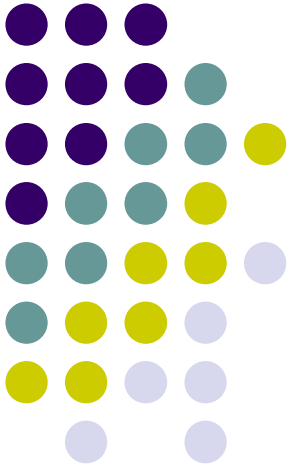
40 years of IT



1967

Digital Equipment Corp. introduces the PDP-10.

(June) First issue of Computerworld is published. It's eight pages.

1968

Gordon Moore and Robert Noyce found Integrated Electronics Corp., later known as Intel.

Bob Dennard of IBM invents dynamic RAM, which soon completely replaces magnetic core memory.

The U.S. Patent Office issues the first patent for computer software to Martin Goetz.

Mutinous computer HAL stars in the movie "2001: A Space Odyssey."

1969

ARPAnet, precursor to the Internet, goes live.

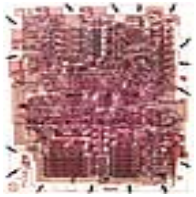
A U.S antitrust suit forces IBM to unbundle its applications, languages and systems software.

Edgar F. "Ted" Codd invents the relational database.

Ken Thompson leads development of Unix at Bell Labs.

1970 Digital ships its first 16-bit minicomputer, the PDP-11/20.

1971 (July) Ray Tomlinson of BBN sends the first message from one network to another.



Intel markets the 4004 CPU, the first microprocessor.

1972 First electronic pocket calculator is developed by Texas Instruments.

Dennis Ritchie of AT&T Bell Labs develops the language C. Its predecessor was called B.

1973 (May) Xerox PARC researcher Bob Metcalfe coins the term "ethernet" in a memo.

1974 (June) A Marsh's Supermarket in Troy, Ohio, is first to use bar-code scanning for groceries.

1975 (January) The Altair 8800, the first personal computer, makes the cover of Popular Electronics.

Microsoft Corp. is founded by Bill Gates and Paul Allen.

1976 Honeywell ships Multics Relational Data Store, the first commercial relational database.

Steve Jobs and Steve Wozniak form Apple Computer Inc.

1977 (April) Dennis C. Hayes begins selling the first modem designed for desktop computers.

(September) Radio Shack sells 10,000 TRS-80 microcomputers in their first month on the market.

1978 Digital ships its first VAX-11/780.

Dan Bricklin and Bob Frankston develop VisiCalc, the first electronic spreadsheet.

1979 Oracle introduces the first commercial SQL relational database management system.

1980 AT&T begins licensing Unix to computer vendors for resale on workstations and servers.

Comdisco gets into the disaster recovery business.

Bjarne Stroustrup at AT&T Bell Labs develops C with Classes, which will evolve into C++.

1981 (August) IBM announces its Personal Computer.

1982 Novell Inc. demonstrates the first PC LAN, which will eventually become NetWare.

First computer virus ?in the wild? infects Apple II computers.

Rod Canion, Jim Harris and Bill Murto found Compaq Computer Corp. to make IBM-compatible PCs.

(January) The U.S. government drops its 13-year-old antitrust case against IBM.

(February) Sun Microsystems Inc. is founded to build low-cost Unix workstations.

(December) Time magazine declares the computer as ?Machine of the Year.?

1983 Radio Shack offers a book-size computer, the Model 100 -- the first laptop.

1984 (February) The first printed mention of Y2K is published in Computerworld.

(May) Michael Dell starts Dell Computer Corp. with $1,000 in his college dorm room.

Hewlett-Packard Co. launches the first successful laser printer, the LaserJet.

1985 First ?business intelligence? computer system is designed for Procter & Gamble Co.

Aldus Corp. introduces PageMaker, launching the desktop publishing industry.

