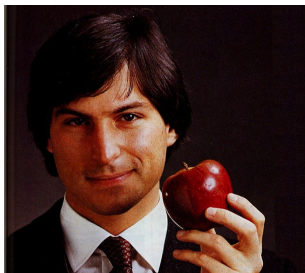

Altair 8800
(1975)

Apple II
1977

Apple II
(1977)

IBM PC
(1981)

The Personal Computer (Cont'd)

- Boom in PCs driven by availability of high-level languages (Microsoft), user-friendly PCs (Apple), and "killer" applications software (spreadsheets, word processing).
- Early debate over shared vs. purchased software.
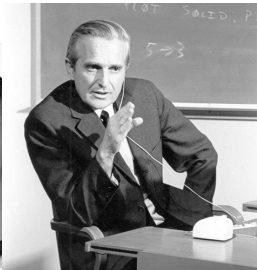

Bill Gates
(1955–)

Steve Jobs
(1955-2011)

Human-Computer Interfaces
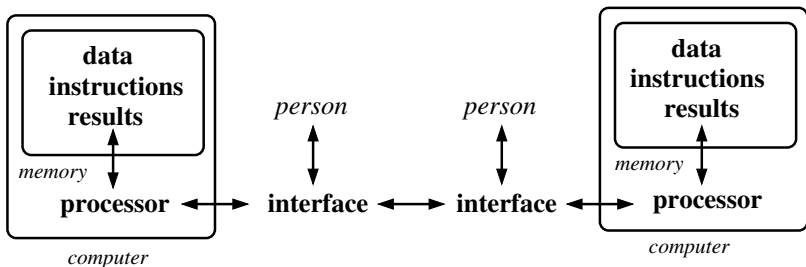

CRT with light pen (1955)

Mouse (1968)

GUI (1973)

- GUI = Graphical User Interface.
- Mouse and GUI invented by Douglas Engelbart (1925–2013) in the 1960s; ignored until 1970s.
- The GUI Wars: Xerox vs. Apple vs. Microsoft
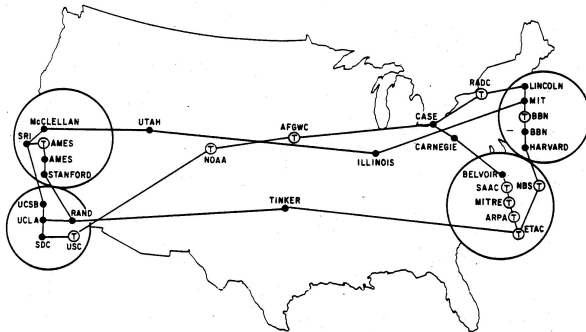
What *is* a Computer? (Take IV)

- Early experiments in networking computers done in 1960's; mostly mathematical analyses of networking schemes.

Computer Networks

- First computer network (ARPAnet) operational in 1969; paid for by Advanced Research Projects Agency in US Department of Defense.
- Network built to share data and computing resources – communication between human users not important.
- Based on adaptive multi-route packet switching vs. classic static multi-route dedicated communication line.
- Characteristics:
    - Distributed vs. centralized control
    - Any packet can go anywhere regardless of origin or destination of message
    - All costs distributed over all network nodes

Computer Networks (Cont'd)

- Thousands of nodes in ARPAnet by end of 1970's; many more on other networks created in 1980s.
- In late, 1980's, networks interconnected $\Rightarrow$ Internet!
- World-Wide Web created on top of Internet by Tim Berners-Lee (1955–) in 1992.

Computing in 2016: The State of the Art

- Cheap personal computing devices
- Cheap easy-to-use software applications
- Cheap(ish) highspeed wireless
- Massive online media (text / audio / video)
- Massive online personal data
- Massive processing power
- . . . All widely available 24/7 . . .
- . . . And there's more of it all every day . . .