1986

DuWayne Peterson at Merrill Lynch & Co. Inc. becomes first million-dollar CIO.

U.S. Congress passes the Computer Fraud and Abuse Act to deal with computer trespasses.

Burroughs merges with Sperry to create Unisys Corp.

1987

(January) Alabama bans PCs from its legislative chamber because of the annoying ?tap, tap, tap.?

(April) IBM announces OS/2.

(June) College dropout Bill Gates, 31, becomes the youngest billionaire in the U.S.

(October) Computer-driven ?program trading? crashes the stock market. The Dow drops 500 points.

(November) Borland?s Quattro spreadsheet triggers a legal battle over software ?look and feel.?

1988

IBM debuts the AS/400 midrange computer (code-named Silverlake).

(October) Steve Jobs? Next Inc. unveils a $6,500 computer that will be sold only to students.

(November) Robert Morris releases his ?worm? program, which cripples the Internet for days.

(March) CERN physicists Tim Berners-Lee and Robert Cailliau propose the World Wide Web.

1990 Thomas H. Davenport, Michael Hammer and James Champy promote Business Process Re-engineering.

(September) IBM and Microsoft split on OS/2 and Windows development.

1991 (October) Linus Torvalds releases the first Linux kernel.

Philip Zimmermann releases free PGP (?Pretty Good Privacy?) public-key encryption system.

National Science Foundation lifts restrictions on commercial use of the Internet.

1992 (April) Microsoft releases Windows 3.1.

SAP AG releases SAP R/3.

1993 (March) After losing half its market value, IBM selects Nabisco's Louis Gerstner as its new CEO.

(August) Apple ships the Newton MessagePad, its first personal digital assistant.

(September) Peter de Jager publishes the first warning about Y2K in Computerworld.

1994

(March) Marc Andreessen and colleagues form Mosaic Communications -- soon changed to Netscape.

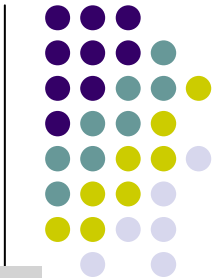
(July) Microsoft modifies its OS licensing terms to end a four-year antitrust investigation.

(November) A flaw is discovered in Intel?s Pentium CPUs that can cause incorrect calculations.

1995

Amazon.com, founded by Jeff Bezos, launches an online store for books and music.

(August) Midnight crowds line up at computer stores as Microsoft releases Windows 95.



1996	(January) After seven months of brewing, Sun ships Java.
	(June) EDS is spun off from parent General Motors Corp.
1997	The widely used DES encryption algorithm is cracked.
	IBM's Deep Blue computer beats chess world champion Garry Kasparov in a six-game tournament.
1998	(February) Compaq acquires Digital Equipment Corp. for $9.6 billion.
	U.S. Justice Department and 20 states sue Microsoft for violating antitrust laws.
1999	The Y2k date rollover problem requires expensive code fixes and raises public alarm.
	(November) U.S. Judge Thomas Penfield Jackson rules that Microsoft is a monopoly.

2000 (February) Hackers take down Yahoo!, CNN.com and E*Trade with massive denial-of-service attacks.

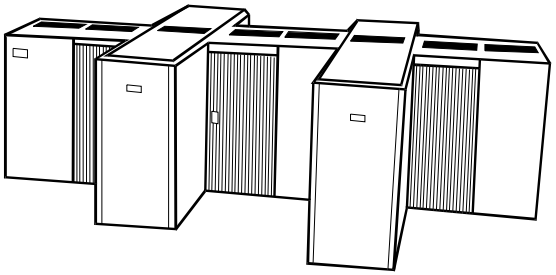
Dot-com companies are decimated as venture capital dries up and stock prices collapse.

2001 HP announces plan to buy Compaq for $25 billion.

2002 Worldcom, which operates a major portion of the Internet?s backbone, files for bankruptcy.

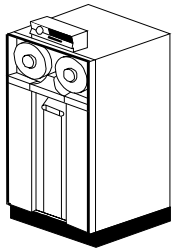
Evolution of Computing

1960 Mainframes

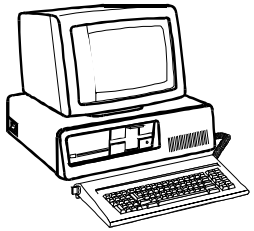


Minicomputers

1970

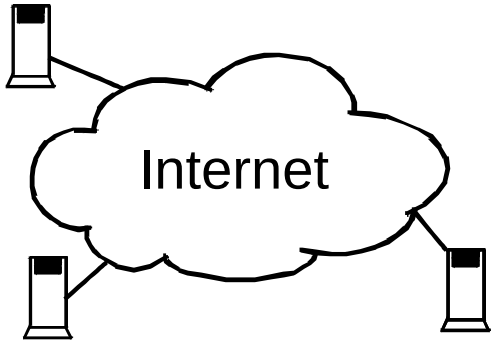


1980

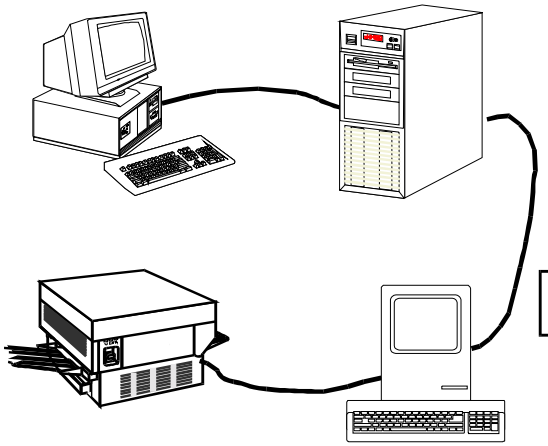


Personal Computers

Internet, Intranets, Extranets



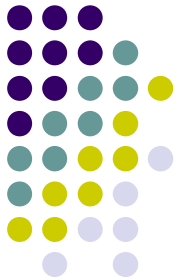
2000



1990

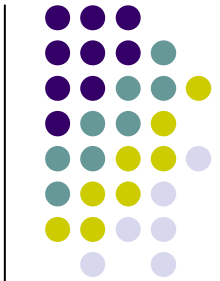
Networks

Evolution of Computing (con't)



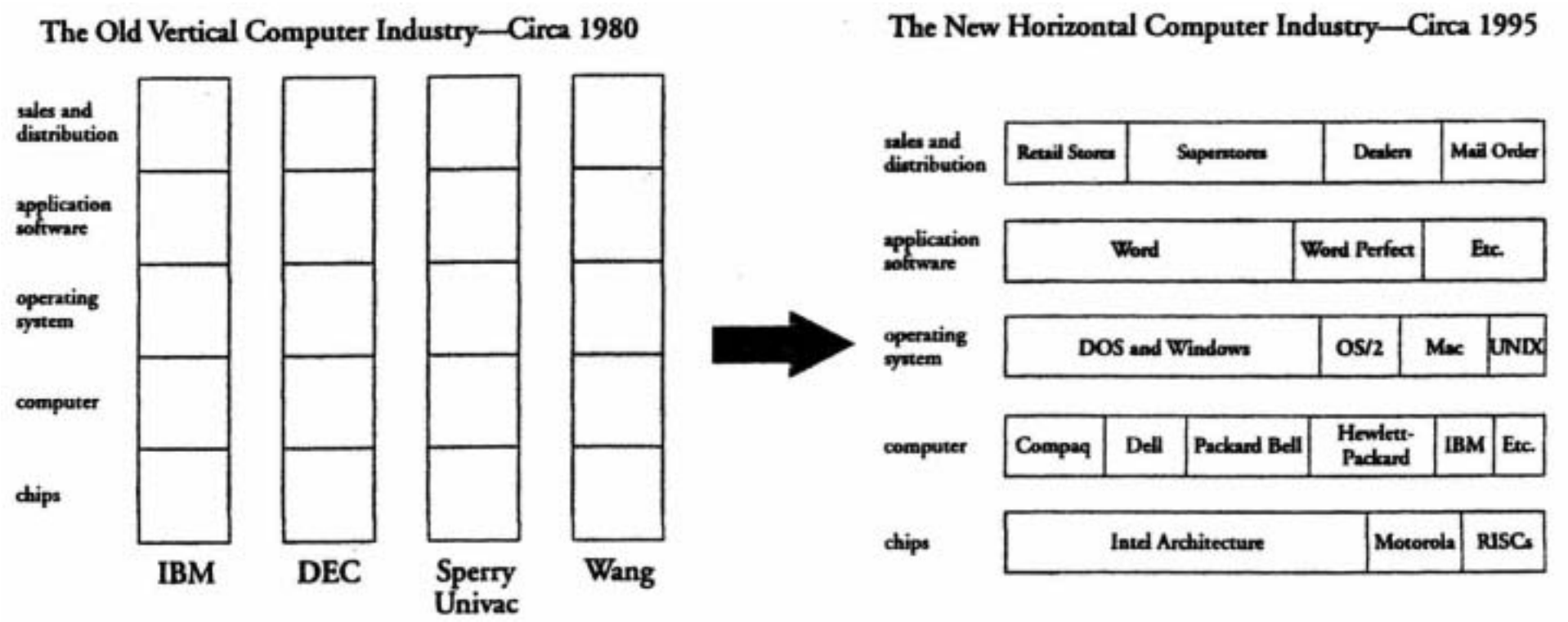
- Legacy systems
  - Large investment in business software keeps them around
  - They work and they are already paid for
  - The hardware they use may be expensive to maintain
- New systems
  - They can be justified by large savings in maintenance of programs and hardware by replacing some legacy systems
  - They are more user friendly than legacy systems
  - They can be the base for more powerful systems using newer computing methods - client/server, for example
- Strategy:
  - Keep the old and gradually replace with the new
  - Graceful, thoughtful evolution is most appropriate
    - Follow an upgrade pace that is just right for your business

Industry Paradigms

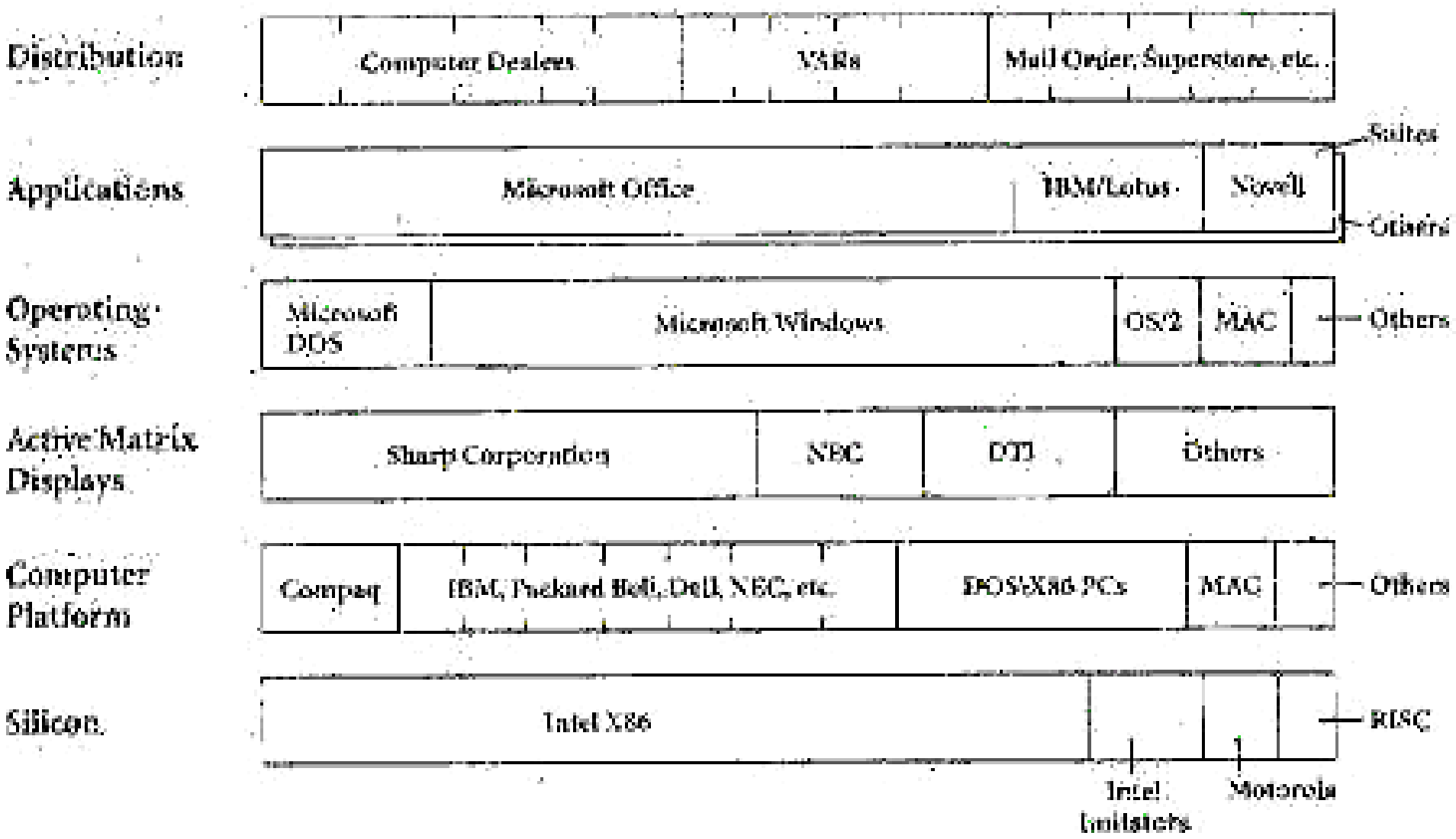


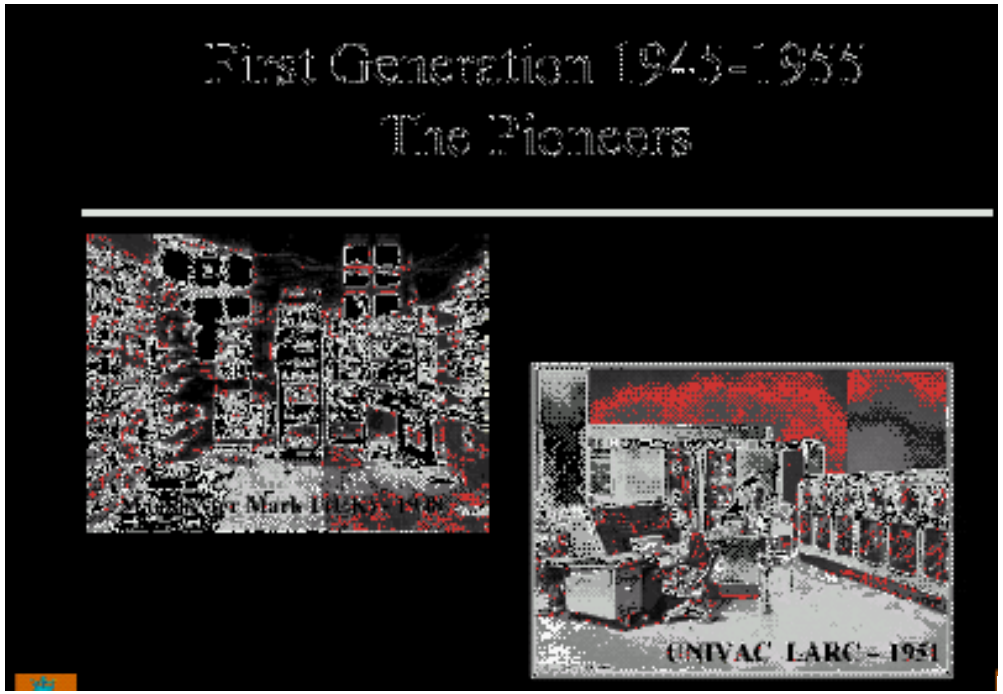
- What is the context and philosophy and consequences behind these paradigms:
  - “Information is Free”
  - “No one ever got fired by buying IBM”
  - Open Systems
  - The Open Software Movement
  - Internet time
  - Any others?

Historical Changes in The Computer Industry



The 1995 Computer Industry
Fragmented, Horizontal Competition





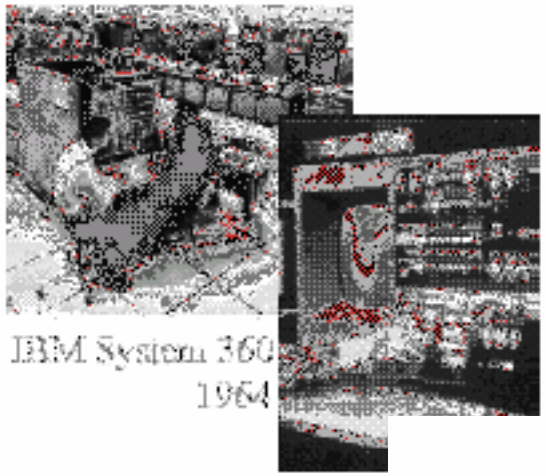
First Generation: 1945-1955
The Pioneers

- Hardware: valves (similar to light-bulbs)

- Operative mode: none
- Language: binary-code (e.g. "0011010111001…")
- Terminal: punch cards first, then TTY (teletype)
- Interaction: no real interaction (batch mode)
- Users: experts, pioneers
- Use: calculation in Computer Centres
- Market: USA government, GE go to comp.centers

Second Generation -- 1956 -1965

DEC PDP 11 -1960

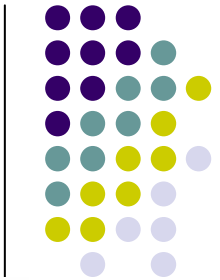


IBM System 360
1964

Second Generation: 1956-1965

- Hardware: transistors (the size of a fuse)
  - magnetic tapes for storage

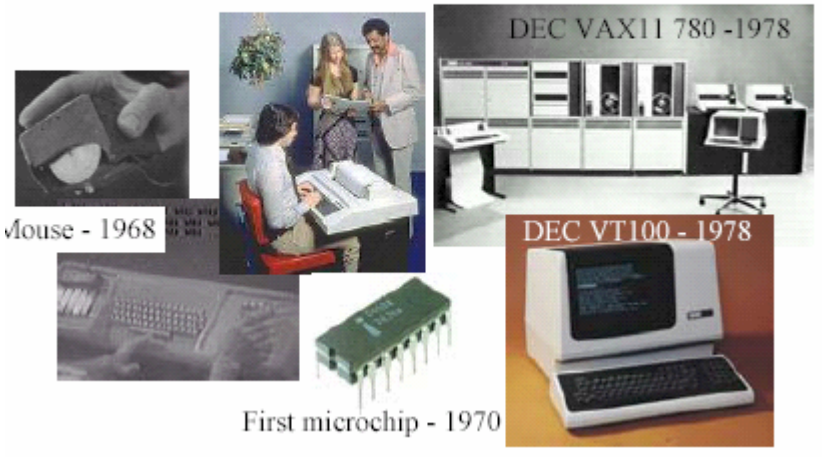
- Operative mode: no OS; stores data and programs
- Language: assembler (COBOL and Fortran later)
- Terminal: screen (glassTTY)
- Interaction: single line command language
- Users: technocrats
- Use: information processing
- Market: few big companies or institutions



Reflections

- Computers: "toys" machines used by technical "gurus"
- No effect on the general public
- No effect on the society
- No real market

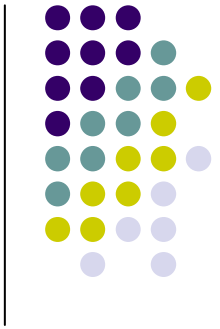
3rd Generation: the real change
1965 - 1980



Third Generation:
1965-1970 1st µchip – 1981 1st PC

- Hardware: integrated circuit microprocessor

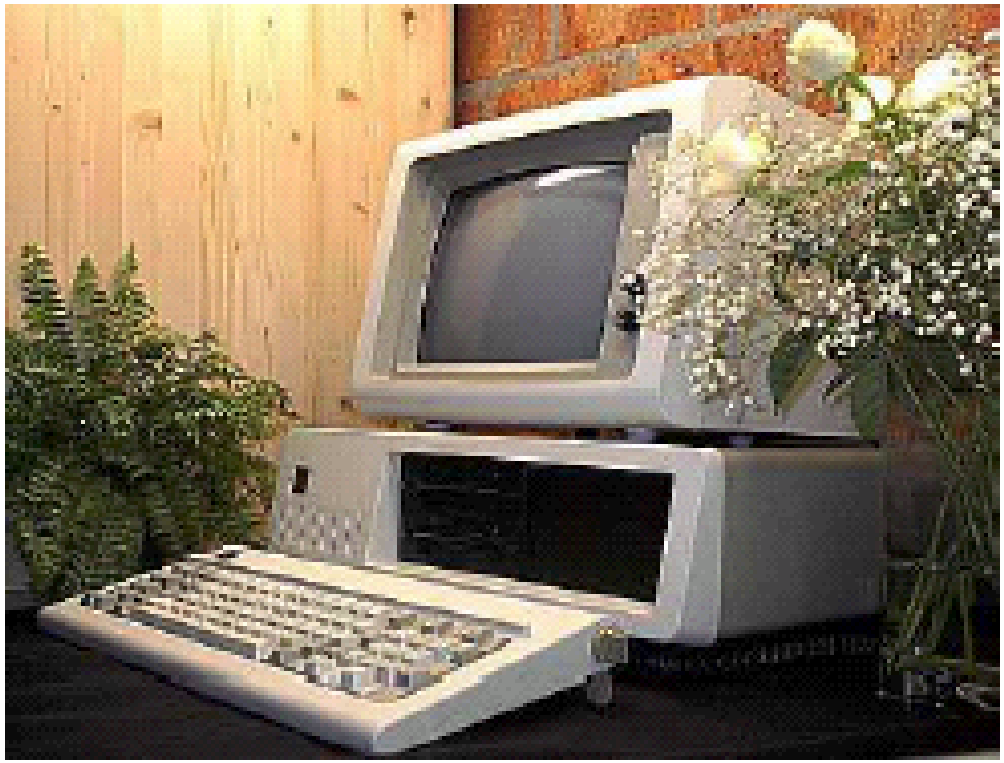
- Operating mode: OS, time sharing to serve many users at a time
- Language: low level (Fortran, Pascal, C)
- Terminal: alphanumeric screen
- Interaction: full-screen hierarchical menus, forms
- Users: specialized – no computer knowledge
- Use: mechanization of white-collar labour
- Market: any company – bank - institution



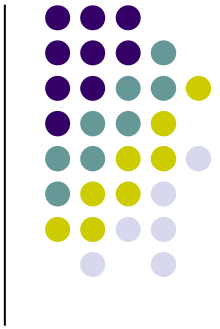
Reflection

- Computers widely used in offices
- Use imposed by management
- Programmers decide, users adopt (conflict?)
- Workers negative on computers penalised
- Business market enlarging

The 1st PC (1981) - IBM 5150



Fourth Generation: 1980-1995



- Hardware: optical disk as data storage CD-ROM
- Operating mode: OS, time sharing to serve many programs at a time
- Language: high level languages
- Terminal: color screen, mouse, joystick
- Interaction: WIMP, sound
- Users: everybody
- Use: personal productivity, communication
- Market: a computer for each user

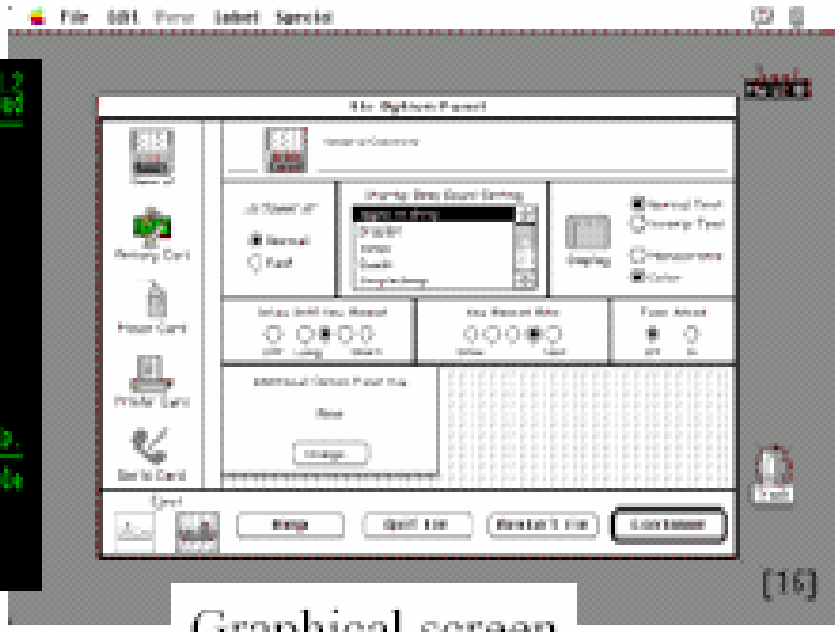
Apple Lisa
1983

Apple Macintosh
1984

[13]

Comparing user interfaces

Alphanumeric screen
3rd generation



Graphical screen
4th generation

Other technology

- The mouse – demo: http://sloan.stanford.edu/MouseSite/1968Demo.html
- Videogames, joysticks and other bizarreness

- CD (Sony, Philips, Polygram) 1979-1982
- Sound (1982 in game hardware)

Reflection

- Computers as personal machines
- Used in offices as well as at home
- Use self directed
- Programmers design, users decide (conflict?)
- Market spreading from office to personal life

Fifth Generation: 1995-future

- Hardware: PDAs and accessories (i.e. Palm pilot), portable digital multimedia (i.e. digital camera, camcorder), wireless connection, plug-and-play devices
- Operating under: distributed OS and programs
- Language: Object Oriented - very high level
- Terminal: heterogeneous
- Interaction: GUI, pen based, voice, gesture
- Users: any kind, from children to aged
- User: all possible
- Market: many computers each person

You can buy any of this today

Computer technology today

- Education & Training: interactive CD, Virtual Reality
- Leisure & Entertainments: digital/interactive TV, video on demands, DVD, videogames
- Information & Advertising: books, WWW, CDs
- Communication: videoconferencing, email, CSCW
- Science: 3D graphics, Virtual Reality
- Support to disabled people: videophone, head pointing, synthesised reading